Atellica® Data Manager

LIS Interface Guide

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SIEMENS Healthineers

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Legal Information

Legal Manufacturer
Siemens Healthcare Diagnostics Inc.
511 Benedict Avenue
Tarrytown, NY 10591 USA
siemens-healthineers.com

Siemens Healthineers Headquarters
Siemens Healthcare GmbH
Henkestraße 127
91052 Erlangen
Germany
Phone: +49 9131 84-0
siemens-healthineers.com

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THE CUSTOMER DOCUMENTATION INCLUDES INFORMATION ON THE SAFETY HAZARDS ASSOCIATED WITH USE OF THE SYSTEM AND PRECAUTIONS TO BE TAKEN TO AVOID SUCH HAZARDS. FAILURE TO OBSERVE WARNINGS OR USE OF THE SYSTEM IN A MANNER DIFFERENT FROM THAT SPECIFIED BY SIEMENS HEALTHINEERS MAY RESULT IN INJURY TO THE OPERATOR OR OTHER PERSONS. SEE WARNING AND HAZARD STATEMENTS.

1 Introduction

LIS Connections Support

This document outlines the communication between one or more laboratory information systems (LIS), or host computer and the Atellica® Data Manager (Atellica DM) system.

The Atellica DM system receives downloaded workorders from, and uploads results to, the LIS. Communication is enabled per the following protocols:

- ASTM 1394
- Technidata LMX
- Siemens Host Spec .79
- HL7 Version 2.5

If the LIS vendor has a choice of protocols, then the ASTM 1394 communication protocol using TCP/IP is the recommended protocol for use with Atellica DM.

Siemens Healthineers and 3rd party systems perform diagnostic tests using the communication protocols outlined in this document that are intended for *in vitro* diagnostic use. As with all diagnostic tests, a definitive clinical diagnosis should not be based on the results of a single test, but should only be made by the physician/clinician **after** evaluating all clinical and laboratory findings. Atellica DM only transmits results according to the protocols in this document and does not alter test results in any way.

Document Conventions

Convention	Description
 **BIOHAZARD**	Biohazard statements alert you to potentially biohazardous conditions.
 **LASER WARNING**	Laser Warning statements alert you to the risk of exposure to lasers.
 **WARNING**	Warning statements alert you to conditions that may cause personal injury.

Convention	Description
 **CAUTION**	Caution statements alert you to conditions that may cause product damage or loss of data. On the system, this symbol indicates that you should refer to the operator's guide for more information.
NOTE:	Note statements alert you to important information that requires your attention.
Bold	Bold type indicates commands on the operator interface, keys, or the exact text that an operator needs to type. For example, if the word save appears as **Save**, it refers to selecting the Save button on the operator interface. Another example is typing a specific entry into a text box. If the word welcome appears as **welcome**, it means that you should type that word into the specified field.
Italic	Italic type refers to the title of a document or a section title in this operator's guide. For example, *Chapter 2, LIS Requirements* refers to Section 2 of this operator's guide.

Terminology

Term	Description
Select	To select an item, use your finger to touch the item on the touch-screen monitor or select the item with the system pointing device. The background of the item changes color or displays a black frame to indicate that you selected the item.

Term	Description
Enter	Type the specified information using the keyboard and then press the Enter key.
Scan	Move the hand-held barcode scanner over the specified barcode to enter the information.

Accessing Product Information in the Document Library

1. In a browser, such as Internet Explorer, enter https://doclib.siemens-healthineers.com/home.
2. Login following the on-screen instructions.
3. Search for assay or system information.

2 LIS Requirements

The following are requirements when connecting an LIS to the Atellica Data Manager:

- The LIS must be capable of batch transmission of workorders to the Atellica DM system. The Atellica DM system does not support query mode with the LIS.
- The LIS must support unique Sample ID numbers.
- The Atellica DM software is designed to operate with unique Patient IDs across all connected LIS. As the LIS is considered the master system from which the most current data originates, the Atellica DM software always accepts updates to patient records from the originating LIS.

As such, every patient demographic update that is downloaded from the LIS to the Atellica DM software must be identified by a unique patient ID that references the same physical patient.

CAUTION

If you reuse a patient ID to reference another physical patient, patient demographic updates downloaded from the LIS overwrite the original patient details associated with this patient ID. An erroneous mix of details that pertain to another physical patient would coexist in the same record of the Atellica Data Manager database with unrelated details that pertain to the original physical patient. Do not re-use patient IDs.

- The LIS should specify the Sample Type in the workorder. The Atellica DM system is designed to operate in an environment in which the Sample Type is specified in the workorder that is downloaded from the LIS. If the Sample Type is not included in the workorder, the Atellica DM system applies the Sample Type for the first test in the workorder to the entire workorder.
- The LIS must be capable of assigning different Sample ID numbers to samples of different sample type for the same patient and then sending the Sample ID numbers to the Atellica DM system as different workorders. For example, a Serum tube and a Urine tube from the same patient must not be assigned the same Sample ID number.
- If samples are divided into multiple sample tubes for an aliquot, each sample tube must have a unique Sample ID.
- You cannot download test panels from the LIS to the Atellica DM system.

- The LIS must be capable of separating different Sample Types into different workorders. The Atellica DM system requires that Sample Types are not mixed in a given workorder. If a workorder contains tests for a mixture of Sample Types, the Atellica DM software rejects the tests that do not match the specified or inferred Sample Type and processes only those requests that match. This rejection is done without notification to the operator, and is only available via Atellica DM log files.
- The units of measure for a given test must be defined identically at the LIS, in the Atellica DM software, and at the analyzers. You must predefine the units for tests in the Atellica DM software to match the units for tests on the analyzer. If units of measure of results are manually changed on an analyzer, you must change the units of measure for the test in the Atellica DM software at that time. In addition, you must purge all existing results for the test from the Atellica DM software. Units of measure are not uploaded to the LIS from the Atellica DM software.
- Some analyzers have multiple result aspects for 1 result. You can configure the Atellica DM software to upload 1 aspect or all aspects related to that result.

Identifying Special Characters

Ensure that special characters within an LIS message are identified and displayed correctly when sent to the Atellica DM system.

This is important for correct functioning of the application; for example when unit checking is enabled for LIS Previous Results.

Example: unit of x10^3/uL.

Identify the "^" character with an escape sequence **(&S&**) to ensure the unit is parsed correctly by the Atellica DM system. In this case, **&S&** is received and the Atellica DM software knows that this means ^ literally, rather than as the special ASTM character.

Aptio® Automation systems do not process the ~ (tilde) correctly. When connecting an Aptio Automation system, do not use the ~ character.

Upload and Download Connections

Different communication connections can be configured between the LIS and the Atellica DM system.

You have the option of configuring 1 or more communication connections with a single LIS.

1-connection configurations allow uploading and downloading data using a single connection.

2-connection configurations enable downloading test orders from the LIS through 1 connection, and uploading results from the Atellica DM software through the other connection.

Multiple-connection configurations enable downloading test orders from the LIS through multiple connections, and uploading results from the Atellica DM software through 1 connection.

While the 2 or more communication channel configuration is not required, the 2 communication connections improve communication efficiency for LIS that are capable of supporting dual connections.

Sample collection times can be configured to update for individual LIS channels when updated collection times are received from the LIS. This option can be accessed by selecting the command bar > **Configuration > LIS channels** > select a LIS channel > **Edit > Allow collection time update**.

3 Image Upload to LIS

The image result is referenced by the image test in a sample. You can upload images from the Atellica Data Manager to the LIS. The following are restrictions on upload:

- You must upload cytogram images using file transfer protocol (FTP). You cannot upload images to a folder on the Atellica Data Manager Server.
- Define output for images on the **LIS Channel** window.
- The Atellica DM system uploads images using anonymous FTP. The same error message displays in any case of mis-configuration.
- The LIS Vendor must match the images to the sample IDs (SID) using the value in the result field of the record that has the image test code.

In the example below, the Hemimage test is uploaded with the test code: 250. The LIS Vendor must match the file *941.bmp* in the FTP input directory to SID 65984. Relevant parts of the code are highlighted in bold.

H|^~\&|||LMXS^ATELLICA DATA MANAGER||ORU|||38

- 1^LIS||P|A2.2|20090708100427|

P|1|||||||U||||||||||||||||

OBR|1|65984||WBC^^L|R|||||||||||||||||||

OBX|1|NM|007||7.25|||*||||19970321113533|||||

OBR|2|65984||RBC^^L|R|||||||||||||||||||

OBX|1|NM|014||4.77|||*||||19970321113533|||||

OBR|3|65984||HGB^^L|R|||||||||||||||||||

OBX|1|NM|035||14.3|||*||||19970321113533|||||

OBR|41|65984||NRBC^^L|R|||||||||||||||||||

OBX|1|CE|044||+|||||||19970321113533|||||

OBR|42|65984||HemImage^^L|R|||||||||||||||||||

OBX|1|ST|250||941|||||||19970321113533|||||

L|||1|87|

NOTE: This example uses LMX communication, and is similar to logic for other protocols.

To enable image upload to the LIS, access command bar > **Configuration**> **LIS channels** > select a LIS channel > **Patients** and mark the checkbox **Upload images**.

LIS Channel Configuration for Image Upload

To configure LIS Channel image upload settings, access the command bar > **Configuration** > **LIS channels** > select a LIS channel > **Edit** >**FTP settings** .

The **Image prefix**: entry field is used to specify the prefix of outbound image file names. Image file names have the format <ImagePrefix><SeqNo>.<FileFormat>. <SeqNo> is an arbitrary 4-digit or 10-digit number that matches the result value of the image test uploaded with the sample results. <FileFormat> is the format of the image: e.g. bmp.

Image prefix: is optional. **Image prefix:** is not added to the result value of the image test uploaded to LIS but is added to the filename of the image file uploaded by FTP.

To store images under specific folder on the FTP server, **Image folder**: can be defined.

The suffix (<SeqNo above>) of the image file name can be 4 or 10 digits long. Under **Image upload suffix**:, select **Default** for 4 digits or **Extended** for 10 digits.

NOTE: Spec 79 protocol is limited to 5 characters in the file name.

For Spec79 protocol, **Image upload suffix**: must be set to **Default**.

It is the responsibility of the LIS to make sure that the image is stored permanently with an unambiguous name.

4 ASTM 1394 Protocol

ASTM 1394 Protocol and Atellica Data Manager

This section describes the ASTM 1394 protocol used for the communication link between the Atellica Data Manager and a laboratory information system (LIS) or host computer.

NOTE: The ASTM 1394 communication protocol is the recommended protocol for use with the Atellica DM system.

This section is intended for the information systems professional responsible for connecting the Atellica DM system and your host computer. Contact your local technical support provider or distributor for additional information.

For a more detailed description of the ASTM 1394 protocol, refer to Standard Specification for Transferring Clinical Observations between Independent Computer Systems (ASTM Designation: E 1394-97).

NOTE: The LIS must initiate the TCP socket communication in order for the Atellica DM system to upload results.

Overview

The ASTM 1394 communication protocol, using dual TCP-IP connections, is the recommended protocol for use with the Atellica DM system.

The ASTM communication protocol supported by the Atellica Data Manager software is based on ASTM standards E1394-97 (Standard Specification for Transferring Information Between Clinical Instruments and Computer Systems) and E1381-95 (Standard Specification for Low-Level Protocol to Transfer Messages Between Clinical Laboratory Instruments and Computer Systems).

The ASTM communication link allows the LIS to transmit workorders and multiple previous patient results for the same test to the Atellica DM software and to accept QC and patient test results transmitted from the Atellica DM software.

Atellica Data Manager to LIS	LIS to Atellica Data Manager
QC	Workorders
Results	Previous sample results
Lab Automation location	

The LIS initiates the TCP-IP socket connection for sending patient workorder information to the Atellica DM system before each sample run. The information will be parsed and stored in the system for download to the analyzer.

The Atellica DM system can be configured to automatically transfer available results to the host or manually transfer results to permit the operator time to review the data and release the sample results.

The LIS must support an implementation of ASTM 1394 and individual fields must be customized to support the Atellica DM implementation.

Frame Size

The system sends messages in frames. Each frame contains a maximum of 247 characters (including frame overhead) for driver v4.4 or between 247 —64000 characters for driver v4.5. Messages longer than the maximum frame size are divided between 2 or more frames.

For driver v4.4, multiple records never combine in a single frame. Every record must begin in a new frame. For driver v4.5, an option exists to combine multiple records in a single frame, up to the maximum frame size. A frame is one of 2 types, an intermediate frame or an end frame.

- Intermediate frames terminate with the characters <ETB>, checksum, <CR> and <LF>.
- End frames terminate with the characters <ETX>, checksum, <CR> and <LF>.

A record containing maximum frame size characters or fewer is sent in a single end frame. Longer records are sent in intermediate frames with the last part of the record sent in an end frame.

<STX> FN text <ETB> C1 C2 <CR> <LF> - intermediate frame

<STX> FN text <ETX> C1 C2 <CR> <LF> - end frame

where:

<STX> = Start of Text transmission control character

FN = single digit Frame Number 0 to 7

text = Data Content of Message

<ETB> = End of Transmission Block transmission control character

<ETX> = End of Text transmission control character

C1 = most significant character of checksum 0 to 9 and A to F

C2 = least significant character of checksum 0 to 9 and A to F

<CR> = Carriage Return ASCII character

<LF> = Line Feed ASCII character

Downloading Workorders

The host computer downloads workorders identified by a sample identification number (SID#). Limit the number of workorders per Workorder message to approximately 1000 with an average of 10 requests per workorder. Messages with more than 1000 orders may be subject to a timeout.

Workorders can be downloaded in any sequence. When the Atellica DM software receives a request from the analyzer, the Atellica DM system searches the database for the matching workorder.

About Atellica Data Manager workorders:

- The LIS should specify the sample type in the workorder. The Atellica DM system is designed to operate in an environment in which the sample type is specified in the workorder that is downloaded from the LIS.
- If communication is interrupted during workorder download, the Atellica DM software correctly processes all records that were correctly received before the communication interruption. Messages sent after the communication interruption are not processed.
- The Atellica DM software does not support replicate testing. Only 1 replicate of a test can be ordered for each sample. If the LIS orders a test multiple times in 1 message, the test will still only run 1 time on the analyzer.

Rejection of Requests in LIS Orders

If an order contains requests that do not match the order sample type or, in its absence, the first request sample type, these requests are not added to the order in the Atellica DM system. You are not informed of this through error messages other than those contained in the LIS internal service log. When generating orders at the LIS, ensure that requests that have different sample type definitions in the Atellica DM database are not included in the same order.

Responding to a Message (ACK or NAK)

To confirm the identity and transmission quality of each message, the receiving device (Atellica DM system or LIS) must respond to each message with an acknowledgement (ACK) or not acknowledged (NAK) message.

- If the transmitted record checksum is correct, the receiving device sends an ACK response of one byte. Upon receiving the ACK response, the sender continues the dialogue.
- If a NAK is received, the sender retransmits the record. This process may be repeated for a maximum of seven times.

- During the establishment phase, the sender must set timer when transmitting the <ENQ>. If a reply of an <ACK>, <NAK>, or <ENQ> is not received within 15 seconds, a timeout occurs. After a timeout, the sender enters the termination phase according to the ASTM 1381 protocol. If the Atellica DM software is the sender, however, an ENQ is transmitted instead of EOT and the 15 second timer starts again. This is repeated until a response is received from the LIS or until 7 ENQs are transmitted, at which point an EOT is transmitted to signal the line is in the neutral state.
- During the establishment phase, if the LIS detects contention, it sets a timer. If an <ENQ> is not received within 20 seconds, a timeout occurs. After a timeout, the receiver regards the line to be in the neutral state.
- During the transfer phase, the sender sets a timer when transmitting the last character of a frame. If a reply is not received within 15 seconds, a timeout occurs. After a timeout, the sender aborts the message transfer by proceeding to the termination phase. As with excessive retransmissions of defective frames, the message must be stored/remembered so that the transmission can be repeated completely.
- The Atellica DM software responds with an acknowledgment (ACK) if the message frame is received without error. The ACK indicates that the message frame calculated checksum match the checksum sent with the frame. The ACK does not indicate that the message frame is part of a syntactically correct message.

Functional Description of Bidirectional Communication

Workorder Download Message Exchange

The table in section (Page 21 *Data Link Release from Host Computer*) outlines the dialogue that occurs between the host computer and the Atellica DM software during a workorder download. The following paragraphs describe the message exchanges illustrated in this table.

Initiation Phase

At the start of communication, the data link is idle, and both the host and the Atellica DM system are in the listening mode. For downloading the workorder, the host computer initiates a communication link by taking control as the “sender” device and sending an initiation message (ENQ) to the Atellica DM software. In this way, the Atellica DM system is informed that the host computer is ready for communication and responds with an acknowledgement (ACK) indicating that it is ready to receive communication from the host computer.

The first record transmitted is the “H” or header record which establishes the rules for delimiting the fields of the subsequent records. After receiving the “H” record, the Atellica DM system responds with an acknowledgement (ACK) indicating that the record was received without error.

Workorder Transmission

After the Initiation Phase, the host computer remains the "sender" device and can start transmitting workorders one at a time in a sequence that is determined by the host computer. Each workorder is transmitted as 1 record. The first record is the Patient (P) record. The Atellica DM system responds with an acknowledgement (ACK) if the record is received without error. The Test Order (O) record is transmitted next by the host computer. The Atellica DM software responds with an acknowledgment (ACK) if the record is received without error. The host computer must wait for each record to be acknowledged by the Atellica DM system before continuing with the next record. Multiple workorders may be transmitted while the host computer is acting as "sender" of the channel by simply continuing with patient and order record pairs until the host computer has completed downloading workorders.

A workorder must be downloaded to the system before the associated sample is aspirated by the analyzer. If not, the analyzer attempts a query, which if unanswered, results in different actions depending on the analyzer. For certain analyzers, a query where no work exists causes a "no work" response to return to the analyzer. For other analyzers, a query where no work exists causes the analyzer to skip the sample. The ADVIA® 120/2120 Hematology System, for example, is designed to use a default profile instead of the profile requested in the workorder.

Data Link Release from Host Computer

After the host computer has finished downloading workorders, the host transmits a Terminator (L) record indicating that the host has completed transfer of all message blocks to be transmitted in this session. The Atellica DM system acknowledges (ACK) the record. The host then sends an end of transmission (EOT) character to the Atellica DM system and both the Atellica DM system and the host return to the idle state.

An EOT character should always be sent from the LIS after the transmission of a terminator record.

If the terminator record from one ASTM message is released without an EOT and is followed by another ASTM message, which consists of a Header, Patient(s), Order(s) and Terminator record, the Atellica DM translator may lose the orders while responding to the LIS messages with ACKs. The LIS considers the orders transmitted.

Workorder Download Message Exchange Results Transmission Mode

Operation	Atellica Data Manager System	Messages Exchanged	Host Computer
Initiation Phase	Receiver	Initiation Message (ENQ) Acknowledgment (ACK) → Header Message (H) ← Acknowledgment (ACK) →	Sender
Downloading Workorders	Receiver	Patient Record ← Acknowledgment (ACK) → Order Record ← Acknowledgment (ACK) →	Sender
Release Phase	Sender	Terminator Record (L) ← Acknowledgment (ACK) → End of Transmission (EOT) ←	Sender

The table *Result Upload Message Exchange* (See (Page 24 *Data Link Release from the Atellica Data Manager*)) outlines the dialogue that occurs between the Atellica DM software and a host computer during a result upload. The following paragraphs describe the message exchanges outlined in this table.

Sorting of Transmitted Sample Results

When the system automatically transmits sample results to the LIS using the task scheduler, it automatically sorts the results by priority and sends STAT samples first. Test results that you manually transmit to the LIS are not sorted by priority unless you configure the system to do so using the following procedure:

NOTE: These are instructions for Siemens Healthineers representatives only.

1. On the command **Query Parameter Set**, in the **Sample Query** editor window, enter the sample criteria for the samples for upload and then select the **Advanced** tab.
2. In the **Sort** criterion field, select the sorting method.

   Selecting the **Priority and Creation Time** option enables the display of STAT samples first.
3. Select **OK** to run the query.

The samples are uploaded in the order in which they were selected. If all the samples were selected at once, the STAT samples at the top of the list are uploaded first.

Initiation Phase

NOTE: This section is based on a scenario wherein the LIS has already initiated TCP-IP socket connection.

At the start of communications, the data link is idle and both the host computer and the Atellica DM system are in the listening mode. For uploading the results, the Atellica DM software initiates taking control as the “sender” device by sending a (ENQ) message to the host. In this way, the host is informed that the Atellica DM system is ready for communication. The host computer responds with an (ACK) acknowledgement indicating that the host computer is ready to receive communication from the Atellica DM system.

NOTE: If the Atellica DM software transmits an (ENQ) but does not receive an (ACK) from the host computer after the initial 15 second timeout, the Atellica DM software continues to send an (ENQ) every 15 seconds for an additional 6 times in an attempt to establish communication with the host. If an additional (ENQ) is not handled and acknowledged by the host after the initial 15 second timeout, communication with the host could become out of sync. Only after the sixth attempt to contact the host does the Atellica DM software transmit an (EOT).

NOTE: The Atellica DM software does not ignore EOT messages sent from the LIS in response to an ENQ. An EOT is sent in response and the line is released. This is not in accordance with section 6.2.4 of the ASTM 1381 protocol.

The first record transmitted is the header (H) record, which establishes the rules for field delimiting the subsequent records. After receiving the header record, the host computer responds with an acknowledgement (ACK) indicating that the record was received without error.

Transmission Results

After establishing the Atellica DM system as the sender, the results are uploaded to the host computer as a series of records. The first record is a patient (P) record to identify the sample and demographic information used by the Atellica DM system for normal range criteria. The second record is a repeat of the order (O) record followed by one result (R) record for each test reported. The record contains the test name, measured value, data status, and date and time of the analysis.

Each record transmitted to the host computer must contain a checksum and be acknowledged (ACK) by the host computer before the next record may be transmitted.

Single sample results are uploaded while the Atellica DM software is the sender. The data link is released between sample reports.

NOTE: Result uploads are only made if a previous data link layer initiation has been made by the LIS. This is how the Atellica DM system determines the host IP address.

Data Link Release from the Atellica Data Manager

After the Atellica DM system has finished uploading results, the Atellica DM system transmits a terminator (L) record that releases the communication data link. The host computer acknowledges (ACK) the last record. The Atellica DM system then transmits an end of transmission (EOT) character and both it and the host computer return to the idle state.

Result Upload Message Exchange

Operation	Atellica Data Manager System	Messages Exchanged	Host Computer
a. Initiation Phase	Sender	Initiation Message(ENQ) → Acknowledgment (ACK) ← Header Message (H) → Acknowledgment (ACK) ←	Receiver

Operation	Atellica Data Manager System	Messages Exchanged	Host Computer
b. Transmission Results	Sender	Patient Record → Acknowledgment (ACK) ← Order Record → Acknowledgment (ACK) ← Result Message (R1) → Acknowledgment (ACK) ← Result Message (R2) → Acknowledgment (ACK) ←	Receiver
c. Release Phase	Sender	Terminator Record (L) → Acknowledgment (ACK) ← End of Transmission (EOT) →	Receiver

Contention

For single channel communication, contention may occur during the initiation phase if the Atellica DM software and the host both try to take control by simultaneously sending an ENQ. When contention occurs, the Atellica DM software has priority to transmit information.

Contention is resolved as follows:

- Upon receiving a reply of <ENQ> to its transmitted <ENQ>, the host system must stop trying to transmit; the host must prepare to receive.

  When the next <ENQ> is received, it replies with an <ACK> or <NAK> depending on its readiness to receive.

- Upon receiving a reply of <ENQ> to its transmitted <ENQ>, the Atellica DM software waits at least 1 second before sending another <ENQ>.

Specimen Receipt Information with the ASTM Protocol

Specimen receipt (inlabbing) information such as SID, read date and time, and check-in location are transmitted from the Atellica DM system to the LIS within the Manufacturer record of the LAS Status Upload message.

For information on the grammar of the inlabbing information contained within a result file and an example of the inlabbing transmission to the LIS, refer to (Page 99 *Specimen Receipt Information and Archive Location Transmission*).

NOTE: Inlabbing information will not be forwarded to the LIS for samples that contain no workorders, unless this option is configured specifically by the local technical support provider.

Translator Specific Options

In the Atellica Data Manager, the driver for the ASTM 1394 LIS translator is the asts driver. The translator specific options are as follows:

-s <port >	<port> set to the TCP/IP port where the LIS translator listens for socket connections. This port must match with the port defined on the LIS. The usual setting is **-s 8888**. This parameter is mandatory.
-r	The -r option is used to remove the dilution and/or result aspect information from the record field and only send the test identifier in the result record field.

-c	Remove the result aspect info for qc results only.
-e	The -e option is used in conjunction with the -i option and specifies that the <name string> is substituted only for blank analyzer identifiers.
-i <name string>	The -i <name string> option specifies that the <name string> is substituted for the analyzer name in the result record. The name string can be blank.
-p	The -p option enables the regrouping of result messages for each analyzer. A separate, complete message is uploaded for each analyzer.
-t	<timeout>Inter character timeout between 10 and 300 sec. Default = 30.
-v	The -v option allows you to verify the frame sequence number.
-l	Driver v4.50 only: supports multiple records per frame for result upload. If disabled each record begins in a new frame by default. Driver v4.4.2: the -l option is present but has no affect on either result upload or order download. asts driver v4.5.0: enabling this option causes the result upload messages to contain more than one record per frame. Confirm that the LIS is able to handle this format before enabling this option. **NOTE:** On driver v4.4.2 and v4.5.0, multiple records per frame are supported for order download.

-a	The -a option is available with driver v4.5 only. When uploading results to the LIS, the system appends the result aspect in the R.3.1.8 field to the test name in R.3.1.4, separated by '_'. The system removes the aspect value in R.3.1.8.
-m	The -m option is available with driver v4.5 only. This option specifies the maximum framesize, which must be between 247–64000. The maximum frame size option is used when sending result messages to the LIS. Order messages from the LIS can contain any frame size up to 64k. The default value is 247.
-w	The -w option is available with driver v4.5 only. This option enables unconditionally accepting an incoming client connection. The system disconnects the previous connection and accepts the new connection.

ASTM 1394 Action Codes

Incoming orders are processed based on the Action Code in field 12 of the order record. This table describes how the action codes are interpreted.

Action Code	Action
N (New) or blank	• If sample ID exists in the database, a duplicate sample ID error is generated • If sample ID does not exist in the database, create new sample.

Action Code	Action
A (Add)	• If the workorder sent from the LIS has patient information that does not match the patient information that already exists for the sample in the Atellica Data Manager software, then a mismatch on Patient Identifier (PID) occurs. An unmatched patient error is generated. **NOTE:** When a PID is associated with a sample, the PID downloaded from the LIS must be consistent with this PID in order to ensure the integrity of the unique sample ID and PID environment. • If the workorder sent from the LIS has patient information that matches the patient information that already exists for the sample in the Atellica DM software, then matching uploaded database requests are rerun. • Add new requests.

Action Code	Action
C (Cancel)	• If the workorder sent from the LIS has patient information that does not match the patient information that already exists for the sample in the Atellica DM software, an unmatched patient error is generated. • When a test is not defined in the Atellica DM software and action code C is used to cancel the associated test request of the work order, the action code serves as a cancellation order and all test requests of the work order with a status less than Review are omitted. • When a test is defined in the Atellica DM software and action code C is used to cancel the associated test request of the work order, only the associated test request of the work order is omitted.

Grammar

The grammar, which provides a description of the ASTM interface, is formally described in the following tables. Each table row represents a grammar rule. The first rule defines the element “Message” in terms of smaller elements. Other, smaller elements are defined subsequently.

- Elements in italics indicate that the text is translated (using another rule, unless obvious).
- Elements in bold indicate that the text is used literally.
- Vertical | bars are field delimiters.
- Square brackets [ ] denote optional inclusion.
- Curly braces { } denote optional repeated inclusion.
- Parentheses ( ) denote grouping.
- Asterisks * denote ignored strings.
- Carets ^ denote subfield separators

Workorder Download

Component	Syntax	Comment
Message	*Header { PatientInformationRecord { PatientCommentRecord } {TestOrderRecord { TestOrderCommentRecord } { ResultRecord } } }Terminator*	
Header Record	**H | \ ^ & | | | | | | | | | | P | 1 |<CR>**	\ is the repeat delimiter, ^ is the component delimiter, & is the escape character.
Patient Information Record	**P** | *SeqNo* | *Patient.Identifier* | *Patient.Identifier* | * | *Patient.LastName ^ Patient.FirstName ^ Patient.MiddleName ^* * | * | *Patient.Birthdate* | *Patient.Sex* | * | * | * | * | * | *SpeciesIdentifier* | * | * | * | * | * | * | * | * | * | *PatientLocation.Name* | * | * | * | * | * | * | * | * **<CR>** **Maximum Record Length** Patient.Identifier: 40 Patient.LastName: 70 Patient.FirstName: 70 Patient.MiddleName: 70 Patient.Birthdate: 8 (YYYYMMDD) Patient.Sex: 1 SpeciesIdentifier: 70 PatientLocation.Name: 70	**NOTE:** If the patient birthdate value downloaded from the LIS indicates that the patient age is greater than 150 years, the birthdate value is not accepted and the patient birthdate is not populated in the Atellica DM system. Patient Sex is M or F only. If coding system is active, the SpeciesIdentifier maximum record length is 30.

Component	Syntax	Comment
Patient Identifier		If Patient.Identifier is not specified, Patient.LastName, Patient.FirstName, Patient.MiddleName, Patient.Birthdate, Patient.Sex, SpeciesIdentifier, and PatientLocation.Name will not be stored in the Atellica DM database for this order. Patient Identifier (PID) is limited to 40 characters.
Patient Name		Patient Last Name, First Name, and Middle Name fields are restricted to 70 characters each.
Species Identifier	—	If a coding system is in effect, this is used to identify a species by SpeciesCode.Value. If not, this is used to identify a species by Species.Name.
Patient Location		If no patient location is specified in the order record, the patient location from the patient record is used.

Component	Syntax	Comment
Patient Comment Record	**C** | *SeqNo* | * | *Patient.Comment* | ***<CR>** **Maximum Record Length** Patient.Comment: 2500	—

Component	Syntax	Comment
Test Order Record	**O** | *SeqNo* | *Sample.Identifier* | * | *[Request] { \ Request }* | *Priority* | * | *Sample.CollectionTime* | * | * ^ * ^ *Sample.ContainerType* | * | *Action-Code* | * | * | *SampleTypeIdentifier* | *Physician.Identifier* | * | * | * | * | * | * | * | * | *PatientLocation.Name* | * | * | ***<CR>**	Limit the number of workorders per Workorder message to approximately 1000 with an average of 10 requests per workorder. The Atellica DM software does *not* process ASTM requested/ ordered date and Time in Order download messages. Physician ID is limited to 40 characters. **NOTE:** Do not mix Action Codes in the same message. The Atellica Data Manager software does not support the receipt of different Action Codes (for example, Cancel and Add) sent in the same message. Example: Test1 Cancel Test2 Add-on Test3 Add-on Test4 Cancel In this example Test1 would not be processed.

Component	Syntax	Comment
Container Type Identifier	—	If a coding system is in effect, this is used to identify a container type by ContainerTypeCode.Value. If not, this is used to identify a container type by ContainerType.Name.
Sample Type Identifier	—	If a coding system is in effect, this is used to identify a sample type by SampleTypeCode.Value. If not, this is used to identify a sample type by SampleType.Name.
Request	^ ^ ^ Test ^ Request.DilutionCondition ^ Request.DilutionCoefficient	This is the dilution factor to be forwarded to the analyzer. The Atellica DM software does not perform calculations based on this value.
Test	Test.Name|TestCode.value|	If a coding system is in effect, this is used to identify a test by TestCode.Value. If not, this is used to identify a test by Test.Name.

Component	Syntax	Comment
Priority	**S | A | ***	S (Stat) A (ASAP) Anything else is interpreted as Routine. **NOTE:** Priority can be updated by the LIS in subsequent workorder downloads.
Action Code	**A | C | N |** *empty*	Add, cancel, new respectively. Default is new.
Test Order Comment Record	**C** | *SeqNo* | * | *Sample.Comment* | ***<CR>**	— LIS aliquotting requests must be sent as sample order comments in the following format (up to a maximum of 8 secondary sample aliquot requests in a single comment record using repeat delimiters): C|1||AliqTube^ <Aliquot sample Identifier 1>\AliqTube^ <Aliquot sample ID 2>\...\AliqTube^ <Aliquot sample Identifier N>

Component	Syntax	Comment
Result Record	**R** | *SeqNo* | * ^ * ^ * ^ *Test* | *Request.LISPrevResultValue* | * | * | * | * | * | * | *Request.LISPrevResultTime***<CR>** **Maximum Record Length** Test: 32 Request.LISPrevResultValue: 240 Request.LISPrevResultTime: 14 (YYYYMMDDHHmmSS)	Stored as the LIS previous result for the request in the Atellica DM software. Multiple previous patient results for the same test can be downloaded. If previous result time is not specified, then current time and date is provided in the Atellica DM software.
Terminator Record	**L** | *SeqNo* | * **<CR>**	—

Patient Result Upload

Component	Syntax	Comments
Header Record	H | \ ^ & | | | | | | | | | | P | 1 | TimeStamp <CR>	Field 9 contains the value Atellica Data Manager with the current version of the Atellica DM Software: ATELLICA DATA MANAGER <version> TimeStamp in YYYYMMDDHHmmSS format
Message	HeaderRecord PatientInformationRecord [PatientCommentRecord] TestOrderRecord [TestOrderCommentRecord] { ResultRecord { ResultCommentRecord } } TerminatorRecord	—

Component	Syntax	Comments
Patient Information Record	P | 1 | Patient.Identifier | | Patient.LastName ^ Patient.FirstName ^ Patient.MiddleName | | Patient.BirthDate | Patient.Sex | | | | | | SpeciesIdentifier^Species.Name | | | | | | | | | | | PatientLocation.Name <CR>	— Patient.Sex record is either M or F.
	Maximum Record Length Patient.Identifier: 40 Patient.LastName: 70 Patient.FirstName: 70 Patient.MiddleName: 70 Patient.Birthdate: 8 (YYYYMMDD) Patient.Sex: 1 SpeciesIdentifier: 70 PatientLocationName: 70	
Species Identifier	—	If a coding system is in effect and a code for the given sample type is available, then the SpeciesCode.Value is transmitted. If not, Species.Name is transmitted.
Patient Comment Record	C | SeqNo | L | Patient.Comment | G<CR>	—

Component	Syntax	Comments
Test Order Record	O | 1 | Sample.Identifier | ^Sample.LastRack ^Sample.LastPosition | | Priority | Sample.CreationTime | Sample.CollectionTime | | * ^ * ^ Sample.ContainerTypeIdentifier | | | | | | SampleTypeIdentifier | Physician.Identifier | | | | | | | | F <CR> **Maximum Record Length** Sample.Identifier: 32 Sample.LastRack: 70 Sample.LastPosition: 6 Priority: See comments Sample.CreationTime: 14 (YYYYMMDDHHmmSS) SampleCollectionTime: 14 (YYYYMMDDHHmmSS) Sample.ContainerTypeIdentifier: 30 SampleTypeIdentifier: 30 PhysicianIdentifier: 40	— The Priority field allows Routine (R), ASAP (A), STAT (S) when no coding system is active. If the coding system is active, maximum record length is 30.
Sample ID		Mandatory. Alphanumeric code that uniquely identifies the sample. Maximum field length is 16 characters.
Sample Last Rack and Last Position		The fields O4.1.2 and O4.1.3, are the last rack and position data values, which are separated by the caret symbol, ^, and are uploaded to the LIS.

Component	Syntax	Comments
Priority	R | A | S	Routine, ASAP, or Stat (Normal, High, or Very high, respectively)
Container Type Identifier	—	If a coding system is in effect, this field identifies a container type by ContainerTypeCode.Value. If not, this is used to identify a container type by ContainerType.Name.
Sample Type Identifier	—	If a coding system is in effect and a code for the given sample type is available, then SampleTypeCode.Value is transmitted. If not, SampleType.Name is transmitted.
Test Order Comment Record	C | 1 | L | Sample.Comment | G <CR> **Maximum Record Length** Sample.Comment: 2500	Added only if a sample comment is available.

Component	Syntax	Comments
Result Record	R | SeqNo | ^ ^ ^ Test ^ Result.DilutionCondition Result.DilutionCoefficient ^ ^ Aspect.Name^ Test.Datatype | Request.Value | | | Flag | | | | VISTA User ^ User.LoginName | Result.AspirationTime | | Instrument.Name <CR> **Maximum Record Length** Test: 32 ResultDilutionCondition: 16 ResultDilutionCoefficient: 19 AspectName: 30 TestDataType: 1 RequestValue: 240 Flag: 64 UserLoginName: 128 ResultAspirationTime: 14 (YYYYMMDDHHmmSS) Instrument.Name: 60	User.LoginName is sent only if it is configured on the system Options menu. The dilution coefficient is the coefficient reported by the analzyer for onboard dilution. This does not incorporate a manual sample dilution because the Atellica DM system calculates results when a manual dilution is ordered at the Atellica DM operator interface. **NOTE:** The **VISTA User** field is used only for results from a Dimension Vista® 1500 system. These are the only supported TestDataType strings: Numeric (N), Strings (S), Enumerated (E), Image (I), Complex (C), Graph (G). If coding system is active, the *Instrument.Name* maximum record length is 30.
Test Test.Value	Test.name | TestCode Test.DataType	If a coding system is in effect and a code for the given test is available, then Test-Code.Value is transmitted. If not, Test.Name is transmitted.
Test.DataType	N | S | E | I	Test.Datatype values include: N = Numeric S = String E = Enumerated I = Image

Component	Syntax	Comments
Flag	*|Empty	Asterisk if Instruments flag is present. **NOTE:** The actual flags are sent as result comment records. See **Instrument-Flag** for more details.
InstrumentFlag	C | SeqNo | I | Instrument.Flag.Code | I<CR>	Instrument flags and request comments are sent only if configured on the system Options menu.
Request Comment	C | SeqNo | L | Request.Comment | G<CR> **Maximum Record Length** Request.comment: 2500	
Terminator Record	L|1<CR>	—

NOTE: Delimiters (|) are not included for trailing null fields. For example, if the tenth field is the last field containing data, the record could terminate after the tenth field, and would contain only nine delimiters.

QC Result Upload

Component	Syntax	Comment
Message	*HeaderRecord PatientInformationRecord TestOrderRecord { ResultRecord { ResultCommentRecord } } TerminatorRecord*	—
Header Record	**H** | \ ^ & | | | | | | | | | | **P** | **1** | TimeStamp **<CR>**	Field 9 contains the value *Atellica Data Manager* with the current version of the Atellica DM Software: **ATELLICA DATA MANAGER** <version>. TimeStamp in YYYYMMDDHHmmSS format

Component	Syntax	Comment
Patient Information Record	**P | 1 <CR>**	
Test Order Record	**O** | **1** | *QCLot.Number* | | | **R** | | | | | | **Q** | | | | | | | | | | | | | **F <CR>** **Maximum Record Length** QCLot.Number: 20	
Result Record	**R** | *SeqNo* | ^ ^ ^ *Test* ^ *Test.Datatype* | *Value* | | | | | | | | *QCResult.AssessmentTime* | | *Instrument.Name* **<CR>** **Maximum Record Length** QCResult.AssessmentTime: 20 (YYYYMMDDHHmmSS)	Test.Datatype value can be numeric or non-numeric. The Atellica DM software can be configured to upload QC results by lot, in which the results for multiple populations within a lot are uploaded, or by population, in which the results for a single population within a lot are uploaded. **NOTE:** Upload by Lot is *not* recommended when uploading large amounts of QC results per upload. When uploading large amounts of QC results, the value for the Time out option on the Translator window should be increased.
Test	*Test.name* | *TestCode.Value*	If a coding system is in effect and a code for the given test is available, then TestCode.Value is transmitted. If not, Test.Name is transmitted.
Test.DataType	**N | S | E | I**	Numeric, String, Enumerated, or Image.
Result Comment Record	*FlagCommentRecord* | *OtherComment Record*	

Component	Syntax	Comment
Flag Comment Record	**C** | *SeqNo* | **I** | Flag | **I <CR>**	
Other Comment Record	**C** | *SeqNo* | **L** | QCResult.Comment | **G <CR>**	
Terminator Record	**L | 1 <CR>**	—

LAS Status Upload

Component	Syntax	ASTM Field
Message	HeaderRecord ManufacturerRecord TerminatorRecord	
Header Record	**H** | \ ^ **&** | | | | | | | | | | **P** | **1** | *TimeStamp* **<CR>**	Timestamp in *YYYYMMDDHHmmss* format
Manufacturer Record	**M** | **1** | **I** | *LasStatus* ^ *SampleId*[1]^ *RegistrationDateTime* | *TrayId* | *Position* | *Location1* ^ *Location2* ^ *Location3* ^ *Location4* **<CR>** **Maximum Record Length** LAsStatus: 40 SampleID: 32 RegistrationDateTime: 14 (YYYYMMDDHHmmSS) TrayID: 70 Position: 240 Location (1-4): 240 each location	LAsStatus is either R or I.

Component	Syntax	ASTM Field
LAS Status	**I|L|R**	LAS Status **I |L| R** I = Inlabbing L = Left Equipment (Cold Storage) R = Rack Rack upload is not currently supported in this upload message.
Sample ID		
Registration Date Time[2]		Timestamp in *YYYYMMDDHHmmss* format
Tray ID/Rack ID		ID of the Tray (ADVIA Automation) or Rack (Aptio Automation).
Pos		Position in tray. Position in tray is identified by a letter/digit combination: A1 through J10 where the letters are A–J and the numbers are 1–10 Position in rack is identified by a numeric value (1-48)
LAS General Area - Location 1	ADVIA Automation: CS MT SC OT Aptio Automation: Node ID	ADVIA Automation: CS = Cold Storage MT = Main Track SC = Side Car OT = Off Track

Component	Syntax	ASTM Field
Location 2	Shelf | Gate (ADVIA Automation) Floor (Aptio Automation)	If General Area = CS[3] Then Location 2=Shelf If General Area = MT, SC, or OT Then Location 2=Gate
Location 3	Door	If General Area = CS[3] Then Location 3=Door Else Location 3 is blank
Location 4	Area Field	If General Area = CS[3] then Location 4=Area Else Location 4 is blank

Notes	Explanation
[1] Sample ID	If the Atellica DM system receives an end of route message from a sample placed into a SIQ tray within the Sample Manager before the inlabbing message is uploaded to the LIS, the Atellica DM system uploads the information from the end of route message, but the SID is 'NO READ' instead of the actual SID.
[2] Registration Date and Time	Registration date and time are not uploaded if a LAS update query initiates the generation of the sample LAS information.
[3] Location 2, 3, 4	Maximum possible field length is 240.

Field-by-Field Descriptions

Message Header Record

Field	Order Download from LIS	Patient Result Upload to LIS	QC Result Upload to LIS	LAS Status Upload to LIS
Record Type ID	'H'	'H'	'H'	'H'
Delimiter Definition	'|\^&'	'|\^&'	'|\^&'	'|\^&'
Message Control ID		Empty	Empty	Empty
Access Password		Empty	Empty	Empty
Sender Name or ID		Empty	Empty	Empty
Sender Street Address		Empty	Empty	Empty
Reserved Field		Empty	Empty	Empty
Sender Telephone Number		Empty	Empty	Empty
Characteristics of Sender		Empty	Empty	Empty
Receiver ID		Empty	Empty	Empty
Comment or Special Instructions		Empty	Empty	Empty
Processing ID		'P'	'P'	'P'
Version No		'1'	'1'	'1'

Field	Order Download from LIS	Patient Result Upload to LIS	QC Result Upload to LIS	LAS Status Upload to LIS
Date and Time of Message Format is YYYYMMDD mmSS		TimeStamp	TimeStamp	TimeStamp

Patient Information Record

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Upload to LIS
Record Type	'P'	'P'	'P'
Sequence Number	SeqNo	1	1
Practice Assigned Patient ID	Patient.Identifier	Patient.Identifier	Empty
Laboratory Assigned Patient ID (Maximum length: 40)	Patient.Identifier	Patient.Identifier	Empty
Patient ID No. 3	Not Used	Empty	Empty
Patient Name (Maximum 70 characters each name)	Patient.LastName ^ Patient.FirstName ^Patient.Middle Name ^ Not used ^ Not used	Patient.LastName ^ Patient.First Name ^Patient.Middle Name	Empty

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Upload to LIS
Mother's Maiden Name	Not Used	Empty	Empty
Birthdate (Maximum length: 8 YYYYMMDD)	Patient.Birth-Date **NOTE:** If the patient birth-date value downloaded from the LIS indicates that the patient age is greater than 150 years, the birthdate value is not accepted and the patient birthdate is not populated in the Atellica DM system.	Patient.BirthDate	Empty
Patient Sex (Either M or F)	Patient.Sex	Patient.Sex	Empty
Patient Race-thnic Origin	Not Used	Empty	Empty
Patient Address	Not Used	Empty	Empty
Reserved Field	Not Used	Empty	Empty
Patient Tele-phone Num-ber	Not Used	Empty	Empty
Attending Physician ID	Not Used	Empty	Empty

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Upload to LIS
Special Field 1 (Maximum 70 characters. If coding system is active, up to 30 characters.)	SpeciesCode. Value (No coding system: Species.Name)	SpeciesCode. Value (No coding system: Species.Name) ^Species.Name	Empty
Special Field 2	Not Used	Empty	Empty
Patient Height	Not Used	Empty	Empty
Patient Weight	Not Used	Empty	Empty
Patient's Known or Suspected Diagnosis	Not Used	Empty	Empty
Patient Active Medications	Not Used	Empty	Empty
Patients Diet	Not Used	Empty	Empty
Practice Field No. 1	Not Used	Empty	Empty
Practice Field No. 2	Not Used	Empty	Empty
Admission and Discharge Dates	Not Used	Empty	Empty
Admission Status	Not Used	Empty	Empty

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Upload to LIS
Location (Maximum 70 characters)	PatientLocation. Name	PatientLocation. Name	Empty
Nature of Alternative Diagnostic Code and Classifiers	Not Used	Empty	Empty
Alternative Diagnostic Code and Classification	Not Used	Empty	Empty
Patient Religion	Not Used	Empty	Empty
Marital Status	Not Used	Empty	Empty
Isolation Status	Not Used	Empty	Empty
Language	Not Used	Empty	Empty
Hospital Service	Not Used	Empty	Empty
Hospital Institution	Not Used	Empty	Empty
Dosage Category	Not Used	Empty	Empty

Test Order Record

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Upload to LIS
Record Type ID	'O'	'O'	'O'

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Upload to LIS
Sequence Number	SeqNo	1	1
Specimen ID	Sample.Identifier (Maximum 32 characters)	Sample.Identifier (Maximum 32 characters)	QCLot.Number (Maximum 20 characters)
Instrument Specimen ID	Not used	^ Sample.LastRack ^ Sample.LastPositio n (Sample.LastRack: maximum 70 characters) (Sample. LastPosition: maximum 6 characters)	Empty
Universal Test ID	^ ^ ^ TestIdentifier ^ Request.Dilution Condition ^ Request.Dilution Coefficient	Empty	Empty
Priority	Priority	Priority	'R'
Requested/ Ordered Date and Time	Not used	Sample.Creation Time	Empty
Specimen Collection Date and Time (Format is YYYYMMDDHHmmSS)	Sample.Collection Time	Sample.Collection Time	Empty

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Upload to LIS
Collection Volume	Not used ^ Not used ^ ContainerType Code.Value (No coding system: ContainerType. Name)	Not used ^ Not used ^ ContainerType Code.Value (No coding system: ContainerType. Name)	Empty
Collector ID	Not used	Empty	Empty
Action Code	A | C | N | empty	Empty	'Q'
Danger Code	Not used	Empty	Empty
Relevant Clinical Information	Not used	Empty	Empty
Date/ Time Specimen Received	Not used	Empty	Empty
Specimen Descriptor (Maximum length: 30)	SampleType Identifier	SampleType Identifier	Empty
Ordering Physician (Maximum length: 40)	Physician. Identifier	Physician. Identifier	Empty
Physician's Telephone Number	Not used	Empty	Empty

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Upload to LIS
User Field No. 1	Not used	Empty	Empty
Users Field No. 2	Not used	Empty	Empty
Laboratory Field No. 1	Not used	Empty	Empty
Laboratory Field No. 2	Not used	Empty	Empty
Date/ Time Results Reported or Last Modified	Not used	Empty	Empty
Instrument Charge to Computer System	Not used	Empty	Empty
Instrument Section ID	Not used	Empty	Empty
Report Type	Not used	'F'	'F'
Reserved Field	Not used	Empty	Empty
Location or Ward of Specimen Collection	Not used	Empty	Empty

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Upload to LIS
Nosocomial Infection Flag	Not used	Empty	Empty
Specimen Service	Not used	Empty	Empty
Specimen Institution	Not used	Empty	Empty

Result Record

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Uploaded to LIS
Result Upload to LIS	‘R’	'R'	'R'
Sequence Number	SeqNo	SeqNo	SeqNo
Universal Test ID	^ ^ ^ TestCode.Value (No coding system: Test.Name)	^ ^ ^ TestCode.Value (No coding system: Test.Name) ^ Result.Dilution Condition ^ Result.Dilution Coefficient ^ ^ Aspect.Name^ Test.DataType	^ ^ ^ TestCode.Value (No coding system: Test.Name) ^ ^ ^ ^ Aspect.Name (only without –c option) ^Test.DataType

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Uploaded to LIS
Data or Measurement Value	Request.LIS-Prev Result-Value (Maximum 240 characters)	Request. StringValue	QCResult.Value
Units	Not used	Empty	Empty
Reference Ranges	Not used	Empty	Empty
Result Abnormal Flags	Not used	Flag	Empty
Nature of Abnormality Testing	Not used	Empty	Empty
Result Status	Not used	Empty	Empty
Date of Change in Instrument Normative Values or Units	Not used	^ User.LoginName	Empty
Operator Identification	Not used	^ User.LoginName	Empty
Date/Time Test Started (Maximum 14 characters: YYYYMMDD HHmmSS)	Request.LIS-Prev Result-Time	Result.Aspiration-Time	QCResult. AssessmentTime
Date/Time Test Completed	Not used	Empty	Empty

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Uploaded to LIS
Instrument Identification	Not used	Instrument.Name	Instrument.Name

Patient Comment Record

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Uploaded to LIS
Record Type ID	'C'	'C'	Not Used
Sequence Number	SeqNo	SeqNo	Not Used
Comment Source	Not used	'L'	Not Used
Comment Text (Maximum length: 2500)	Patient.Comment	Patient.Comment	Not Used
Comment Type	Not used	'G'	Not Used

Test Order Comment Record

Field	Workorder Downloaded from LIS	Patient result Uploaded to LIS	QC Result Uploaded to LIS
Record Type ID	'C’	'C’	Not Used
Sequence Number	SeqNo	1	Not Used
Comment Source	Not used	'L'	Not Used
Comment Text (Maximum length: 2500)	Sample.Comment	Sample.Comment	Not Used
Comment Type	Not used	'G'	Not Used

Result Comment Record

When uploading patient and QC results, the Atellica Data Manager transmits flags as comment records.

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Uploaded to LIS
Record Type ID	—	'C'	Not Used
Sequence Number	—	SeqNo	Not Used
Comment Source	—	'I' or ‘L’	Not Used
Comment Text	—	Flag code or other comment	Not Used

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Uploaded to LIS
Comment Type	—	'I' or 'G'	Not Used

Request Information Record

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Uploaded to LIS
Record Type ID	'Q'	'Q'	Not Used
Sequence Number	Not used	Not used	Not used
Starting Range ID Number	Not used	Not used	Not used
Ending Range ID Number	Not used	Not used	Not used
Universal Test ID	Not used	Not used	Not used
Nature of Request Time Limits	Not used	Not used	Not used
Beginning Request Results Date and Time	Not used	Not used	Not used
Ending Request Results Date and Time	Not used	Not used	Not used
Request Physician Name	Not used	Not used	Not used
Requesting Physician Telephone Number	Not used	Not used	Not used
User defined Field No. 1	Not used	Not used	Not used
User defined Field No. 2	Not used	Not used	Not used

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Uploaded to LIS
Request Information Status Codes	Not used	Not used	Not used

Message Terminator Record

Field	Order Download from LIS	Patient Result Upload to LIS	QC Result Upload to LIS	LAS Status Upload to LIS
Record Type ID	‘L’	‘L’	‘L’	‘L’
Sequence Number	SeqNo	1	1	1
Termination Code	Not used	‘N’	‘N’	‘N’

Scientific Record

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Uploaded to LIS
1. Record Type ID	'S’	'S’	Not Used
2. Sequence Number	Not Used	Not Used	Not Used
3. Analytical Method	Not Used	Not Used	Not Used
4. Instrumentation	Not used	Not used	Not used
5. Reagents	Not used	Not used	Not used
6. Units of Measure	Not used	Not used	Not used
7. Quality Control	Not used	Not used	Not used

Field	Workorder Downloaded from LIS	Patient Result Uploaded to LIS	QC Result Uploaded to LIS
8. Specimen Descriptor	Not used	Not used	Not used
9. Reserved Field	Not used	Not used	Not used
10. Container	Not used	Not used	Not used
11. Specimen ID	Not used	Not used	Not used
12. Analyte	Not used	Not used	Not used
13. Result	Not used	Not used	Not used
14. Result Units	Not used	Not used	Not used
15. Collection Date and Time	Not used	Not used	Not used
16. Collection End Time	Not used	Empty	Empty
17. Result Date and Time	Not used	Not used	Not used
Analytical Pre-processing Steps	Not used	Not used	Not used
Patient Diagno-sis	Not used	Not used	Not used
Patient BirthDate	Not used	Not used	Not used
Patient Sex	Not used	Not used	Not used
Patient Race	Not used	Not used	Not used

Manufacturer Information Record

Field	Order Download from LIS	Patient Result Upload to LIS	QC Result Upload to LIS	LAS Status Upload to LIS
1. Record Type ID	'M'	'M'	'M'	'M'

Field	Order Download from LIS	Patient Result Upload to LIS	QC Result Upload to LIS	LAS Status Upload to LIS
2. Sequence Number	Not used	SeqNo	SeqNo	1
3. User specific	Not used	Not used	Not used	1
4. User specific	Not used	Not used	Not used	LasStatus ^ SampleId ^ Datetime
5. User specific	Not used	Not used	Not used	TrayId
6. User specific	Not used	Not used	Not used	Position
7. User specific	Not used	Not used	Not used	Location1 ^ Location2 ^ Location3 ^ Location4

ASTM Transmission Examples

Patient sensitive information was made anonymous within the following examples; therefore, checksums for records with anonymous information may not be accurate.

In the examples, the Atellica DM software version has an x. In the released software version, the x is a number of the software version on your system.

Message from LIS to Atellica Data Manager - LIS Aliquot functionality (One Secondary Sample Requested)

H|\^&|||||||||P|1

P|1|2833570|2833570||Vogt^Paul||19700929|M

O|1|9000039904|||R||||||A||||S|500186

C|1||AliqTube^9000039918|

O|2|9000039918||^^^7090^^\^^^7100^^\^^^

7140^^\^^^43062^^\^^^7150^^| R||||||A||||S|500186

L|1

Primary SID: 9000039904

Secondary SID: 9000039918

Message from LIS to Atellica Data Manager - LIS Aliquot functionality (Two Secondary Samples Requested in single message)

H|\^&|||||||||P|1

P|1|2833570|2833570||Vogt^Paul||19700929|M

O|1|9000039904|||R||||||A||||S|500186

C|1||AliqTube^9000039918\AliqTube^9000039919|

O|2|9000039918||^^^7090^^\^^^7100^^\^^^7140^^R||||||N||||S|500186

O|3|9000039919||^^^43062^^\^^^7150^^|R||||||N||||S|500186

L|1

Primary SID: 9000039904

Secondary SID 1: 9000039918

Secondary SID 2: 9000039919

Message from LIS to Atellica Data Manager - LIS Aliquot functionality (Two Secondary Samples Requested with multiple messages)

H|\^&|||||||||P|1

P|1|2833570|2833570||Vogt^Paul||19700929|M

O|1|9000039904|||R||||||A||||S|500186

C|1||AliqTube^9000039918|

O|2|9000039918||^^^7090^^\^^^7100^^\^^^7140^^|R||||||N||||S|500186

L|1

H|\^&|||||||||P|1

P|1|2833570|2833570||Vogt^Paul||19700929|M

O|1|9000039904|||R||||||A||||S|500186

C|1||AliqTube^9000039919|

O|2|9000039919||^^^43062^^\^^^7150^^|R||||||N||||S|500186

L|1

Primary SID: 9000039904

Secondary SID 1: 9000039918

Secondary SID 2: 9000039919

Workorder Download: LIS to the Atellica Data Manager, New Workorders

Host action	Atellica Data Manager response
Host: >ENQ<	Atellica Data Manager: >ACK<
Host: >STX1H|\^&||||||||||P| 1<CR>ETXB A<CR><LF>	Atellica Data Manager: >ACK<
Host: >STX2P|1|1234560|||LAST- NAME1^ FIRSTNAME1|| 19500101|M<CR>E TX5F<CR><LF>	Atellica Data Manager: >ACK<
Host: >STX3O|1|1111111111|| ^^^10^\^^^14 ^\^^^15^\^^^16^\^^^17^\^^^18 ^|R||20 060516091500||||A||||| <CR>ETXE6< CR><LF>	Atellica Data Manager: >ACK<
Host: >STX4P|2|1234561|||LAST NAME2^FIRST NAME2|| 19500202|F<CR>ETX92< CR><LF>	Atellica Data Manager: >ACK<
Host: >STX5O|1|2222222222|| ^^^fe^\^^^tr f^|R|| 20060516000000||||A|||||<CR> ETX37<CR><LF>	Atellica Data Manager: >ACK<
Host: >STX6L|1| <CR>ETXBB<CR><LF>	Atellica Data Manager: >ACK<
Host: >EOT<	Atellica Data Manager: >ACK<

Workorder Download: LIS to the Atellica Data Manager, Multiple Previous LIS Results

The following workorder message orders four tests: ALB, TSH, ALT, and HGB for Sample ID, MUL2.

Test ALB contains 3 previous LIS results, TSH contains 1 previous LIS result, ALT contains 2 previous LIS results and HGB does not contain any previous LIS results.

NOTE: You can view the displayed LIS Results at the **LIS Previous Results** tab at the **Request** window, which you access by double selecting the request at the **Review and Edit** window.

H\|\^&\|\|\|\|\|\|\|\|\|\|P\|1\|

P|1|125|125||Lastname^Firstname^Mr.||19110707|M||||555- 1212|||||||||||||||||||||

O|1|MUL2||^^^ALB^NEAT^2|||||||A|||||||||ER|||||||||

R|1|^^^ALB|1.21|||||||20050101140000|

R|2|^^^ALB|1.22|||||||20040101152700|

R|3|^^^ALB|1.23|||||||20030101143457|

O|2|MUL2||^^^TSH|||||||A|||||||||ER|||||||||

R|1|^^^TSH|2.22|||||||20050101|

O|3|MUL2||^^^ALT|||||||A|||||||||ER|||||||||

R|1|^^^ALT|3.22|||||||20030303152700|

R|2|^^^ALT|3.23|||||||20030303143457|

O|4|MUL2||^^^HGB|||||||A|||||||||ER|||||||||

L|1F

Workorder Download: LIS to the Atellica Data Manager, Rerun

(action code “A” required)

Host: >ENQ<

Atellica Data Manager: >ACK<

Host: >STX1H|\^&|||||||||||P|1<CR>ETXBA<CR><LF>

Atellica Data Manager: >ACK<

Host: >STX2P|1|1234561|||LASTNAME^FIRSTNAME||19510101|

M<CR>ETXC A<CR><LF>

Atellica Data Manager: >ACK<

Host: >STX3O|1|3332221111||^^^cl^|R||20060516143000||||A|||||

<CR>ETX26<C R><LF>

Atellica Data Manager: >ACK<

Host: >STX4L|1|<CR>ETX3D<CR><LF>

Atellica Data Manager: >ACK<

Host: >EOT<

Quality Control Result Upload: Atellica Data Manager to LIS

Atellica Data Manager: >ENQ<

Host: >ACK<

Atellica Data Manager:

>STX1H|\^&|||||||||||P|1|20060630132618<CR>ETXFC<CR><LF>

Host: >ACK<

Atellica Data Manager: >STX2P|1|||||||U<CR>ETXF8<CR><LF>

Host: >ACK<

Atellica Data Manager:

>STX3O|1|110302|||R||||||Q|||||||||||||F<CR>ETXEF<CR><LF>

Host: >ACK<

Atellica Data Manager:

>STX4R|1|^^^FolateBA^^^^^^N|6.19|||||||20060630133504||Centaur_3<CR>ETX22

<CR><LF>

Host: >ACK<

Atellica Data Manager: >STX5L|1|N<CR>ETX08<CR><LF>

Host: >ACK<

Atellica Data Manager: >EOT<

Quality Control Result Upload: Atellica Data Manager to LIS By Lot

Atellica Data Manager:{ENQ}<

LIS:{ACK}<

Atellica Data Manager:{STX}1H|\^&|||||||Atellica Data Manager

1.x.x.x|||P|1|20090626182922{CR}{ETX}32{CR}<

LIS:{ACK}<

Atellica Data Manager:{STX}2P|1|||||||U{CR}{ETX}F8{CR}<

LIS:{ACK}<

Atellica Data Manager:{STX}3O|1|40711|||||||||Q|||||||||||||F{CR}{ETX}73

{CR}<

LIS:{ACK}<

Atellica Data Manager:

{STX}4R|1|^^^COR^^^^DOSE^N|150.0|||||||20090626061033||Centaur
XP{CR}{ETX}B4{CR}<

LIS:{ACK}<

Atellica Data Manager:

{STX}5R|2|^^^COR^^^^DOSE^N|151.0|||||||20090626121033||
Centaur XP{CR}{ETX}B4{CR}<

LIS:{ACK}<

Atellica Data Manager: {STX}6R|3|^^^FSH^^^^DOSE^N|15.0|||||||20090626061033||

Centaur XP{CR}{ETX}85{CR}<

LIS:{ACK}<

Atellica Data Manager:

{STX}7R|4|^^^FSH^^^^DOSE^N|15.1|||||||20090626121033||
Centaur XP{CR}{ETX}85{CR}<

LIS:{ACK}<

Atellica Data Manager:

{STX}0R|5|^^^TSH^^^^DOSE^N|0.80|||||||20090626061033||Centaur
XP{CR}{ETX}91{CR}<

LIS:{ACK}<

Atellica Data Manager:

{STX}1R|6|^^^TSH^^^^DOSE^N|0.81|||||||20090626121033||Centaur

XP{CR}{ETX}91{CR}<

LIS:{ACK}<

Atellica Data Manager:{STX}2L|1{CR}{ETX}3B{CR}<

LIS:{ACK}<

Atellica Data Manager:{EOT}<

Quality Control Result Upload: Atellica Data Manager to LIS By Population

Atellica Data Manager:{ENQ}<

LIS:{ACK}<

Atellica Data Manager:{STX}1H|\^&||||||ATELLICA DATA MANAGER

1.x.x.x|||P|1|20090626183542{CR}{ETX}31{CR}<

LIS:{ACK}<

Atellica Data Manager:{STX}2P|1|||||||U{CR}{ETX}F8{CR}<

LIS:{ACK}<

Atellica Data Manager:{STX}3O|1|40711|||||||||Q|||||||||||||F{CR}{ETX}73

{CR}<

LIS:{ACK}<

Atellica Data Manager:

{STX}4R|1|^^^COR^^^^DOSE^N|150.0|||||||20090626061033||Centaur

XP{CR}{ETX}B4{CR}<

LIS:{ACK}<

Atellica Data Manager:

{STX}5R|2|^^^COR^^^^DOSE^N|151.0|||||||20090626121033||Centaur

XP{CR}{ETX}B4{CR}<

LIS:{ACK}<
Atellica Data Manager:{STX}6L|1{CR}{ETX}3F{CR}<
LIS:{ACK}<
Atellica Data Manager:{EOT}<
Atellica Data Manager:{ENQ}<
LIS:{ACK}<
Atellica Data Manager:{STX}1H|\^&|||||||ATELLICA DATA MANAGER
1.x.x.x|||P|1|20090626183542{CR}{ETX}31{CR}<
LIS:{ACK}<
Atellica Data Manager: {STX}2P|1|||||||U{CR}{ETX}F8{CR}<
LIS:{ACK}<
Atellica Data Manager:
{STX}3O|1|40711|||||||||Q|||||||||||||F{CR}{ETX}73 {CR}<
LIS:{ACK}<
Atellica Data Manager:
{STX}4R|1|^^^FSH^^^^DOSE^N|15.0|||||||20090626061033||Centaur
XP{CR}{ETX}81{CR}<
LIS:{ACK}<
Atellica Data Manager:
{STX}5R|2|^^^FSH^^^^DOSE^N|15.1|||||||20090626121033||Centaur
XP{CR}{ETX}81{CR}<
LIS:{ACK}<
Atellica Data Manager: {STX}6L|1{CR}{ETX}3F{CR}<
LIS:{ACK}<
Atellica Data Manager:{EOT}<
Atellica Data Manager:{ENQ}<
LIS:{ACK}<
Atellica Data Manager:{STX}1H|\^&|||||||ATELLICA DATA MANAGER
1.x.x.x|||P|1|20090626183542{CR}{ETX}31{CR}<
LIS:{ACK}<
Atellica Data Manager:{STX}2P|1|||||||U{CR}{ETX}F8{CR}<
LIS:{ACK}<
Atellica Data Manager:
{STX}3O|1|40711|||||||||Q|||||||||||||F{CR}{ETX}73

{CR}<

LIS:{ACK}<

Atellica Data Manager:

{STX}4R|1|^^^TSH^^^^DOSE^N|0.80|||||||20090626061033||Centaur

XP{CR}{ETX}91{CR}<

LIS:{ACK}<

Atellica Data Manager:

{STX}5R|2|^^^TSH^^^^DOSE^N|0.81|||||||20090626121033||Centaur

XP{CR}{ETX}91{CR}<

LIS:{ACK}<

Atellica Data Manager:{STX}6L|1{CR}{ETX}3F{CR}<

LIS:{ACK}<

Atellica Data Manager:{EOT}<

Result Upload: Atellica Data Manager System to LIS

Atellica Data Manager: >ENQ<

Host: >ACK<

Atellica Data Manager: >STX1H|\^&|||||||||P|1|20070612003418<CR>ETXF8<CR>

<LF>

Host: >ACK<

Atellica Data Manager:

>STX2P|1|A0000001|A0000001||LASTNAME^FIRSTNAME||19200202|F||

||||Human^Human||||||||||93434<CR>ETXFA<CR><LF>

Host: >ACK<

Atellica Data Manager:

>STX3O|1|X111111111|||R|20070611164759|
20070611133000||^^Primary

Tube||||||Serum|||||||||F<CR>ETX69<CR><LF>

Host: >ACK<

Atellica Data Manager:

>STX4R|1|^^^ALB^Neat^1.0^^^N|3.8|||||||20070611231253||2402<CR>E

TX59<CR><LF>

Host: >ACK<

Atellica Data Manager:

>STX5R|2|^^^CREA^Neat^1.0^^^N|1.5|||||||20070611231253||2402<CR>

ETXA2<CR><LF>

Host: >ACK<

Atellica Data Manager:

>STX6R|3|^^^NA^Neat^1.0^^^N|146|||||||20070611231253||2402<CR>ET

X4C<CR><LF>

Host: >ACK<

Atellica Data Manager:

>STX7R|4|^^^K^Neat^1.0^^^N|4.6|||||||20070611231253||2402<CR>ETX

07<CR><LF>

Host: >ACK<

Atellica Data Manager:

>STX0R|5|^^^CL^Neat^1.0^^^N|110|||||||20070611231253||2402<CR>ET

X47<CR><LF>

Host: >ACK<

Atellica Data Manager: >STX1R|6|^^^HEMO^Neat^1.0^^^E|-

|||||||20070611231253||2402<CR>ETX71<CR><LF>

Host: >ACK<

Atellica Data Manager: >STX2R|7|^^^ICTE^Neat^1.0^^^E|-

|||||||20070611231253||2402<CR>ETX6F<CR><LF>

Host: >ACK<

Atellica Data Manager: >STX3R|8|^^^LIPE^Neat^1.0^^^E|-

|||||||20070611231253||2402<CR>ETX76<CR><LF>

Host: >ACK<

Atellica Data Manager: >STX4L|1|N<CR>ETX09<CR><LF>

Host: >ACK<

Atellica Data Manager: >EOT<

Result Upload: Atellica Data Manager System to LIS, ID Assay Algorithm Result

Atellica Data Manager: >ENQ<

Host: >ACK<

Atellica Data Manager:

>STX1H|\^&||||||||||P|1|20080501195056<CR>ETX00<CR><LF>

Host: >ACK<

Atellica Data Manager:

>STX2P|1|Z111111|Z111111||LASTNAME^FIRSTNAME||19500101|M|||||
Human^Human<CR>ETX15<CR><LF>
Host: >ACK<
Atellica Data Manager:
>STX3O|1|G123456789|^0057^C||R|20080501195020|||||||||||||||||F<CR>
ETX27<CR><LF>
Host: >ACK<
Atellica Data Manager:
>STX4R|1|^^^HCV^^^^INDX^N|0.8|||||||20060412125859||
Centaur_1<CR>ETX2A<CR><LF>
Host: > ACK <
Atellica Data Manager: >STX5C|1|L|Manual Validation
Required|G<CR>ETX26<CR><LF>
Host: > ACK <
Atellica Data Manager:
>STX6R|2|^^^HCV^^^^RLU^S|800|||||||20060412125859||
Centaur_1<CR>ETXF4<CR><LF>
Host: > ACK <
Atellica Data Manager:
>STX7R|3|^^^HCV^^^^COFF^S|1.0|||||||20060412125859||
Centaur_1<CR>ETX18<CR><LF>
Host: > ACK<
Atellica Data Manager:
>STX0R|4|^^^HCV^^^^INTR^S|Equiv|||||||20060412125859||Centaur_1<
CR>ETXAC<CR><LF>
Host: >ACK<
Atellica Data Manager:
>STX1R|5|^^^HCV_RVT^^^^^S|N<CR>ETX09<CR><LF>
Host > ACK <
ATELLICA DATA MANAGER:
>STX2R|6|^^^HCV_INTR^^^^^E|EQ<CR>ETX86<CR><LF>
Host: > ACK <
ATELLICA DATA MANAGER:
>STX3R|7|^^^HCV_1_EQ^^^^^S|Y<CR>ETX42<CR><LF>

Host: > ACK <

ATELLICA DATA MANAGER:

>STX4R|8|^^^HCV_2_EQ^^^^^^S|Y<CR>ETX45<CR><LF>

Host: >ACK<

ATELLICA DATA MANAGER:

>STX5R|9|^^^HCV_3_R^^^^^^S|Y<CR>ETX04<CR><LF>

Host: > ACK <

ATELLICA DATA MANAGER: >STX6L|1|N<CR>ETX09<CR><LF>

Host: >ACK<

ATELLICA DATA MANAGER: >EOT<

EHIV and CHIV Result Upload Examples

NOTE: In the following sections, any references to the ADVIA Centaur system also includes the ADVIA Centaur® XP system, unless otherwise stated.

These examples show the records transmitted to an ASTM LIS with the options set for uploading the validation user and instrument flags.

Atellica DM is configured to accept all ADVIA Centaur result aspects: INDX, INTR, RLU, COFF.

NOTE: If these aspects are not defined for the analyzer in Atellica DM, they are not sent to the LIS upload data stream.

EHIV Testing Examples

Example 1: EHIV Reactive Result Upload

In this example, the test result is reactive.

The result lines in the data stream are indicated as R|.

Result 1 shows the Index value received from the ADVIA Centaur system as 2.43.

Result 2 shows the cutoff value as an index of 1.00.

Result 3 shows the interpretive result received from the ADVIA Centaur system as React.

Result 4 indicates the RLU units as 79985.

Result 5 shows the interpretive result generated by Atellica DM as R.

Results 6, 7, 8, and 9 are the indicator tests generated from Atellica DM.

NOTE: When you use partial upload, one or all of the indicator tests may upload in a separate result message before the instrument results upload.

H|\^&|||||||||P|1|20061006134242

P|1|||||||U||||||Human^Human

O|1|SAMPLE1|||R|20061006134203||||||||||||||||||F

R|1|^^^EHIV^^^^INDX^N|2.43|||*||||^batch|20061006191123||Centaur_2

C|1|I|Ctrl Bracketed|I

R|2|^^^EHIV^^^^COFF^S|1.00|||||||^batch|20061006191123||Centaur_2

R|3|^^^EHIV^^^^INTR^S|React|||||||^batch|20061006191123||Centaur_2

R|4|^^^EHIV^^^^RLU^S|79985|||||||^batch|20061006191123||Centaur_2

R|5|^^^EHIV_INTR^^^^^E|R|||||||^batch

R|6|^^^EHIV_CMPLTE^^^^^S|Y|||||||^batch

R|7|^^^EHIV_1_DR^^^^^S|Y|||||||^batch

R|8|^^^EHIV_2_NR^^^^^S|Y|||||||^batch

R|9|^^^EHIV_3_R^^^^^S|Y|||||||^batch

L|1|N

Example 2: EHIV Non-Reactive Result Upload

In this example, the test result is non-reactive.

The result lines in the data stream begin with R|.

Result 1 shows the Index value received from the ADVIA Centaur system as < 0.05.

Result 2 shows the cutoff values as an index of 1.00.

Result 3 shows the interpretive result received from the ADVIA Centaur system as NR.

Result 4 indicates the RLU units as 9356.

Result 5 shows the interpretive result generated by Atellica DM as NR.

Results 6, 7, 8, and 9 are the indicator tests.

NOTE: When you use partial upload, one or all of the indicator tests may upload in a separate result message before the instrument results upload.

H|\^&|||||||||P|1|20061006134701

P|1|||||||U||||||Human^Human

O|1|SAMPLE2|||R|20061006134633||||||||||||||||||F

R|1|^^^EHIV^^^^INDX^N|<0.05|||*||||^batch|20061006191553||Centaur_2

C|1|I|<|I

C|2|I|Below Check|I

C|3|I|Ctrl Bracketed|I

C|4|I|Repeated|I

R|2|^^^EHIV^^^^COFF^S|1.00|||||||^batch|20061006191553||Centaur_2

R|3|^^^EHIV^^^^INTR^S|NR|||||||^batch|20061006191553||Centaur_2

R|4|^^^EHIV^^^^RLU^S|9356|||||||^batch|20061006191553||Centaur_2

R|5|^^^EHIV_INTR^^^^^E|NR|||||||^batch

R|6|^^^EHIV_CMPLTE^^^^^S|Y|||||||^batch

R|7|^^^EHIV_1_DR^^^^^S|Y|||||||^batch

R|8|^^^EHIV_2_NR^^^^^S|Y|||||||^batch

R|9|^^^EHIV_3_NR^^^^^S|Y|||||||^batch1L|1|N

CHIV Testing Examples

CHIV Examples of Result Upload to an ASTM 1394 LIS

NOTE: In the following sections, any references to the ADVIA Centaur system also includes the ADVIA Centaur XP system, unless otherwise stated.

These examples show the records transmitted to an ASTM LIS with the options set for uploading the validation user and instrument flags. Atellica DM is configured to accept all ADVIA Centaur result aspects: INDX, INTR, RLU, COFF.

NOTE: If these aspects are not defined for the analyzer in Atellica DM, they are not sent to the LIS upload data stream.

Example 1: Reactive Result Upload

In this example, the test result is reactive.

The result lines in the data stream are indicated as R|.

Result 1 shows the Index value received from the ADVIA Centaur system as 2.43.

Result 2 shows the cutoff value as an index of 1.00.

Result 3 shows the interpretive result received from the ADVIA Centaur system as React.

Result 4 indicates the RLU units as 79985.

Result 5 shows the interpretive result generated by Atellica DM as R.

Results 6, 7, 8, and 9 are the indicator tests generated from Atellica DM.

NOTE: When you use partial upload, one or all of the indicator tests may upload in a separate result message before the instrument results upload.

H|\^&|||||||ATELLICA DM 1.x.x.x|||P|1|20110327164605

P|1|||||||U||||||Human^Human

O|1|SAMPLE1|||R|20110327112203||||||||||||||||||F

R|1|^^^CHIV^^^^INDX^N|2.43|||||||^batch|20110327154341||Centaur_2

R|2|^^^CHIV^^^^COFF^S|1.00|||||||^batch|20110327154341||Centaur_2

R|3|^^^CHIV^^^^INTR^S|React|||||||^batch|20110327154341||Centaur_2

R|4|^^^CHIV^^^^RLU^S|79985|||||||^batch|20110327154341||Centaur_2

R|5|^^^CHIV_INTR^^^^^E|R|||||||^batch

R|6|^^^CHIV_CMPLTE^^^^^S|Y|||||||^batch

R|7|^^^CHIV_1_DR^^^^^S|Y|||||||^batch

R|8|^^^CHIV_2_NR^^^^^S|Y|||||||^batch

R|9|^^^CHIV_3_R^^^^^S|Y|||||||^batch

L|1|N

Example 2: CHIV Non-Reactive Result Upload

In this example, the test result is non-reactive.

The result lines in the data stream begin with R|.

Result 1 shows the Index value received from the ADVIA Centaur system as < 0.05.

Result 2 shows the cutoff values as an index of 1.00.

Result 3 shows the interpretive result received from the ADVIA Centaur system as NR.

Result 4 indicates the RLU units as 9356.

Result 5 shows the interpretive result generated by Atellica DM as NR.

Results 6, 7, 8, and 9 are the indicator tests.

NOTE: When you use partial upload, one or all of the indicator tests may upload in a separate result message before the instrument results upload.

H|\^&|||||||ATELLICA DM 1.x.x.x|||P|1|20110327164707

P|1|||||||U||||||Human^Human

O|1|SAMPLE2|||R|20110327112209||||||||||||||||||F

R|1|^^^CHIV^^^^INDX^N|<0.05|||*||||^batch|20110327152331||Centaur_2

C|1|I|<|I

C|2|I|Below Check|I

C|3|I|Repeated|I

R|2|^^^CHIV^^^^COFF^S|1.00|||||||^batch|20110327152331||Centaur_2

R|3|^^^CHIV^^^^INTR^S|NR|||||||^batch|20110327152331||Centaur_2

R|4|^^^CHIV^^^^RLU^S|9356|||||||^batch|20110327152331||Centaur_2

R|5|^^^CHIV_INTR^^^^^E|NR|||||||^batch

R|6|^^^CHIV_CMPLTE^^^^^S|Y|||||||^batch

R|7|^^^CHIV_1_DR^^^^^S|Y|||||||^batch

R|8|^^^CHIV_2_NR^^^^^S|Y|||||||^batch

R|9|^^^CHIV_3_NR^^^^^S|Y|||||||^batch

L|1|N

5 Technidata LMX 6.0

This section describes the Technidata protocol used for the communication link between the Atellica Data Manager and a laboratory information system (LIS) or host computer.

This section is intended for the information systems professional responsible for connecting the Atellica DM system and your host computer. Please contact your local technical support provider or distributor if you need additional information.

The Atellica DM software supports communication with the Technidata. LMX LIS using FTP as low level protocol and ASTM 1238 as high level protocol.

Overview

The LMX communication link allows the LIS to transmit workorders and multiple previous patient results for the same test to the Atellica DM software and to accept QC and patient test results transmitted from the Atellica DM software.

The LIS initiates sending patient workorder information to the Atellica DM system before each sample run. The information will be parsed and stored in the system for download to the analyzer.

The Atellica DM system can be configured to automatically transfer available results to the host or manually transfer results to permit the operator time to review the data and release the sample results.

Translator Specific Options

In the Atellica DM system, the driver for the Technidata LMX translator is the lmxs driver.

The translator specific options are the following:

-b<Order file prefix>	The -b <Order file prefix> option specifies the prefix of the order file name. The default setting is **DEM**. Expected workorder file names are <Order file prefix><SeqNo>.AST. <SeqNo> is a configurable sequence number. Files are processed on receipt by the Atellica DM system and are deleted afterwards.
-i <incoming file directory>	The -i option specifies the directory that is used to read the incoming workorders. In most cases this is the FTP root (C:\inetpub\ftproot) or a subdirectory of it. This is *mandatory*.

-l	The -l option specifies that the patient location is stored in the OBR.19 field. If it is not set, the default location is P.26.
-r <Receiver ID>	The -r option specifies the receiver ID that will be in the ASTM message (field 7.10). The default value is 38-1.
-s <Sender ID>	The -s option specifies the sender ID that will be in the ASTM message (field 7.5). The default value is LMXS.
-t <Sleep time>	The -t option specifies the number of seconds the translator will wait between two consecutive checks for new incoming workorder files. The default value is 30.
-v <Protocol version>	The -v option specifies the protocol version that will be in the ASTM message (field 7.13). The default value used for LMX communication is A2.2.

Translator Generic Export Options

LMX 6.0 and later export options are not backward compatible with previous versions. You enter the following translator generic export options in the **Specific Options** field.

[-O <Value>]	Export directory. Result files will be placed in this location.
[-E <Value>]	Export file pattern. Subdirectories can be specified and are created automatically, except when '-U' is specified. For example, {Date:%Y}/{Date:%m%d}/ {Time:%H%M%S}-{#*}.txt Default is 'RES{###}.AST' Possible patterns: {DateTime[:format]} Standard format: %Y%m%d%H%M%S { Date[:format]} Standard format: %Y%m%d {Time[:format]} Standard format: %H%M%S {#*} Counter, unlimited in length, starts from 1 {#..#} Where a limited amount of '#' characters can be specified, the target Counter will be of the same length. e.g. {####} will start from 0001, 9999 is the last allowed value **NOTE:** The counter increments if the rest of the filename is not unique. For unique filenames, for example, filenames based on time, the counter is set to 1. If Counter exceeds the amount of allowed digits, an error is raised, the results are not output to file, but the driver does not exit. seq[:format] Similar to {#...#} format, however, the next Counter is always equal to the last one found + 1. Standard format: - (starts from 1) Allowed format: 9.....9", where the amount of 9- digits specify the maximum counter length. For example, seq:9999 starts from 0001. If Counter exceeds the amount of allowed digits (for example, after the counter has reached 9999 when seq:9999 is specified), the counter does not reset. An error is raised and the results are not output to file, but the driver does not exit.

	Examples of result file format: for a date of 04/05/ 2008 and time = 14:03:51 **-O C:\LMX -E{Date:%Y}/{Date:%m%d}/ {Time:%H%M%S}-{#*}.txt** Filename =140351-1.txt in the folder C:\LMX\2008\0405\ **-O C:\LMX -E {DateTime:%Y%m%d%H%M%S}-{SEQ:-}.AST** Filename = 20080503135944-1.AST in the C:\LMX folder
[-U <List>]	Use FTP when storing files on the export directory: 'Protocol=FTP'," Host='<IP Address>'or ' <Hostname'>,', ['Service='<Value>]',' ['User='<Value>]',' ['Password='<Value>]',' ['TransferMode='<'Binary' | 'Ascii'>]',' ['ConnectionMode='<'Passive' | 'Active'>]',' ['Time-Out='<Value (milliseconds)>] Default service is 'ftp' Default operator is 'anonymous'. Password not needed in case of operator 'anonymous', ',' characters in a password should be specified as '~,'. Default transfer mode is 'Binary'. Default connection mode 'Passive'. Default time-out is 0 (no time-out). For example: -U Protocol=FTP,Host=172.31.21.22, TransferMode=Ascii **NOTE:** ConnectionMode Passive -> FTP server opens FTP dataport (FTP PASV) ConnectionMode Active -> FTP client opens FTP dataport (FTP PORT) When a firewall is installed in between FTP client and server, use Passive, as in this case, the FTP client session always takes the initiative.

[-Y <Value>]	Storage directory for temporary files. If unspecified, 'Root-Directory'/tmp is assumed. On UNIX/Windows platforms, the terminating '/' character is mandatory. When using -U FTP, this option is mandatory and the directory must be specified. For example, *D:\Atellica-DataManager\tmp*
[-J <List>]	File store method. <STORE_NORMAL | STORE_TRUNCATE' | STORE_APPEND'[',Separators='<Separators>] | STORE_OKFILE'[',Extension='<OKFileExtension>] > 'STORE_NORMAL' If the target file exists, an error is generated. If a file unique making pattern {{#...#} or {seq}) is specified, a new file is created each time. 'STORE_APPEND'[',Separators='<Separators>] The target file is appended. **NOTE:** The file is appended only if the -E option does not contain the unique marking patterns {{#...#} or {seq}). If these patterns are used then STORE_APPEND is interpreted as STORE_NORMAL. <Separators> = semi-colon-separated list of decimal-coded numbers. Separators added to the target file in between data appends. For example, '-J STORE_APPEND,Separators=13;10' adds a carriage return and a new line between target file data appends. STORE_OKFILE'[',Extension='<OKFileExtension>] The target file is accompanied by an OK file with the same file name, except for the extension. When only '-J STORE_OKFILE' is specified, extension 'ok' is assumed. **NOTE:** When the -E option specifies a file unique making pattern ({#...#} or {seq}), then 'STORE_APPEND' is interpreted as 'STORE_NORMAL'. Default is '-J STORE_NORMAL'

Examples of Specific Options

FTP

-i c:\inetpub\ftproot -O *Export*\ -Y D:\atellica data manager\tmp\ -U Protocol=FTP,Host=x.x.x.x -J STORE_NORMAL

where

- Export is a sub-folder on the FTProot folder on the LMX host
- Host =x.x.x.x - replace with the IP address of the LMX host

Shared folder:

-i \\<servername>\<Sharename>\ -O \\<servername>\<Sharename>\

where \\<*servername*>\<*Sharename*>\ defines a shared folder.

NOTE: If you are using a UNIX/LINUX server, verify the proper technique for specifying addresses.

File Transfer

Communication with the LMX is handled by two programs:

- The LMX translator processes all workorder files and creates results files.
- The File Transmitter is a separate program, running as a Windows process, that takes care of the FTP file transfer over the network. It is not needed when a shared network volume is being used.

The File Transmitter is installed by the Atellica DM installation program. No configuration is needed afterwards. Specify the –U Protocol=FTP parameter for the LMX translator. The -i parameter must specify the FTP folder on the Atellica DM server where the files are put by the LMX. If files must be put in a specific subdirectory of the LMX FTP server, you should also specify the -O <Subdirectory name>\ parameter.

NOTE: The "\" after the subdirectory name in the -O <Subdirectory name>\ parameter is required.

File naming conventions:

- Workorder files: DEMxxx.AST

  The prefix, DEM by default, is configurable using the -b switch. xxx is a configurable sequence number.

- Result files: RESxxx.AST

  The prefix, RES by default, can be configured using the -E switch.

Files are processed on receipt by the Atellica DM system and deleted afterwards. Sequence numbers of the result files are reset each time the translator is restarted, so ensure that all files are processed on the LMX before restarting the translator.

The Atellica DM software generates a .OK file after the result file has been fully transferred or created. Incoming .OK files for the workorder files can be used, but the Atellica DM software does not use the contents of the .OK file to verify that the workorder file is completely downloaded. Instead, the Atellica DM software waits 10 seconds after the last modification time of the workorder file to process the workorder file.

NOTE: A new workorder for the same patient can be processed at the LIS before the previous results are validated and uploaded. It is possible that the previously displayed results are not the most recently validated results.

FTP Error for LMX Transmission

If an error stating

The computer is disconnected from the network

displays on the screen or in the LMX translator log, it may be caused by Internet Explorer being set to work offline. You can deselect the option using the Internet Explorer File menu.

Specimen Receipt Information with the Technidata LMX Protocol

Specimen receipt (inlabbing) information such as SID, read date and time, and check-in location are transmitted from the Atellica DM system to the LIS in the Order Segment record of the Patient Result Upload message.

For information on the grammar of the inlabbing information contained within a result file and an example of the inlabbing transmission to the LIS, refer to (Page 99 *Specimen Receipt Information and Archive Location Transmission*)

Action Codes

The behavior of the action code in OBR record 12 is as follows:

Action Code	Action
R	1. If sample available for different patient: unmatched patient error. If not: 2. Rerun matching uploaded database requests. 3. Delete database requests with status < UPL that are not in the order. 4. Add requests that are in the order but not in the database. 5. If sample ID does not exist in the database, add new sample
S	1. If sample available for different patient: unmatched patient error 2. Omit all database requests with status < Review. **NOTE:** The Action Code field should not be blank.

Specific Action Code Behavior

The behavior depends on the setting of the **Full Sample Download** option on the LIS channel in the Atellica DM system by the local technical support provider. There are 2 possible actions the Atellica DM system can take when receiving a workorder using the LMX protocol:

- **Full Sample Download Enabled**: When the Atellica DM system software receives an updated workorder from the LIS using the LMX communication protocol, any current result in the Atellica DM system with a status of REV (Review) or VAL (Validated) will be omitted if these requests are absent from the updated workorder. Results with a status of UPL (Uploaded) are not affected.
- **Full Sample Download Disabled:** When the Atellica DM software receives an updated workorder from the LIS using the LMX communication protocol, tests that are present in Atellica DM system but not present in the workorder are not affected.

Mixed Action Codes

Do not mix action codes in the same message. The Atellica DM system software does not support the receipt of different action codes (for example, Cancel and Add) sent in the same message.

Test1 Cancel

Test2 Add-on

Test3 Add-on

Test4 Cancel

In this example, Test1 would not be processed.

NOTE: For LMX, a Cancel action code causes all requests in the sample in status Pending, Rerun, and Scheduled to be omitted. The cancel action is not limited to the test name in the order.

Grammar

- The grammar, which provides a description of the ASTM interface, is formally described in the tables below. Each table row represents a grammar rule. The first rule defines the element "Message" in terms of smaller elements. Further down the table the smaller elements are defined, and so on.
- Elements in *italics* must be translated (using another rule, unless obvious).
- Elements in **bold** must be used literally.
- Vertical | bars denote alternative choices.
- Square brackets [ ] denote optional inclusion.
- Curly braces { } denote optional repeated inclusion.
- Parentheses ( ) denote grouping.
- Asterisks * denote ignored strings.

Workorder Download

Component	Syntax	Comment
Message	*HeaderSegment { PatientSegment { PatientCommentSegment } { Order Segment { OrderCommentSegment } [ResultSegment] } } TerminatorSegment*	—
Header Segment	**H | ^ ~ \ & | * | * | * | ORM | * | * | * | <CR>**	—

Component	Syntax	Comment
Patient Segment	**P** | *SeqNo* | *Patient.Identifier* | * | * | *Patient.LastName* ^ *Patient.FirstName* ^ *Patient.MiddleName* ^ * ^ * ^ * | * | *Patient.Birthdate* | *Patient.Sex* | * | * | * | * | * | * | * | * | * | * | * | * | * | * | *Patient.Location.Name* | * | * | **<CR>**	**NOTE:** If the patient birthdate value downloaded from the LIS indicates that the patient age is greater than 150 years, the birthdate value is not accepted and the patient birthdate is not populated in the Atellica DM system.
Patient Identifier (P3)		Patient Identifier (PID) is limited to 40 characters. Patient.Identifier1 populates field P3. Patient.Identifier2 populates field P4.
Patient Identifier (P4)		P3 and P4 must be consistent. If P3 is not specified, then P4 will be taken as the patient ID. P3 will be checked first.

Component	Syntax	Comment
Patient Name		Patient Last Name, First Name, and Middle Name are restricted to 70 characters.
Patient Location		The Patient Location from the patient record is used if no Patient Location is specified in the order record.
Patient Comment Segment	**C** | *SeqNo* | **L** | *Patient.Comment* | **<CR>**	—
Order Segment	**OBR** | *SeqNo* | *Sample.Identifier* ^ * | * | *Test* ^ * ^ **L** ^ * ^ *Request.DilutionCondition* ^ *Request.DilutionCoefficient* | *Priority* | * | *Sample.CollectionTime* | * | * | * | *ActionCode* | * | * | * | * | * | * | *PatientLocation.Name* * | * | * | * |	This is the dilution factor to be forwarded to the analyzer. The Atellica DM software does not perform calculations based on this value.
Test	—	If a coding system is in effect, this is used to identify a test by TestCode.Value. If not, this is used to identify a test by Test.Mnemonic.

Component	Syntax	Comment
Priority	—	S = Stat A = As Soon As Possible Anything else is interpreted as Routine. **NOTE:** Priority can be updated by the LIS in subsequent workorder downloads.
Action Code	**S | R**	Refer to (Page 83 *Action Codes*)
Order Comment Segment	**C** | *SeqNo* | **L** | *Sample.Comment* | **<CR>**	—
Result Segment	**OBX** | *SeqNo* | * |*Test* | * | *Request.LISPrevResultValu e* | * | * | * | * | **A** | *Request.LISPrevResultTim e* | * | * | * | * | **<CR>**	Previous result: Field 12 (status) must be set to A (Anteriority). Time of day defaults to 00:00:00 if not specified.
Terminator Segment	**L** | * | * | * | * | **<CR>**	—

Patient Result Upload

Component	Syntax	Comment
Message	*HeaderSegment PatientSegment [PatientCommentSegment] OrderList TerminatorSegment*	—

Component	Syntax	Comment
Header Segment	**H | ^ ~ \ &** | | | *SenderId* | | **ORM** | | | | *ReceiverId* | | | *Version* | *TimeStamp* | **<CR>**	—
Sender ID	*Id* ^ **ATELLICA DM**	ID as specified in the -s startup option of the translator. The default setting is lmxs.
Receiver ID	*Id* ^ **LIS**	ID as specified in the -r startup option of the translator. The default setting is 38-1.
Version	—	As specified in the -v startup option of the translator. The default setting for LMX communication is A2.2.
Time Stamp	—	Date and time the result was sent. Format: YYYYMMDDHHMMSS.
Patient Segment	**P | 1 |** | *Patient.Identifier* | | *Patient.LastName* ^ *Patient.FirstName* ^ *Patient.MiddleName* | | *Patient.BirthDate* | *Patient.Sex* | | | | | | | | | | | | | | | | | | Ward ^ Room | | **<CR>**	Patient.Identifier1 populates field P3. Patient.Identifier2 populates field P4.
Patient Comment Segment	**C** | *SeqNo* | **L** | *Patient.Comment* | **<CR>**	—
Order List	*Order { Order }*	—
Order	*OrderSegment [OrderCommentSegment] { ResultSegment {ResultCommentSegment } }*	—

Component	Syntax	Comment
Order Segment	**OBR** | *SeqNo* | *SampleIdentifier* ^ *OrderId* | | *Test* ^ ^ **L** | *Priority* | | | | | | *ActionCode* | | | | | | | | | | | | | | | | | **<CR>**	
Priority	**R | A | S**	R= Routine A = As soon as possible S = Stat
Action Code	Blank for patient result uploads. **Q** for QC result uploads	
Order Comment Segment	**C | 1 | L |** *Sample.Comment* | **<CR>**	Added only if a sample comment is available.
Result Segment	**OBX** | *SeqNo* | *ResultType* | *Test* ^ ^ ^ ^ *DilutionCondition* ^ *DilutionCoefficient* | | *Value* | | | *Flag* | | | *Status* | *AvailabilityTime* | | | | *Operator* |**<CR>**	The dilution coefficient is the coefficient reported by the analyzer for onboard dilution. This does not incorporate a manual sample dilution because the Atellica DM system calculates results when a manual dilution is ordered at the Atellica DM opearator interface. AvailabilityTime corresponds to the Aspiration time of the result.

Component	Syntax	Comment
Result Type	**CE | NM | ST**	CE = Coded Entry for enumerated tests. **NOTE:** For enumerated test results, choice codes *must* be synchronized between LMX and the Atellica DM software. NM = Numeric Result. ST = Alphanumerical Result
Test	—	If a coding system is in effect and a code for the given test is available, then TestCode.Value is transmitted. If not, Test.Mnemonic is transmitted.
Flag	* | <empty>	Asterisk if Instruments flag is present. **NOTE:** The actual flags are sent as result comment records. See **Result Comment Segment** for more details.
Result Comment Segment	**C** | *SeqNo* | **L** | (Request.Comment | *InstrumentFlag.Code*) **<CR>**	Instrument flags and request comments are sent only if this action is configured on the system Options menu.
Terminator Segment	**L** | | | **1** | *LineCount* **<CR>**	—
Seq No	—	The sequence number of the segment identifies the segment within the scope of its parent segment.

Component	Syntax	Comment
Line Count	—	The line count is the total number of segments in a message, including the Terminator Segment itself.

QC Result Upload

Component	Syntax	Comment
Message	*HeaderSegment PatientSegment OrderList TerminatorSegment*	—
Header Segment	**H | ^ ~ \ &** | | | *SenderId* | | **ORU** | | | *ReceiverId* | | **P** | *Version* | *TimeStamp* | **<CR>**	—
Sender ID	*Id* ^ **Atellica Data Manager**	ID as specified in the -s startup option of the translator. The default setting is lmxs.
Receiver ID	*Id* ^ **LIS**	ID as specified in the -r startup option of the translator. The default setting is 38-1.
Version	—	As specified in the -v startup option of the translator. The default setting for LMX communication is A2.2.
Time Stamp	—	Date and time the result was sent. Format: YYYYMMDDHHMMSS.

Component	Syntax	Comment
Patient Segment	**P** | **1** | | | | | | | **U** | | | | | | | | | | | | | | | | | **<CR>**	—
Order List	*Order { Order }*	—
Order	*OrderSegment { ResultSegment {ResultCommentSegment } }*	—
Order Segment	**OBR** | *SeqNo* | *QCLot.Number* | | *Test* ^ ^ **L** | **R** | | | | | | **Q** | | | | | | | | | | | | | | | **<CR>**	—
Result Segment	**OBX** | *SeqNo* | *ResultType* | *Test* | | *QCResult.Value* | | | | | | | *Result.Availability-Time* | | | | | **<CR>**	Value is either QCResult.Value or nonnumeric extracted from a QCResult.Comment. **NOTE:** Upload by Lot is *not* recommended when uploading large amounts of QC results per upload. When uploading large amounts of QC results, the value for the Time out option on the Translator window should be increased.

Compo-nent	Syntax	Comment
Result Type	**CE | NM | ST**	CE = Coded Entry for enumerated tests. **NOTE:** For enumerated test results, choice codes *must* be synchronized between LMX and the Atellica DM software. NM = Numeric Result. ST = Alphanumerical Result
Test	—	If a coding system is in effect and a code for the given test is available, then Test-Code.Value is transmitted. If not, Test.Name is transmitted.
Terminator Segment	**L** | | | **1** | *LineCount* **<CR>**	—
Seq No	—	The sequence number of the segment identifies the segment within the scope of its parent segment.

Compo-nent	Syntax	Comment
Line Count	—	The line count is the total number of segments in a message, including the Terminator Segment itself.

LMX Transmission Examples

Patient sensitive information has been made anonymous within the following examples.

Workorder Download: LIS to Atellica DM system, New Workorders

H|^~\&|||0001^HCSECURG||ORM|||0002^Atellica Data Manager||P|A2.2|20010118162941|

P|1|PID1234|||LASTNAME^FIRSTNAME^||19500101|M|||||||||||||||ICU|

OBR|1|SID1234^||NA^^L^^^|R|||||||||||||||

OBR|2|SID1234^||CL^^L^^^|R|||||||||||||||

OBR|3|SID1234^||CA^^L^^^|R|||||||||||||||

OBR|4|SID1234^||IRON^^L^^^|R|||||||||||||||

OBR|5|SID1234^||TSH^^L^^^|R|||||||||||||||

OBR|6|SID1234^||FSH^^L^^^|R|||||||||||||||

C|1|L|This is only a test.|

L|||1|8||

Workorder Download: LIS to Atellica DM system, Rerun

H|^~\&|||0001^HCSECURG||ORM|||0002^Atellica Data

Manager||P|A2.2|20010118162941|

P|1|PID1234|||LASTNAME^FIRSTNAME^||19500101|M|||||||||||||||ICU|

OBR|1|SID1234^||NA^^L^^^|R|||||||||||||||

OBR|2|SID1234^||TSH^^L^^^|R|||||||||||||||

OBR|3|SID1234^||FSH^^L^^^|R|||||||||||||||

C|1|L|This is only a test.

|L|||1|5||

Quality Control Result Upload: Atellica DMSystem to LIS

H|^~\&|||8888^Atellica Data Manager||ORU|||38- 1^LIS||P|A2.2|20071120025446|
P|1|||||||U||||||||||||||||||
OBR|1|Q1234||CL^^L|R||||||Q|||||||||||||
OBX|1|NM|CL||105|||||||20071119025419|||||
OBR|2|Q1234||CL^^L|R||||||Q|||||||||||||
OBX|1|NM|CL||99|||||||20071119025519|||||
OBR|3|Q1234||CL^^L|R||||||Q|||||||||||||
OBX|1|NM|CL||95|||||||20071119025619|||||
OBR|4|Q1234||CL^^L|R||||||Q|||||||||||||
OBX|1|NM|CL||104|||||||20071119025719|||||
OBR|5|Q1234||CL^^L|R||||||Q|||||||||||||
OBX|1|NM|CL||103|||||||20071119025819|||||
OBR|6|Q1234||CL^^L|R||||||Q|||||||||||||
OBX|1|NM|CL||106|||||||20071119025919|||||
OBR|7|Q1234||CL^^L|R||||||Q|||||||||||||
OBX|1|NM|CL||101|||||||20071119030019|||||
L|||1|17|

Result Upload: Atellica Data Manager to LIS

H|^~\&|||8888^Atellica Data Manager||ORU|||381^LIS||P|A2.2| 20071120030826|
P|1|PID1234|PID1234||LASTNAME^FIRSTNAME||19500101|M|||||||||||||||| CU|
OBR|1|SID1234||CA^^L|R||||||||||||||||||||
C|1|L|This is only a test.|
OBX|1|NM|CA||9.2|||||||||||
OBR|2|SID1234||NA^^L|R||||||||||||||||||||
OBX|1|NM|NA||143|||||||||||
OBR|3|SID1234||CL^^L|R||||||||||||||||||||
OBX|1|NM|CL||102|||||||||||
C|2|L|Add-on test requested by phone.|
OBR|4|SID1234||IRON^^L|R||||||||||||||||||||
OBX|1|NM|IRON||67|||||||||||
OBR|5|SID1234||FSH^^L|R||||||||||||||||||||
OBX|1|ST|FSH||POS|||||||||||

OBR|6|SID1234||TSH^^L|R|||||||||||||||||||

OBX|1|NM|TSH||4.23|||||||||||

L|||1|17|

Example: One Result with Multiple Aspects

H|^~\&|||LMXS^Atellica Data Manager||ORU|||38-1^LIS||P|A2.2|20110522175156|

P|1|CTR8|CTR8||CTR8FIRST^CTR8LAST||19800927|M|||||||||||||||||

OBR|1|CTR8||TSH^^L|S|||||||||||||||||||

OBX|1|NM|TSH||898.0|||||||20110522175119|||||

OBR|2|CTR8||TSH^^L|S|||||||||||||||||||

OBX|1|ST|TSH||POS|||||||20110522175119|||||

L|||1|7|

6 Specimen Receipt Information and Archive Location Transmission

Specimen receipt (inlabbing) information transmission is the auto-receipt registration of samples checked in to the LAS. The SID, registration date and time stamp, and location of the sample are uploaded from the LAS to the Atellica DM system and then to the LIS.

Archive location transmission is the upload of the sample cold storage archive location information as reported by the LAS. The Atellica DM software can be configured to upload only the inlabbing information, only the archive location information, or both, depending upon the needs of the laboratory.

Changes to your LIS interface software can be required to provide the auto-receipt functionality of uploading accession information or archive location information to your LIS.

Inlabbing Upload

Your LIS must be able to support the receipt of inlabbing information for samples that were not created within the LIS. If your LIS cannot support this, you may not be able to fully integrate this feature.

Inlabbing messages contain the following associated sample information:

- SID
- Registration date and time, when the sample was checked into the LAS
- Checkin location

You can only perform one upload of LAS inlabbed information per sample. Subsequent LAS inlabbing updates for the sample cannot be sent to the LIS.

The expectation is that once the LAS sends the initial inlabbing message to the Atellica DM system, this information is uploaded to the LIS.

NOTE: If results have already been uploaded to the LIS or if there are no tests ordered for that sample, inlabbing information for that sample cannot be uploaded.

Archive Location Information Upload

Uploaded archive location information messages contain the following associated sample information:

- LasStatus
- SampleId

- RegistrationDateTime (time, when the sample was archived into cold storage on the LAS)
- TrayId
- Position
- Location1 ^ Location2 ^ Location3 ^ Location4

The Atellica DM software uploads the LAS archive location information each time the sample is archived on the LAS. If the sample is removed from cold storage for additional processing and then archived to a new cold storage location, the Atellica DM software receives the new archive location information and uploads the information to the LIS.

Please note the following restrictions and requirements:

- The Siemens Host Spec 79 protocol *does not* support inlabbing or archive location information upload.
- The LIS may require configuration changes to accept and process the inlabbing information or archive location information uploaded from the Atellica DM system.
- The format used for uploading inlabbing and archive information for HL7 is described in the HL7 Version 2.5 chapter in (Page 130 *SAC Segment*)

The LIS must be capable of handling the uploaded data for all possible fields described within the grammar structure tables.

ASTM 1394 Messages

For the ASTM 1394 protocol, the inlabbing and archive location information is contained within the Manufacturer record of the LAS Status Upload message.

The inlabbing archive location message contains the following: header record, manufacturer record and terminator record.

Grammar Structure of the ASTM LAS Status Upload Message

LAS Status Upload

Component	Syntax	ASTM Field
Message	HeaderRecord ManufacturerRecord TerminatorRecord	
Header Record	**H | \ ^ & | | | | | | | | | | P | 1 |** *TimeStamp* **<CR>**	Timestamp in *YYYYMMDDHHmms s* format

Component	Syntax	ASTM Field
Manufacturer Record	**M | 1 | I |** *LasStatus ^ SampleId*[1]*^ RegistrationDateTime | TrayId | Position | Location1 ^ Location2 ^ Location3 ^ Location4* **<CR>**	
LAS Status	**I|L|R**	LAS Status **I |L| R** I = Inlabbing L = Left Equipment (Cold Storage) R = Rack Rack upload is not currently supported in this upload message.
Sample ID		
Registration Date Time[2]		Timestamp in *YYYYMMDDHHmms s* format
Tray ID/Rack ID		ID of the Tray (ADVIA Automation) or Rack (Aptio Automation).
Pos		Position in tray. Position in tray is identified by a letter/ digit combination: A1 through J10 where the letters are A - J and the numbers are 1-10 Position in rack is identified by a numeric value (1-48)

Component	Syntax	ASTM Field
LAS General Area - Location 1	ADVIA Automation: CS MT SC OT Aptio Automation: Node ID	ADVIA Automation: CS = Cold Storage MT = Main Track SC = Side Car OT = Off Track
Location 2	**Shelf | Gate (ADVIA Automation)** Floor (Aptio Automation)	If General Area = CS[3] Then Location 2=Shelf If General Area = MT, SC, or OT Then Location 2=Gate
Location 3	Door	If General Area = CS[3] Then Location 3=Door Else Location 3 is blank
Location 4	Area Field	If General Area = CS[3] then Location 4=Area Else Location 4 is blank
Terminator Record	**L | 1 | N <CR>**	

Notes	Explanation
[1]Sample ID	If the Atellica DM system receives an end of route message from a sample placed into a SIQ tray within the Sample Manager before the inlabbing message is uploaded to the LIS, the Atellica DM system uploads the information from the end of route message, but the SID is 'NO READ' instead of the actual SID.
[2]Registration Date and Time	Registration date and time are not uploaded if a LAS update query initiates the generation of the sample LAS information.

Notes	Explanation
[3]Location 2, 3, 4	Maximum possible field length is 240.

ASTM Specimen Receipt Information Transmission to LIS

The following two examples represent typical inlabbing messages.

Example 1

Tube 123456789 registered onto the lab automation system on 06-02- 2006 at 17:50

H|\^&||||||||||P|1|20060602193714

M|1|I|I^123456789^20060602175000|||MT

L|1|N

Example 2

Tube 123459876 registered onto the lab automation system on 06-02- 2004 at 9:15:12

H|\^&||||||||||P|1|20060602193518

M|1|I|I^123459876^20060602091512|||MT

L|1|N

The following example is a typical archive location information message.

Example 3

In this example, sample 123456781 located in position A1 of unload tray 10027117 was placed into cold storage on 07-19-2007 at 14:06. The cold storage location information uploaded corresponds to how the operator configured the cold storage names on the LineMaster computer.

H|\^&||||||||||P|1

M|1|I|L^123456781^20070719140624|10027117|A1|
CS^Shelf2^Door2^Ar ea2

L|1

Technidata LMX Files

Sample inlabbing and archive location information from the Atellica DM system is transmitted to the LIS in the Order Segment record of the Patient Result Upload message.

Like other result files transferred to the LIS, the inlabbing and archive location message within the result file contains the following: header segment, patient segment, order segment, and terminator segment.

Grammar Structure of the Inlabbing Upload File

Inlabbing Upload

Component	Syntax	Comment
Message	*HeaderSegment PatientSegment [PatientCommentSegment] OrderList TerminatorSegment*	—
Header Segment	**H | ^ ~ \ &** | | | *SenderId* | | **ORU** | | | *ReceiverId* | | | *Version* | *TimeStamp* | **<CR>**	—
Sender ID	*Id* ^ **ATELLICA DATA MANAGER**	ID as specified in the -s startup option of the translator. The default setting is lmxs.
Receiver ID	*Id* ^ **LIS**	ID as specified in the -r startup option of the translator. The default setting is 38-1.
Version	—	As specified in the -v startup option of the translator. The default setting for LMX communication is A2.2.
Time Stamp	—	Date and time the result was sent. Format: YYYYMMDDHHMMSS.
Patient Segment	**P | 1** | | | | | | | U| | | | | | | | | | | | | | | | | | **<CR>**	—

Component	Syntax	Comment
Order Segment	**OBR** | *SeqNo* | *SampleIdentifier1*^ | | ^ ^ **L** | | | | | | |	
	ActionCode | | | | | | | | *LasStatus* ^ *RegistrationDateTime* ^ *TrayId* ^ *Position* ^ *GeneralArea(Location1)* ^ *Location2* ^ *Location3* ^*Location4* | | | | | *Order Result Status* **<CR>**	
Action Code	Blank for inlabbing upload.	
LAS Status	**I|L|R**	LAS Status **I |L| R** I = Inlabbing L = Left Equipment (Cold Storage) R = Rack Rack upload is not currently supported in this upload message.
Registration Date Time[2]		Timestamp in YYYYMMDDHHmmss format
Tray Id		ID of the Tray (ADVIA Automation) or Rack (Aptio Automation)

Component	Syntax	Comment
Position		Position in tray/ rack. Position in tray is identified by a letter/ digit combination: A1 through J10 where the letters are A - J and the numbers are 1 - 10 Position in rack is identified by a numeric value(1-48)
LAS General Area - Location 1	ADVIA Automation: CS MT SC OT Aptio Automation: Node ID	ADVIA Automation: CS = Cold Storage MT = Main Track SC = Side Car OT = Off Track
Location 2	Shelf | Gate (ADVIA Automation) Floor (Aptio Automation)	If General area = CS[3] then Location 2 = Shelf Else Location 2 = Gate
Location 3	Door	If General Area = CS[3] then Location 3 = Door Else Location 3 is blank
Location 4	Area Field	If General Area = CS[3] then Location 4 = Area Else Location 4 is blank
Order Result Status	I	For an inlabbing message, this value is I.

Component	Syntax	Comment
Terminator Segment	**L | | | 1** | *LineCount* **<CR>**	—
Seq No	—	The sequence number of the segment identifies the segment within the scope of its parent segment.
Line Count	—	The line count is the total number of segments in a message, including the Terminator Segment itself.

Notes	Explanation
[1] Sample ID	If the Atellica DM system receives an end of route message from a sample placed into a SIQ tray within the Sample Manager before the inlabbing message is uploaded to the LIS, the Atellica DM system uploads the information from the end of route message, but the SID is 'NO READ' instead of the actual SID.
[2] Registration Date and Time	Registration date and time are not uploaded if a LAS update query initiates the generation of the sample LAS information.
[3] Location 2, 3, 4	Maximum possible field length is 240.

LMX Specimen Receipt Information Transmission to LIS

The following two examples represent typical inlabbing messages.

Example 1

Tube 123456789 registered onto the lab automation system on 06-02-2006 at 17:50

H|^~\&|||LMXS^ATELLICA DATA MANAGER||ORU|||38-1^LIS ||P|A2.2|20060602182901|

P|1|||||||U|||||||||||||||||

OBR|1|123456789||^^L|R|||||||||||||||I^20060602175000^^^MT|||||I

L|||1|4|

Example 2

In this example, tube 123459876 registered onto the lab automation system on 06-02-2004 at 9:15:12.

H|^~\&|||LMXS^ATELLICA DATA MANAGER||ORU|||38- 1^LIS||P|A2.2|20060602192057|

P|1|||||||U|||||||||||||||||

OBR|1|123459876||^^L|R|||||||||||||||I^20060602091512^^^MT|||||I

L|||1|4|

The following example is a typical archive location information message.

Example 3

In this example, sample 123456781 located in position J2 of unload tray 10002784 was placed into cold storage on 05-06-2008 at 19:20. The cold storage location information uploaded corresponds to how the operator configured the cold storage names on the LineMaster computer.

H|^~\&|||LMXS^ATELLICA DATA MANAGER||ORU|||38- 1^LIS||P|A2.2|20080506183910|

P|1|||||||U|||||||||||||||||

OBR|1|123456781||^^L|||||||||||||||L^20080506184528^10002784^J2^CS

^R ight^Wed^Igloo 2|||||IL|||1|4|

Example 4

In this example, tube 12341 registered onto the Input Output Module (Node 4) of the Aptio Automation system on 04-08-2011 at 12:56:44.

H|\^&|||||||||P|1|20110408131504

M|1|I|I^12341^20110408125644|||04

L|1

7 Siemens Host Spec. 79 Protocol

This section describes the Siemens Host Spec. 79 protocol used for the communication link between the Atellica DM system and a LIS or host computer.

This section is intended for the information systems professional responsible for connecting the Atellica DM system and your host computer. Contact your local technical support provider for additional information.

NOTE: For a more detailed description of the Host Spec. 79 protocol, refer to *Communication Links Between the Data Manager and a Host Computer* (Customer bulletin 067D0068-xx).

NOTE: Upload of more than 1 patient result aspect is not supported by this protocol. Analyzers such as the ADVIA Centaur system can upload more than 1 aspect for a result to the Atellica DM software. Although all result aspects can be stored in the Atellica DM database, the Atellica DM software uploads only 1 result aspect–the aspect that is specified as the result selector–to the LIS using the Spec. 79 protocol. Uploading only 1 aspect can impact sites that upload infectious disease results, where both numerical and interpretative aspects may be required.

Overview

NOTE: The ASTM 1394 communication protocol is the recommended protocol for use with the Atellica DM system.

The LIS initiates sending patient workorder information to the Atellica DM system before each sample run. The information will be parsed and stored in the system for later use. An automatic request for patient demographics is generated when a measurement cycle starts and no existing sample ID workorder or patient demographic record exists on the analyzer.

The Atellica DM system can be configured to automatically transfer available results to the host or manually transfer results to permit the operator time to review the data and release the sample results.

NOTE: The Siemens Host Spec. 79 protocol does not support the Atellica DM system inlabbing functions.

Translator Specific Options

In the Atellica DM system, the driver for the Siemens Host Spec. 79 LIS translator is the s79s driver.

The translator Specific Options are as follows:

-c <Configuration file name>	The -c trame.par option specifies the name of the configuration file. The default setting is trame.par.
-i <Configuration file directory>	The -i specifies the path where the configuration file is located.
-s <port >	The -s xxxx option sets the port number of the LIS. This is *mandatory* and is usually entered as **8888**. xxxx is the port number of LIS.
-f	The -f option sets the system to upload sample/ system flags.
-p	The -p option sets the system to upload disposition codes.
-u	The -u option sets the system to upload the validation operator name.

Trame.par

The Trame.par file defines the structure of Host Spec. 79 messages exchanged between the Atellica DM system and the LIS. Modifying this file enables you to change the data stream that is transmitted. You can specify the position of each item within the stream, as well as specify data characteristics such as length, justification, and padding. However, you cannot use the Trame.par file to modify transmission of the actual test results.

The Trame.par file contains 3 parts:

- The first part of the file is the word **HOST**.
- The second part of the file lists the data items (keys) that can be included in the message and specifies their characteristics. Test-related data items for orders and results are not listed here because they cannot be modified. Each key has three characteristics that you can modify. They are enclosed within parentheses and separated by a comma. Each key definition is terminated by a period.
- The third part of the file defines the sequence (message frame) in which the data items are transmitted. There are two possible message frames; one frame is for the workorder "Y" message, and one frame is for the result "R" message.

Keys and Their Characteristics

Keys are individual items within the data stream. They display in the following format:

key name = (X,Y,Z)

X	The number of characters transmitted for this item
Y	L = characters are left aligned R = characters are right aligned
Z	S = each unused character position is filled with a space Z = each unused character position is filled with a zero

Grammar

Component	Syntax	Comment
Definition	HOST <CR> <LF> { KeyDefinition } { FrameDefinition }	—
KeyDefinition	KeyName = (Width , Alignment , Padding) . <CR> <LF>	—
KeyName	WorkOrderKeyName | ResultKeyName	—
WorkOrderKeyName	BIRDAY | BIRMONT | BIRYEAR | COCOM | COLDAY | COLHOUR | COLMIN | COLMONT | COLSEC | COLYEAR | CPCOM | DOCTOR | IDEE | LOCATIO | PATNAM | PATNUM | SEX | SPCODE | URGENT | UPDT | SLIDE	—

Component	Syntax	Comment
ResultKeyName	ASPDAY | ASPHOUR | ASPMIN | ASPMONT | ASPSEC | ASPYEAR | COCOM | CPCOM | IDEE | INSTRUMENT | NUMPOS | NUMRACK | PATNUM | POSTUBE | SPCODE | SPTEXT	—
Width	—	Number of characters to be transmitted
Alignment	L | R	L = left R = right
Padding	S | Z	S = space Z = zero
FrameDefinition	(WorkOrderFrameDefinition | ResultFrameDefinition) <CR> <LF>	—
WorkOrderFrameDefinition	TRAME_Y = STX , MT , { WorkOrderItem , } CRLF , LRC , ETX .	—
ResultFrameDefinition	TRAME_R = STX , MT , { ResultItem , } CRLF , LRC , ETX .	—
WorkOrderItem	" StringLiteral " | SpaceCount | (WorkOrderKeyName) | :	Colon (:) is a placeholder for variable-size request-based information
ResultItem	" StringLiteral " | SpaceCount | (ResultKeyName) | :	Colon (:) is a placeholder for variable-size request-based information
StringLiteral	—	Transmitted literally
SpaceCount	—	Number of space characters to be transmitted

Key Name Overview

Key	Atellica DM Field	Comment	Default
ASPDAY	Result.AspirationTime (day)	In the Atellica DM system, aspiration time is linked to results and is more specific than these samplebased messages permit. The Atellica DM software copies the earliest aspiration time of any embedded result into the message.	(2,R,Z)
ASPHOUR	Result.AspirationTime (hour)		(2,R,Z)
ASPMONT	Result.AspirationTime (month)		(2,R,Z)
ASPMIN	Result.AspirationTime (minutes)		(2,R,Z)
ASPSEC	Result.AspirationTime (seconds)		(2,R,Z)
ASPYEAR	Result.AspirationTime (year)		(2,R,Z)
BIRDAY	Patient.BirthDate (day)	—	(2,R,S)
BIRMONT	Patient.BirthDate (month)	—	(2,R,S)
BIRYEAR	Patient.BirthDate (year)	—	(4,R,S)
COCOM	Sample.Comment	—	—
COLDAY	Sample.CollectionTime (day)	—	(2,R,Z)
COLHOUR	Sample.CollectionTime (hour)	—	(2,R,Z)
COLMIN	Sample.CollectionTime (minute)	—	(2,R,Z)

Key	Atellica DM Field	Comment	Default
COLMONT	Sample.CollectionTime (month)	—	(2,R,Z)
COLSEC	Sample.CollectionTime (second)	—	(2,R,Z)
COLYEAR	Sample.CollectionTime (year)	—	(2,R,Z)
CPCOM	Patient.Comment	—	—
DOCTOR	Physician.Identifier	———	(6,L,S)
IDEE	Sample.Identifier	—	(14,R,Z)
INSTRUMENT	Instrument.Name	In the Atellica DM system, instrument or analyzer references are linked to results and are more specific than this sample-based message permits. The Atellica DM software copies the first analyzer reference of any embedded result into the message.	(5,R,S)
LOCATIO	PatientLocation.Name	—	(1,R,S)
NUMPOS	Sample.LastPosition	—	—
NUMRACK	Sample.LastRack	—	—

Key	Atellica DM Field	Comment	Default
PATNAM	Patient.Last-Name Patient.First-Name		(30,L,S)
PATNUM	Patient.Identifier		(14,L,S)
POSTUBE	Sample.LastRack Sample.LastPo-sition	If you specify the POSTUBE, the track transmits as rack+position separated by a space. You can change this format by specifying NUMRACK and NUMPOS separately.	(6,R,S)
SEX	Patient.Sex	M, F, or blank.	(1,R,S)
SPCODE	SpeciesIdentifier	If a coding system is in use, this identifies a species by Species-Code.Val ue. If not, this identifies a species by Species.Name.	(4,R,S)
SPTEXT	Species.Name	—	—
URGENT	Sample.Priority	U = Stat Anything else is interpreted as Routine priority.	(1,L,S)
UPDT	—	Update indicator that is required for updates to existing samples.	(1,R,S)

Key	Atellica DM Field	Comment	Default
SLIDE		Manufacturer record following the order segment with M.3 = SlideSuppression when the value of SLIDE is 'N.'	(1,R,S)

Order Download

The following conditions apply to order download records:

- Patient Identifier (PID) is limited to 40 characters. Patient Last Name, First Name, and Middle Name are restricted to 70 characters. Physician First Name and Last Name are restricted to 70 characters.
- Test identifiers contained in the order message are right-aligned with leading zeros. If a coding system is in use, this is used to identify a test by TestCode.Value. If not, this is used to identify a test by Test.Mnemonic.
- Request-based data may include previous result values and times. If no time is specified, 00:00:00 is the default.
- When the Atellica DM software receives an updated workorder from the LIS using the Host Spec. 79 communication protocol, any current result in the Atellica DM system with a status of REV (Review) or VAL (Validated) will be deleted and the request for that test omitted if these requests are absent from the updated workorder. Results with a status of UPL (Uploaded) are not affected.

NOTE: Do not mix action codes in the same message. The Atellica DM software does not support the receipt of different action codes (for example, Cancel and Add) sent in the same message.

Test1 Cancel

Test2 Add-on

Test3 Add-on

Test4 Cancel

In this example, Test1 would not be processed.

FTP Error for Image Transmission

If an error stating “The computer is disconnected from the network” displays on the screen, it may be caused by Internet Explorer being set to work offline. You can deselect the option using the Internet Explorer File menu.

Updating Workorders from the LIS using Host Spec. 79 and LMX

When the Atellica DM software receives an updated workorder from the LIS using the Host Spec. 79 and LMX communication protocols, any current result in the Atellica DM system with a status of Review (REV) or Validated (VAL) is deleted and the request for that test omitted if these requests are absent from the updated workorder. Results with a status of Uploaded (UPL) are not affected.

NOTE: Use caution when updating a workorder from the LIS using the Host Spec. 79 or LMX communication protocols. Requests are omitted without a message or warning. This issue will be addressed in a future software release.

Patient Result Upload

The following conditions apply to patient result upload records:

- Up to 110 result records can be transmitted in a single message.
- Test identifiers are right-aligned with leading spaces. If a coding system is in use, the identifier is set to TestCode.Value. If not, it is set to Test.Mnemonic.
- Result values are right aligned with leading spaces.
- The Flags field contains an Asterisk (*) only if a flag is present in the Flag codes field.
- The Spec79 protocol restricts upload of analyzer flags to a maximum of 15 per result and to flags with a 2-character code.
- Result disposition code contains 'E' (Edited) only if the result is not obtained from an analyzer.
- The validation user login name is transmitted only if startup parameter

  -u is used and UploadModel.ValidationUser is set.

QC Result Upload

QC result upload is very similar to the patient result upload. The structure of the message is the same, defined by trame.par. However, the following key names are substituted differently:

Key Name	Atellica DM Field	Comment
ASPDAY	QCResult.Assessment-Time (day part)	In the Atellica DM system, aspiration time is linked to results and is more specific than this sample-based message permits. The Atellica DM software copies the earliest aspiration time of any embedded result into the message.
ASPHOUR	QCResult.Assessment (hour part)	
ASPMONT	QCResult.Assessment (month part)	
ASPMIN	QCResult.Assessment (minutes part)	
ASPSEC	QCResult.Assessment (seconds part)	
ASPYEAR	QCResult.Assessment (year part)	
IDEE	QCLot.Number	

All other fields are left blank. This means that they are either filled in with spaces (S in trame.par) or by zeroes (Z in trame.par).

Message Frames

The elements of a message frame are as follows:

Frame name=STX, MT, "Literal character", space indicator, :, space indicator, (key name), CRLF, LRC, ETX.

Frame name	TRAME_Y = Workorder message
	TRAME_R = Result message
Literal characters	These characters are transmitted exactly as they display, without the quotation marks.
Space indicator	This number indicates the number of space characters transmitted.
:	This character indicates the position of test related information that has no fixed size.

TRAME_Y Workorder Data Stream - with Slide

TRAME_Y=STX,MT,"Y",2,(URGENT),(UPDT),1,(IDEE),8,(SLIDE),16,
(SPCODE),1,(PATNUM),3,(PATNAM),1,(BIRMONT),"/",(BIRDAY),"/ ",
(BIRYEAR),1,(SEX),1,(COLMONT),"/",(COLDAY),"/ ",(COLYEAR),1,
(COLHOUR),(COLMIN),1,(LOCATIO),1,(DOCTOR),1, CRLF,:,CRLF,LRC,ETX.

TRAME_Y Workorder Data Stream - without Slide

TRAME_Y=STX,MT,"Y",2,(URGENT),(UPDT),1,(IDEE),20,(SPCODE),1,
(PATNUM),3,(PATNAM),1,(BIRMONT),"/",(BIRDAY),"/",(BIRYEAR), 1,(SEX),1,
(COLMONT),"/",(COLDAY),"/",(COLYEAR),1,(COLHOUR), (COLMIN),1,
(LOCATIO),1,(DOCTOR),1,CRLF,:,CRLF,LRC,ETX.

Default “R” (Result) Message

TRAME_R=STX,MT,"R",1,(IDEE),1,(SEX),(POSTUBE),6,(SPCODE),1,
(ASPMONT),"/",(ASPDAY),"/ ",(ASPYEAR),1,(ASPHOUR),":",(ASPMIN),":",
(ASPSEC),3,CR,LF,:CRLF,LRC,ETX.

8 HL7 Version 2.5

Overview

The Atellica DM software provides the mhl7 translator, which implements a subset of HL7 version 2.5. The HL7 version 2.5 protocol provides the communication link between the Atellica DM system and a LIS using HL7. An HL7 version 2.5 implementation is not backward compatible with HL7 version 2.3 implementations. To communicate, a minimal lower layer protocol must be implemented by the LIS.

The HL7 communication link allows the LIS to transmit workorders and multiple previous patient results for the same test to the Atellica DM software and to accept QC and patient test results transmitted from the Atellica DM software.

NOTE: If the LIS that is connected to the Atellica DM system uses the HL7 protocol, there is a 63-character limit for the upload of analyzer or instrument flags.

Translator Specific Options

The mhl7 translator has the following specific options:

-i <sending_application: sending_facility>	Only applicable for HL-7 OUL R22, result upload, and HL-7 SSU U03, specimen status update, message types. Used to identify the sending application and the sending facility. Default values: sending_application = **Atellica Data Manager** sending_facility = **ResultExport**
-r <receiving_application: receiving_facility>	Only applicable for HL-7 OUL R22, result upload, and HL-7 SSU U03, specimen status update, message types. Used to identify the receiving application and receiving facility. Default values: receiving_application = **LIMS** receiving_facility = **ResultImport**
-s <port>	Configures the TCP/IP port where the mhl7 translation listens for LIS Communications

-c <client idle time out>	Configures the time-out value (seconds) after which the mhl7 translator closes a client connection that has been idle; that is, no upload or download operation occurred in that time interval. This option is only applicable when mhl7 translator is configured as a TCP/IP listener service(-s option used). Default = **86,400** seconds (1 day of idle operation).
-t <client response time out>	Configures the time-out value (seconds) applied when the mhl7 translator, operating as a TCP/IP listener, expects a response to a result upload or sample status update message. If the timeout value is exceeded then the mhl7 translator issues a reject message and determines that the result upload or status update did not succeed. Default value = **30** seconds.
-w <accpet unconditionally incoming client connection>	Available for driver v1.5 only. The system disconnects the previous connection and accepts the new client connection.
-a <disable upload of result aspect>	Available for driver v1.5 only. This option prevents "<Aspect name>" from appending to the Test name in the OBR.4 and OBX.3 fields and must only be used when disabling Upload Result Aspects on the Patient tab of the LIS channel. If the -a option is used with Upload Result Aspects enabled, and a result has multiple aspects, all the aspect results upload with the same test name. When Upload Result Aspects is disabled, only the result matching the result selector in Atellica DM uploads.

Lower Layer Protocol

This mhl7 translator uses a minimal lower layer protocol to demarcate the HL7 messages exchanged with the LIS. The format of this lower level protocol is as follows:

<SB>message_data<EB><CR>

- The protocol codes are identified as follows:
- <SB> - one byte Start Block character; that is, 0x0b (decimal 11)
- <EB> - one byte End Block character; that is, 0x1c (decimal 28)
- <CR> - carriage return character, 0x0d

Single and Dual Channel

The mhl7 translator is used as a single connection to the LIS or as a dual connection, where two channels are used to communicate with the LIS.

Single Channel

A single TCP/IP channel is established with the LIS. The translator sends results and status updated to the LIS on this channel. It also receives orders from the LIS on this same channel. Transmission by both the Atellica DM software and the LIS can be simultaneous as the minimal lower layer does not impose any session establishment requirements, as with ASTM 1381.

The –s option configures the port at which mhl7 listens for the connection from the LIS.

Alternatively, the translator can connect to the LIS as a client by placing the LIS IP address and port number in the translators External Interface.

NOTE: When the Atellica DM system is operating as a TCP socket server, the client must connect to that socket in order for there to be an available TCP connection. If the Atellica DM system operates as the TCP Client instead then it can attempt to establish the TCP connection.

Dual Channel

Separate upload and download channels are configured. This configuration is established via the Outbound LIS Translator and Inbound LIS Translator.

The outbound translator uploads results and status updates to the LIS. Simultaneously, the inbound translator can receive orders from the LIS.

The –s option configures whether the translator serves as a TCP/IP listener (server). If it does not serve as a TCP/IP listener, it serves as a client, which connects to a LIS listening socket. If defined as a client, the LIS IP address and port number must be placed in the translators External Interface.

The dual channel configuration provides for increased bandwidth of communication with the LIS, but requires that the LIS support separate upload and download channels.

CAUTION

Always configure the Atellica DM system as a TCP-IP server. This allows LIS vendors to change IP addresses without reconfiguration of the Atellica DM system.

Message Grammar

This section details all of the HL7 message formats that are recognized by the mhl7 translator and the corresponding acknowledgement that is expected.

All messages must be in the appropriate message format or they will be rejected. See (Page 151 *Application Processing Rules*) and (Page 153 *Handling of Unrecognized Messages*).

Result Upload Message

A Result Upload message is comprised of the following segments:

	MSH	Message Header
[		
	PID	Patient Identification
	[NTE]	Notes and Comments (for Detail)
]		
[		
	PV1	Patient Visit
]		
{		
	SPM	Specimen Details
	[SAC]	Specimen Container
{		
	OBR	Observation
	[ZOB]	Site Specific Observation
	[ORC]	Common Order
	[{ZBP}]	Site Specific Blood Product Details
{		

	OBX	Observation Result
	[{NTE}]	Notes and Comments
}		
}		
}		

MSH Segment

MSH segment is detailed in this section *Application Processing Rules,* (Page 151 *Application Processing Rules*).

PID Segment

The PID segment consists of the following:

SEQ	DT	OPT	RP/#	ELEMENT NAME	APPLICATION
1	SI	O		Set ID - Patient ID	PID counter
2	CX	O		Patient ID (External ID)	–
3	CX	R	Y	Patient ID (Internal ID)	Patient ID
4	CX	O		Alternate Patient ID - PID	–
5	XPN	R		Patient Name	Patient Name
6	XPN	O		Mother's Maiden Name	–
7	TS	O		Date/Time of Birth	Birth Date
8	IS	O		Sex	Patient Sex
9	XPN	O	Y	Patient Alias	–
10	CE	O		Race	–
11	XAD	O	Y/3	Patient Address	–
12	IS	B		County Code	–

SEQ	DT	OPT	RP/#	ELEMENT NAME	APPLICA-TION
13	XTN	O	Y/3	Phone Number - Home	–
14	XTN	O	Y/3	Phone Number - Business	–
15	CE	O		Primary Language	–
16	CE	O		Marital Status	–
17	CE	O		Religion	–
18	CX	O		Patient Account Number	–
19	ST	O		SSN Number - Patient	–
20	DLN	O		Driver's License Number - Patient	–
21	CX	O		Mother's Identifier	–
22	CE	O		Ethnic Group	–
23	ST	O		Birth Place	–
24	ID	O		Multiple Birth Indicator	–
25	NM	O		Birth Order	–
26	CE	O	Y	Citizenship	–
27	CE	O		Veterans Military Status	–
28	CE	O		Nationality	–
29	TS	O		Patient death date time	–
30	ID	O		Patient death indicator	–
31	ID	O		Identity Unknown Indicator	–

SEQ	DT	OPT	RP/#	ELEMENT NAME	APPLICA-TION
32	IS	O		Identitiy Reliability Code	–
33	TS	O		Last Update Date/ Time	–
34	HD	O		Last Update Facility	–
35	CE	C		Species Code	Species Code

The applicable fields of the PID segment follow:

- **Patient ID** Patient identifier from Result.Patient.Identifier. Patient Identifier (PID) is limited to 40 characters.
- **Patient Name** Consists of 3 components derived from Result.Patient: LastName, FirstName, MiddleName respectively. Patient Last Name, First Name, and Middle Name are restricted to 70 characters.
- **BirthDate** From Request.Patient.BirthDate and is formatted as YYYYmmdd.

NOTE: If the patient birthdate value downloaded from the LIS indicates that the patient age is greater than 150 years, the birthdate value is not accepted and the patient birthdate is not populated in the Atellica DM system.

- **PatientSex** From Result.Patient.Sex and values are F (female), M (male) and U (unknown).
- **SpeciesCode** From Result.Patient.Species.

NTE Segment

The NTE segment represents notes or comments and is always associated with the previous segment logically. The NTE segment consists of the following:

SEQ	DT	OPT	RP/#	ELEMENT NAME	APPLICATION
1	SI	O		Set ID - NTE	NTE Sequence number
2	ID	O		Source of Comment	L
3	FT	O		Comment	Comment
4	CE	O		Comment Type	Comment Type

The applicable fields of the NTE segment follow:

- Comment: Comment associated with the previous segment. When the preceding segment is a PID segment, then Comment is from Result.Patient.Comment.
- CommentType: Type of the Comment. When the Comment is a PID comment, then the value is “OC.”

PV1 Segment

The PV1 segment includes patient administration information. While this segment consists of 50 fields, the mlh7 translator only uses the first 3 fields. The PV1 segment consists of the following:

SEQ	DT	OPT	RP/#	ELEMENT NAME	APPLICATION
1	SI	O		Set ID - PV1	Set Id
2	IS	R		Patient Class	Patient Class
3	PL	O		Assigned Patient Location	Patient Location
4	IS	O		Admission Type	–
5	CX	O		Preadmit Number	–

The applicable fields of the PV1 segment follow:

- SetId: Always populated with the value “1.”
- Patient Class: Always transmitted as “N” (not applicable).
- Patient Location: From Result.Patient.Location.

SPM segment

The SPM segment contains specimen related information. The SPM segment consists of the following:

SEQ	LEN	DT	OPT	RP/#	ELEMENT NAME	APPLICATION
1		SI	O		Set ID - SPM	SPM segment counter
2		EIP	O		Specimen ID	Specimen ID
3		EIP	O	Y	Specimen Parent IDs	–
4		CWE	R		Specimen Type	Specimen Type

SEQ	LEN	DT	OPT	RP/#	ELEMENT NAME	APPLICATION
5		CWE	O	Y	Specimen Type Modifier	–
6		CWE	O	Y	Specimen Additives	–
7		CWE	O		Specimen Collection Method	–
8		CWE	O		Specimen Source Site	Specimen Source Site^^^^^
9		CWE	O	Y	Specimen Source Site Modifier	–
10		CWE	O		Specimen Collection Site	–
11		CWE	O	Y	Specimen Role	–
12		CQ	O		Specimen Collection Amount	–
13		NM	C		Grouped Specimen Count	–
14		ST	O	Y	Specimen Description	Specimen Description
15		CWE	O	Y	Specimen Handling Code	–
16		CWE	O	Y	Specimen Risk Code	–
17		DR	O		Specimen Collection Date/Time	Specimen Collection Time
18		TS	O		Specimen Received Date/Time	–
19		TS	O		Specimen Expiration Date/Time	–
20		ID	O		Specimen Availability	–

SEQ	LEN	DT	OPT	RP/#	ELEMENT NAME	APPLICATION
21		CWE	O	Y	Specimen Reject Reason	–
22		CWE	O		Specmen Quality	–
23		CWE	O		Specimen Appro-priateness	–
24		CWE	O	Y	Specimen Condi-tion	–
25		CQ	O		Specimen Current Quality	–
26		NM	O		Number of Speci-men Containers	–
27		CWE	O		Container Type	Container Type
28		CWE	O		Container Condi-tion	–
29		CWE	O		Speciment Child Role	–

The applicable fields of the SPM segment follow:

- Specimen ID: From Order.Sample. When the sample is a QC result, the QC Lot information is sent in this field.
- Specimen Type: From Order.SampleType. When the sample is a QC sample, then the value used is “QC3”, which is reserved for this purpose.
- Specimen Source: From Sample.SampleSource.
- Specimen Description: From Sample.Comment. The maximum length of the text in this field is 255 characters.
- Specimen Collection Time: From Sample.CollectionTime and formatted as YYYYmmddHHMMSS.
- Container Type: From Sample.ContainerType.

SAC Segment

The SAC segment contains specimen container information and consists of 44 fields. While the following table is truncated; the fields that do not display are not used.

The SAC segment consists of the following:

SEQ	DT	OPT	RP/#	ELEMENT NAME	APPLICATION
1	EI	O		External Accession Identifier	–
2	EI	O		Accession Identifier	–
3	EI	C		Container Identifier	–
4	EI	C		Primary (parent) Container Identifier	–
5	EI	O		Equipment Container Identifier	–
6	CM	O		Specimen Source	–
7	TS	O		Registration Date/Time	–
8	CE	O		Container Status	–
9	CE	O		Carrier Type	–
10	EI	O		Carrier Identifier	Carrier Identifier
11	NA	O		Position in Carrier	Position in Carrier
12	CE	O		Tray Type - SAC	–
13	EI	O		Tray Identifier	–
14	NA	O		Position in Tray	–
15	CE	O	Y	Location	–
16	NM	O		Container Height	–
17	NM	O		Container Diameter	–
18	NM	O		Barrier Delta	–
19	NM	O		Bottom Delta	–
20	CE	O		Container Height/ Diameter/Delta Units	–
21	NM	O		Container Volume	–
22	NM	O		Available Volume	–

SEQ	DT	OPT	RP/#	ELEMENT NAME	APPLICATION
23	NM	O		Initial Specimen Volume	–
24	CE	O		Volume Units	–
25	CE	O		Separator Type	–
26	CE	O		Cap Type	–
27	CE	O	Y	Additive	–
28	CE	O		Specimen Component	–
29	SN	O		Dilution Factor	Dilution Factor

The applicable fields of the SAC segment follow:

- Carrier Identifier: From Sample.InstrumentRack.
- Position in Carrier: From Sample.InstrumentPosition.
- Dilution Factor: From Result.ManualDilutionCoefficient and contains four components: 29.1 : -, 29.2 : “1”, 29.3 : -, and 29.4, the actual dilution factor.

OBR Segment

The OBR segment contains information on the ordered tests or observations and consists of 47 fields. This is a mandatory segment in a Result Upload message and an Order Download message. There may be multiple OBR segments associated with a parent SPM segment.

While this segment consists of 47 fields, the mhl7 translator only uses a subset of these fields.

The OBR segment consists of the following:

SEQ	DT	OPT	RP/#	ELEMENT NAME	APPLICATION
1	SI	O		Set ID - OBR	OBR sequence number
2	EI	C		Placer Order Number	Placer Order Number

SEQ	DT	OPT	RP/#	ELEMENT NAME	APPLICA-TION
3	EI	C		Filler Order Number+	Filler Order Number
4	CE	R		Universal Service ID	Universal Service ID
5	ID	B		Priority	–
6	TS	B		Requested Date/time	Results/ Patient[n]/ Order[n]/ Collection Time
7	TS	C		Observation Date/Time#	Results/ Patient[n]/ Order[n]/ Collection Time
8	TS	O		Observation End Date/Time	–
9	CQ	O		Collection Volume*	–
10	XCN	O	Y	Collection Identifier*	–
11	ID	O		Specimen Action Code*	–
12	CE	O		Danger Code	–
13	ST	O		Relevant Clinical Info.	–
14	TS	C		Received Date/Time*	–
15	CM	O		Specimen Source*	Specimen Source
16	XCN	O	Y	Ordering Provider	Ordering Provider
17	XTN	O	Y/2	Order Callback Phone Number	–
18	ST	O		Placer field 1	–
19	ST	O		Placer field 2	–
20	ST	O		Filler field 1+	–

SEQ	DT	OPT	RP/#	ELEMENT NAME	APPLICA-TION
21	ST	O		Filler field 2+	–
22	TS	C		Results Rpt/Status Chng - Date/ Time +	Status Change Date/Time
23	CM	O		Charge to Practice +	–
24	ID	C		Diagnostic Serv Sect ID	–
25	ID	O		Result Status +	–
26	CM	O		Parent Result +	Parent Result
27	TQ	O	Y	Quantity/Timing	Quantity/ Timing
28	XCN	O	Y/5	Result Copies To	
29	CM	O		Parent	Parent
30	ID	O		Transportation Mode	–
31	CE	O	Y	Reason for Study	–

The applicable fields of the OBR segment follow:

- OBR.2 Placer Order Number: From Sample.Identifier. For QC results, this value is the QC lot number.
- OBR.3 Filler Order Number: Identical to OBR.2.
- The following is a code example showing OBR.2 and OBR.3 as the same value:
- OBR|1|324383|324383|FSH|||20090901|
- OBR.4 Universal Service ID: Identifies the Test. It is a Composite field which contains the Test optionally followed by the Aspect separated by a dot: TSH.RLU.
- OBR.15 Specimen Source: See SPM segment.
- OBR.16 Ordering Provider: Sample.Physician if available. Physician Name is restricted to 70 characters.
- OBR.22 Status Change DateTime: Current time when segment created.
- OBR.25 Result Status: If observation could not be done, then the value is “X”. Otherwise this field is empty.

- OBR.26 Parent Result: Used in conjunction with OBR.29. OBR.26.1 Indicates a specific parent OBX segment of the parent OBR to which this current OBR is related to. OBR.26.2 Contains the parent OBX segment identifier (OBX.4).
- OBR 27: Indicates priority and timing. 27.1.4 indicates Sample.CollectionTime. 27.1.6 Indicates Sample.Priority as follows: R for Routine; S for Stat; A for Asap; Empty implies Routine.
- OBR.29: Indicates the parent OBR to which this current OBR is related, if any.

Mixed Action Codes

Do not mix action codes in the same message. The Atellica DM software does not support the receipt of different action codes (for example, Cancel and Add) sent in the same message.

- Test1 Cancel
- Test2 Add-on
- Test3 Add-on
- Test4 Cancel

In this example, Test1 would not be processed.

ZOB Segment

The ZOB segment, a site specific segment, specifies the auto dilution of a result. The ZOB segment consists of the following:

SEQ	DT	OPT	RP/#	ELEMENT NAME	SampleNet
1	SI	O		Set ID - ZOB	ZOB sequence number
2	ST	O		Auto Dilution Condition	Auto Dilution Condition
3	NM	O		Auto Dilution Coefficient	Auto Dilution Coefficient

The applicable fields of the ZOB segment follow:

- Auto Dilution Condition: From Result.AutoDilutionCondition
- Auto Dilution Coefficient: From Result.AutoDilutionCoefficient

  NOTE: This is the dilution reported by the analyzer. This does **not** specify a manual sample tube dilution.

ORC Segment

The ORC Common order Segment contains information common to all orders and consists of 25 fields. The mhl7 translator uses a subset of these fields.

The ORC segment consists of the following:

SEQ	LEN	DT	OPT	RP/#	ELEMENT NAME	APPLICATION
1		ID	R	N	Order Control	Control
2		EI	C		Placer Order Number	Placer Order Number
3		EI	C		Filler Order Number	Filler Order Number
4		EI	O		Placer Group Number	–
5		ID	O	N	Order Status	–
6		ID	O		Response Flag	–
7		TQ	O	Y	Quantity/Timing	Quantity/Timing
8		CM	O		Parent	–
9		TS	O		Date/Time of Transaction	Current Date/ Time
10		XCN	O	Y	Entered By	–
11		XCN	O	Y	Verified By	–
12		XCN	O	Y	Ordering Provider	Ordering Provider

The applicable fields of the ORC segment follow:

- ORC.1: Always populated with the value “SC”.
- ORC.2,ORC.3: See OBR2 and OBR.3.
- ORC.7: See OBR.27.
- ORC.9: Current date and time when segment is created.
- ORC.12: From Sample.Physician. Physician Name is restricted to 70 characters.

ZBP Segment

The ZBP is an optional segment used to indicate blood product information. This segment is not supported by the Atellica DM software.

OBX Segment

The OBX segment is the critical segment used to indicate test result value. The OBX segment consists of the following:

SEQ	LEN	DT	OPT	RP/#	ELEMENT NAME	APPLICATION
1		SI	O		Set ID - OBX	OBX sequence number
2		ID	R		Value Type	Value Type
3		CE	R		Observation Identifier	Observation Identifier
4		ST	C		Observation Sub-ID	–
5		*	C	Y	Observation Value	Result Value
6		CE	O		Units	–
7		ST	O		References Range	–
8		IS	O	Y/5	Abnormal Flags	–
9		NM	O		Probability	–
10		ID	O	Y	Nature of Abnormal Test	–
11		ID	R		Observ Result Status	Observation Result Status
12		TS	O		Date Last Obs Normal Values	–
13		ST	O		User Defined Access Checks	–
14		TS	O		Date/Time of the Observation	Observation-Time
15		CE	O		Producer's ID	–

SEQ	LEN	DT	OPT	RP/#	ELEMENT NAME	APPLICATION
16		XCN	O	Y	Responsible Observer	Responsible Observer
17		CE	O	Y	Observation Method	–
18		EI	O	Y	Equipment Instance Identifier	Instrument Identifier
19		TS	O		Date/Time of the Analysis	Analysis Date/ Time

The applicable fields of the OBX segment follow:

- OBX.2: Data type of the Result Value. Codes include the following: NM for Numeric; ST for string; and RP for an image.
- OBX.3: Test name and aspect. An example is T3.DOSE.
- OBX.5: Result.Value. Where the result type is RP (image), then the value is the filename of the image that would be transferred to the LIS via ftp
- OBX.11: Result Status. As only Validated results are uploaded this is always “F”.
- OBX.14: Result.AspirationTime.
- OBX.16: Responsible user. The format is ValidationUser~InstrumentUser.
- OBX.18: Analyzer that produced the result value.
- OBX.19: Test Completion Time, if defined.

Result Upload Message Example 1

If there are Comments or Instrument Flags associated with the Result Value, one or more NTE segments follow an OBX segment. If the NTE contains a result comment, then the Comment Type is “RC”. If it contains a Result Flag, then the Comment Type is “RF.”

An example of a Result Upload Message is as follows:

MSH|^~\&|CentraLink

|ResultExport|LIMS|ResultImport|20071201132448||OUL^R22^OUL_R22|1|P|2.5|||||8859/1

PID|1||ND||Patient^Sick||19750110|M|||||||||||||||||||N|||||Human PV1|1|NSPM|1|mov3||Whole blood SAC|||||||||004|06

OBR|1|mov3|mov3|WBC|||||||||||||||||20071201132448|||||^^^^^RORC|SC|mov3|mov3||||^^^^^R||20071201132448

OBX|1|NM|WBC||10.61||||||F|||19981023095217||sysman||Inst1
NTE|1|L|NC|RF NTE|2|L|WC|RF

OBR|2|mov3|mov3|RBC|||||||||||||||||20071201132448|||||^^^^^R
ORC|SC|mov3|mov3||||^^^^^R||20071201132448

OBX|1|NM|RBC||5.14||||||F|||19981023095217||sysman||Inst1

OBR|3|mov3|mov3|HGB|||||||||||||||||20071201132448|||||^^^^^R

ORC|SC|mov3|mov3||||^^^^^R||20071201132448

OBX|1|NM|HGB||13.9||||||F|||19981023095217||sysman||Inst1

Result Upload Message Example 2

An example of a QC Result Upload Message for a QC lot of 2091 follows:

NOTE: The value **QC3** in field 4 of the Specimen segment distinguishes the result as a QC result. The QC lot number populates the Specimen ID (Field 2) of the SPM Segment and the Placer Order field (Field 2) of the OBR segment.

MSH|^~\&|CentraLink

|ResultExport|LIMS|ResultImport|20080417084931||OUL^R22^OUL_R22|
5|P|2.5|||||8859/1

PID|1|||||||U|||||||||||||||||||||N

PV1|1|N

SPM|1|2091||QC3

OBR|1|2091|2091|RBC|||||||||||||||||20080417084931|||||^^^^^R

ORC|SC|2091|2091||||^^^^^R||20080417084931

OBX|1|NM|RBC||4.88||||||F|||19981023093347||||Advia120_06

Result Upload Message Example 3

The Atellica DM software supports the upload of all aspects to LIS using the HL7 protocol. Result comments and flags are only uploaded after the result selector aspect and not after all aspects.

NOTE: DOSE is the result selector aspect in the following example:

OBR|4|TestSID|TestSID|T3.DOSE|||||||||||||||||20090429190107|||||^^^^^R

ORC|SC|TestSID|TestSID||||^^^^^R||20090429190107

OBX|1|NM|T3.DOSE||3.17||||||F|||20010820152907||user1||AdviaCentaur_1

NTE|1|L|Result comment T3|RC

NTE|2|L|Diluted|RF

NTE|3|L|High CV|RF

OBR|5|TestSID|TestSID|T3.COFF|||||||||||||||||20090429190107|||||^^^^^R

ORC|SC|TestSID|TestSID||||^^^^^R||20090429190107

OBX|1|NM|T3.COFF||1.00|||||F|||20010820152907||user1||AdviaCentaur_1

OBR|6|TestSID|TestSID|T3.RLU|||||||||||||||||20090429190107|||||^^^^^R

ORC|SC|TestSID|TestSID||||^^^^^R||20090429190107

OBX|1|NM|T3.RLU||160815|||||F|||20010820152907||user1||AdviaCentaur_1

Result Upload Acknowledge Example

The Result Upload acknowledge message is comprised of the MSH and MSA segments. See (Page 151 *Application Processing Rules*).

The Message Type field in MSH.9 is “ACK^R22^ACK”.

An example of a Result Upload Acknowledge message is as follows:

MSH|^~\&|LIMS|ResultImport|CentraLink

|ResultExport|20070305170957||ACK^R22^ACK|2|P| 2.5|||||8859/1

MSA|AA|1||

Order Download Message from LIS to Atellica DM System

An order download (Import) message \ comprises the following segments. The use of the Batch Protocol mechanism, BHS and BTS segments, is optional.

The Batch Protocol mechanism is used by a LIS to indicate a loadlist batch for a particular analyzer.

	[BHS]	Batch Header
{		*(One or more HL-7 messages of the same type if a BHS segment is specified)*
	MSH	Message Header
[		
	PID	Patient Identification
	[NTE]	Notes and Comments
[		
	PV1	Patient Visit
]		
]		
{		
	SPM	Specimen Details

[SAC]	Specimen Container
{	
ORC	Common Order
[	
OBR	Observation
[ZOB]	Site Specific Observation segment
[{ZBP}]	Site Specific Blood Product Details
[{	
OBX (mic)	Observation Result
}]	
]	
	Start - Previous Result
[	
ORC	Common Order - Previous Result
OBR	Observation - Previous Result
{	
OBX	Observation Result
}	
]	
	End - Previous Result
}	
}	
}	
[BTS]	Batch Trailer

BHS Segment

The BHS segment indicates the start of a batch of orders. The BHS.6 field specifies the analyzer to be targeted. The BHS segment consists of the following:

SEQ	DT	OPT	RP/#	ELEMENT NAME	Application
1	ST	R		Batch Field Separator	"|"
2	ST	R		Batch Encoding Characters	"^~\&"
3	HD	O		Batch Sending Application	Batch Sending Application
4	HD	O		Batch Sending Facility	Batch Sending Facility
5	HD	O		Batch Receiving Application	Batch Receiving Application
6	HD	O		Batch Receiving Facility	Batch Receiving Facility
7	TS	O		Batch Creation Date/Time	–
8	ST	O		Batch Security	–
9	ST	O		Batch Name/ID/Type	–
10	ST	O		Batch Comment	–
11	ST	O		Batch Control ID	Batch Control ID
12	ST	O		Reference Batch Control ID	Reference Batch Control ID

The applicable fields of the BHS segment follow:

- BHS.3: Sending Application. Any value used is returned in batch acknowledgement.
- BHS.4: Sending Facility. Any value used is returned
- BHS.5: Receiving Application. Not defined, any value used is returned.
- BHS.6: Targeted Instrument to which all orders, between this segment and the batch closing BTS segment, are to be targeted.
- BHS.11: Unique batch identifier.
- BHS.12: Not relevant on sending.

The response to a Batch of orders is itself a batch of acknowledgement segments.

MSH Segment

The MSH segment is as detailed in (Page 151 *Application Processing Rules*).

The Message Type is "OML^O33^OML_O33"

The PID, NTE, PV1, SPM, SAC, ORC, OBR, ZOB, ZBP and OBX segments for the Order Download message are identical to those detailed for the Result Upload message. See the segment information outlined for each segment after the following: (Page 124 *Result Upload Message*).

NOTE: Patient Identifier (PID) is limited to 40 characters. Patient Last Name, First Name, and Middle Name are restricted to 70 characters. Physician First Name and Last Name are restricted to 70 characters.

NOTE: In the order download message, the OBX segment contains LIS previous results. Multiple previous results can be downloaded for an individual test.

The following detail is unique to an Order Download message:

ORC.1 Control – The applicable values follow: "NW" for a New Order; "XO" for an Order Update; "CA" to cancel the contained order; and "PR" if child OBX records exist following the ORC that contains Previous Results.

The difference between using NW and XO are as follows:

- Either NW or XO can be sent if the test is not already on the sample.
- XO must be sent for a rerun
- The first time a sample is sent, use NW. For all subsequent tests or reruns, use XO

NOTE: When Previous Results are sent, the fields Physician ID, Priority, and Collection Time are not read from the ORC segment.

BTS Segment

The BTS is the batch trailer segment and indicates the end of a batch of orders that is targeted to a particular analyzer.

The BHS segment consists of the following:

SEQ	DT	OPT	RP/#	ELEMENT NAME	Sample-Net
1	ST	O		Batch Message Count	
2	ST	O		Batch Comment	
3	NM	O	Y	Batch Totals	

Order Download Example 1

An example of a single order download message follows:

MSH|^~\&|WPX||DX_LAB|Hematology|20060616150307||OML
^O33^OML _O33|161|P|2.5|||||8859/1|

PID|1||AE||Elkorbachi^Ann^AA^^H^Dr^L||19740423|F|Kroket^^^^^^A||Ced
erstraat^56^Gent^^9000^B||09234567||BE|||104000145^^^ASOL|||||Gent|

Y|||||20020101000000|Y

SPM|1|Advia120NR1||WHOLE BLOOD||||||||||||200608141505|||||||||

ORC|NW|Advia120NR1|||||^^^^^S^^Order comment||20060814150256

OBR|1|Advia120NR1||WBC^White blood cells

ORC|NW|Advia120NR1|||||^^^^^S^^Order comment||20060814150256

OBR|1|Advia120NR1||RBC

ORC|NW|Advia120NR1|||||^^^^^S^^Order comment||20060814150256

OBR|1|Advia120NR1||HCT

ORC|NW|Advia120NR1|||||^^^^^S^^Order comment||20060814150256

OBR|1|Advia120NR1||MCV

ORC|NW|Advia120NR1|||||^^^^^S^^Order comment||20060814150256

OBR|1|Advia120NR1||BLASTS

ORC|NW|Advia120NR1|||||^^^^^S^^Order comment||20060814150256

OBR|1|Advia120NR1||ATYPS

ORC|NW|Advia120NR1|||||^^^^^S^^Order comment||20060814150256

OBR|1|Advia120NR1||CH

ORC|NW|Advia120NR1|||||^^^^^S^^Order comment||20060814150256

OBR|1|Advia120NR1||HDW

ORC|NW|Advia120NR1|||||^^^^^S^^Order comment||20060814150256

OBR|1|Advia120NR1||HGB

ORC|NW|Advia120NR1|||||^^^^^S^^Order comment||20060814150256

OBR|1|Advia120NR1||HYPER

SPM|2|Advia120NR2||WHOLE BLOOD||||||||||||200608141505|||||||||

ORC|NW|Advia120NR2||4717S|||^^^20030101205959^^S^^Order
blabla||20040609150256||||||||||IHE Cardio (6400)^^^^^^FI^^^6400

OBR|1|Advia120NR2||WBC||||||||||1234^Anonymous^A

SPM|3|Advia120NR3||WHOLE BLOOD||||||||||||200608141505|||||||||

ORC|NW|Advia120NR3||4717S|||^^^20030101205959^^S^^Order
blabla||20040609150256||||||||||IHE Cardio (6400)^^^^^^FI^^^6400

OBR|1|Advia120NR3||RBC||||||||||1234^Anonymous^A

Order Download Example 2

An example of a HL7 LIS workorder download when the LIS specifies the analyzer to be targeted for the requests follows:

NOTE: An analyzer with ID of VERSANT440_3 is shown as the target for two new orders.

BHS|^~\&|CentraLink

|ResultExport|LIMS|VERSANT440_3|20071201132448||||021||

MSH|^~\&|CentraLink

|ResultExport|LIMS|ResultImport|20071201132448||OML^O33^OML_O33

|1|P|2.5|||||8859/1

PID|1||V440_3Test1||vBHSFirst1^vBHSMid1^vBHSLast1||19850110|M||||||

||||||||||||||N|||||Human

PV1|1|N|AH

SPM|1|V443Test_1||Serum|||||||||Comment|||20071201124545|||||||||12 x 75

ORC|NW|V443Test_1|V443Test_1||||^^^20071201124545^^R||200804011 32448|||JF

OBR|1|V443Test_1|V443Test_1|HIV RNA

3.0||20080401132448|20080401132448||||||||JF||||||20080401132448|||||^^ ^20080401132448^^R

MSH|^~\&|CentraLink

|ResultExport|LIMS|ResultImport|20071201132448||OML^O33^OML_O33 |2|P|2.5|||||8859/1

PID|1||V440_3Test2||vBHSFirst2^vBHSMid2^vBHSLast2||19950110|M||||||

||||||||||||||N|||||Human

PV1|1|N|AH

SPM|2|V443Test_2||Serum|||||||||Comment|||20071201124545|||||||||12 x 75

ORC|NW|V443Test_2|V443Test_2||||^^^20071201124545^^R||200804011 32448|||JF

OBR|1|V443Test_2|V443Test_2|HIV RNA 3.0||20080401132448|20080401132448|||||||| JF||||||20080401132448|||||^^ ^20080401132448^^R

BTS||Batch Comment||

Order Download Example 3: Workorder Download from LIS with Multiple Previous Results

The following workorder message orders four tests: WBC, RBC, HGB, and RDW for Sample ID, MUL3.

Test WBC contains 4 previous LIS results, RBC contains 1 previous LIS result, HGB contains 3 previous LIS results and RDW does not contain any previous LIS results.

NOTE: You can view the displayed LIS Results at the **LIS Previous Results** tab at the **Request** window, which you access by double-selecting the request at the **Review and Edit** window.

MSH|^~\&|CentraLink

|ResultExport|LIS|ResultImport|20080416160705||OML^O33^OML_O33|1 |P|2.5|||||| 8859/1

PID|1||MUL3||MULname3^MULname2^MULname1||19820521|M||||||||||||||

|||||||N|||||Human

NTE|1||OML Patient Comment|OC

PV1|1|N|AH

SPM|1|MUL3||Whole blood|||||||||OML Instrument

Comment|||20080409030000|||||||||12 x 75

ORC|PR|MUL3|||||^^^20080409030000^^S||20080416160705|||JF

OBR|1|MUL3|MUL3|WBC||20080409030000|20080409030000|||||||||JF|||||

|20080416160705|||||^^^20080409030000^^S

OBX|1|NM|WBC||1.31||||||F|||20070404111111

OBX|2|NM|WBC||1.32||||||F|||20060404111111

OBX|3|NM|WBC||1.33||||||F|||20060101111111

OBX|4|NM|WBC||1.34||||||F|||20050404111111

ORC|PR|MUL3|||||^^^20080409030000^^S||20080416160705|||JF

OBR|1|MUL3|MUL3|RBC||20080409030000|20080409030000|||||||||JF||||||

20080416160705|||||^^^20080409030000^^S

OBX|1|NM|RBC||2.31||||||F|||20070404111111

ORC|PR|MUL3|||||^^^20080409030000^^S||20080416160705|||JF

OBR|1|MUL3|MUL3|HGB||20080409030000|20080409030000|||||||||JF||||||

20080416160705|||||^^^20080409030000^^S

OBX|1|NM|HGB||3.31||||||F|||20070404111111

OBX|2|NM|HGB||3.32||||||F|||20070404101111

OBX|3|NM|HGB||3.33||||||F|||20060404

ORC|NW|MUL3|||||^^^20080409030000^^S||20080416160705|||JF

OBR|1|MUL3|MUL3|RDW||20080409030000|20080409030000|||||||||JF|||||

20080416160705|||||^^^20080409030000^^S

Order Download Acknowledgement Message

The ORL message type acknowledges an order download. If a batch was used around the received orders, then a batch or order download acknowledgement is returned.

The order download acknowledgement message is comprised of the following segments.

	[BHS]	Batch Header
{		*(One or more HL -7 messages of the same type if a BHS segment is specified)*
	MSH	Message Header
	MSA	Message Acknowledgement
}		
	[BTS]	Batch Trailer

The message type of the MSH segment must be “ORL^O34^ORL_O34”.

Order Download Acknowledgement Example

An example of an order download acknowledgement message follows:

MSH|^~\&|DX_LAB|Hematology|WPX||20070305170957||ORL^O34^ORL

_O34|2|P|2.5|||||8859/1

MSA|AA|161||

Specimen Status Update Message (U03)

The specimen status update message communicates sample status information and inlabbing events to the LIS. A specimen status update message is comprised of the following segments

	MSH	Message Header
	EQU	Equipment Detail
{		
	SAC	Specimen Container
}		

MSH Segment

The MSH segment is as detailed in the Application Processing Rules section. See (Page 151 *Application Processing Rules*).

The message Type is “SSU^U03^SSU_U03”.

EQU Segment

The EQU segment identifies equipment. The EQU segment consists of the following:

SEQ	DT	OPT	RP/#	ELEMENT NAME	APPLICATION
1	EI	R		Equipment Instance Identifier	Equipment Identifier
2	TS	R		Event Date/Time	Event Time
3	CE	C		Equipment State	"OP"
4	CE	O		Local/Remote Control State	–––
5	CE	O		Alert Level	–

The applicable fields of the EQU segment follow:

- EQU.1: Sending information provided by the –s command line option.
- EQU.2: Time of the status updated event represented as YYYYmmddHHMMSS
- EQU.3: Always populated with the value “OP”.

SAC Segment

The SAC segment consists of the following:

SEQ	DT	OPT	RP/#	ELEMENT NAME	APPLICATION
1	EI	O		External Accession Identifier	
2	EI	O		Accession Identifier	
3	EI	C		Container Identifier	Container Identifier
4	EI	C		Primary (parent) Container Identifier	

SEQ	DT	OPT	RP/#	ELEMENT NAME	APPLICATION
5	EI	O		Equipment Container Identifier	
6	CM	O		Specimen Source	
7	TS	O		Registration Date/ Time	
8	CE	O		Container Status	Container Status
9	CE	O		Carrier Type	
10	EI	O		Carrier Identifier	
11	NA	O		Position in Carrier	
12	CE	O		Tray Type - SAC	
13	EI	O		Tray Identifier	Tray Identifier
14	NA	O		Position in Tray	Position in Tray
15	CE	O	Y	Location	Location
16	NM	O		Container Height	–

The applicable fields of the SAC segment follow:

- SAC.3 Container Identifier: Sample.LASStatus or Identifier.
- SAC.8 Container Status: Applicable values include: “I” for identified; “L” for Left Equipment; “P” for In Position; “O” for In Process; “R” for Process Completed; “M” for Missing; “X” for Container Unavailable; “U” for Unknown.

  NOTE: Only the I and L values are supported.

- SAC.13 Tray identifier: Sample.LASTrayID.
- SAC.14 Position In Tray: Sample.LASTRayPosition.
- SAC.15 Location: A repeated field. Field One is always Sample.LASGeneralArea.

  The subsequent fields depend on the first as follows:

1st Location field (LAS General Area)	2nd Location Field	3rd Location Field	4th Location Field
CS	Shelf	Door	Area
MT	Gate (or blank)		
SC	Gate		
OT	Gate		

Shelf |"Shelf"^SampleLASStatus/LASShelf|

Door |"Door"^SampleLASStatus/LASDoor|

Area |"Area"^SampleLASStatus/LASArea|

Gate |"Gate"^SampleLASStatus/LASGate|

Specimen Status Update Message Example

MSH|^~\&|CentraLink

|ResultExport|LIMS|ResultImport|20070305170957||SSU^U03^SSU_U03|

12|P|2.5||||||8859/1|ACK^U03^ACK

EQU|CentraLink|20070305171000|OP|

SAC|||3421388|||||L|||||Tray1|20|CS~Shelf^14~Door^5~Area^7

Specimen Status Acknowledgement Message

This message acknowledges a specimen status update. The specimen status acknowledgement message is comprised of the following segments.

MSH	Message Header
MSA	Message Acknowledgement

MSH Segment

The MSH segment is as detailed in (Page 151 *Application Processing Rules*).

The MSH message type is “ACK^U03^ACK”.

Specimen Status Acknowledgement Message Example

MSH|^~\&|LIMS|ResultImport|CentraLink

|ResultExport|20070305170957||ACK^U03^ACK|2|P|2.5||||||8859/1 MSA|AA|12||

Application Processing Rules

This mhl7 translator supports the original HL-7 acknowledgement rules.

To transmit an acknowledgement, a message is sent, which consists of an MSH segment followed by an MSA segment.

The MSH segment consists of and is formatted as follows:

NOTE: In the following table, the value "R" in the OPT column indicates that the field is required:

SEQ	DT	OPT	RP#	Element Name	Application
1	ST	R		Field Separator	"|"'
2	ST	R		Encoding Characters	"^~&"'
3	ST	O		Sending Application	Sending Application
4	ST	O		Sending Facility	Sending Facility
5	ST	O		Receiving Application	Receiving Application
6	ST	O		Receiving Facility	Receiving Facility
7	TS	O		Date/Time Of Message	Current Date/ Time
8	ST	O		Security	--
9	CM	R		Message Type	Message Type
10	ST	R		Message Control ID	Message control id
11	ID	R		Processing ID	P
12	ID	R		Version ID	2.5
13	NM	O		Sequence Number	Sequence Number
14	ST	O		Continuation Pointer	-

SEQ	DT	OPT	RP#	Element Name	Application
15	ID	O		Accept Acknowledge-ment Type	
16	ID	O		Application Acknowl-edgement Type	
17	ID	O		Country Code	
18	ID	O		Character Set	8859/1

The applicable fields of the MSH segment are as follows:

- MSH.1 Field Separator: Required. Always populated with the value “|”.
- MSH.2 Encoding Characters: Required. Always populated with the value “^~\&”.
- MSH.3 Sending Application: See the -i option in. (Page 121 *Translator Specific Options*)
- MSH.4 Sending Facility: See the -i option in (Page 121 *Translator Specific Options*)
- MSH.5 Receiving Application: See the -r option in. (Page 121 *Translator Specific Options*)
- MSH.6 Receiving Facility: See the -r option in (Page 121 *Translator Specific Options*).
- MSH.9 Message Type: Required. Message type must be “ACK^message_type^ACK”.
- MSH.10 Message Control ID: Required. Unique identifier for each message. The mhl7 translator internally maintains a monotonically incremented counter, which supplies this value. The actual start value is irrelevant, but each message must use a different value.
- MSH.11 Processing ID: Required. Always populated with the value “P”.
- MSH.12 Version: Required. Populated with the value “2.5”.
- **NOTE:** The mhl7 translator echoes the version number of the sender in response messages. If 2.5 was sent, then 2.5 is sent in response.
- MSH.13 Sequence Number: Not supported.
- MSH.18 Character Set: Required. Populated with the value “8859/1”.

MSA Segment

The MSA segment consists of and is formatted as follows:

SEQ	DT	OPT	RP#	Element Name	Application
1	ID	R		Acknowledgement Code	Acknowledge Code
2	ST	R		Message Control ID	Echo Message Control ID from initiating message
3	ST	O		Text Message	Error Message
4	NM	O		Expected Sequence Number	—
5	ID	O		Delayed Acknowledgement Type	—
6	CE	O		Error Condition	—

The applicable field of the MSA segment is:

MSA.1 Acknowledgment Code: Required. Populated with the value “AA” to indicate acceptance or with “AR” to indicate rejection of the last message. Any value other than AA indicates non acceptance.

NOTE: If an HL7 Acknowledge message is received when one is not expected then it is simply ignored

Handling of Unrecognized Messages

If the mhl7 translator receives a HL7 message that is not one of those detailed in the Message Grammar sections above or is not a HL7 acknowledgement message as detailed above, the translator rejects the message with an acknowledgement code of AR.

If the Version ID received is not “2.5,” then the received message is rejected.

Handling of Timeouts

The following only applies when mhl7 is configured to listen on a TCP/IP port specified by the –s option

- If Client (LIS) connects to the mhl7 listening port but no message exchange occurs for the time specified by the client idle timeout, –c, then the translator closes the socket and reverts to listening for subsequent connections. The LIS must connect again.

  NOTE: The mhl7 only permits one connection to the socket, any connections made to the LIS when one is already in place are closed immediately.

- When results are being uploaded, the timeout value specified by the –t command line option is used. If the LIS does not respond in this time, then the message is not considered to have been sent.

- If an acknowledgement is received when not expected, the acknowledgement is ignored.

When the mhl7 is configured as a TCP/IP Client, that is, when it connects to a socket at which the LIS is listening, the need for timeouts does not exist because the LIS is providing the connection point.

Two translator record time-out values can be configured:

- Application interface timeout. Required field. Indicates the maximum time interval between the Atellica DM software requesting something of the mhl7 translator and the receipt of a response to that request from the mhl7. When a timeout occurs, the Atellica DM software does not mark the initiating message (result upload or status updated) as having been sent. The default is 105.

- Optional external interface timeout. Messages initiated by an external application. This value must always be less than the application interface timeout value.

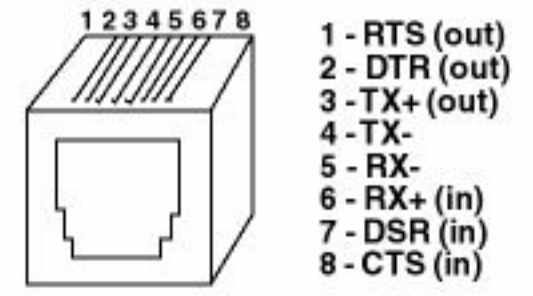
NOTE: The mhl7 translator does not support the HL7 sequence number protocol. Each message is identified through the Message Control ID value (MSH.10).

The mhl7 translator does not support the HL7 enhanced acknowledgement rules.

Observation Priority is not indicated in OBR.5, but is indicated in OBR.27.1.6.

9 Serial Connection

The serial inputs on the multiple port terminal servers require a cable that terminates with an RJ45 connector. For a serial-connected LIS, it is necessary to create a custom adapter in order to communicate with the Terminal Server. RJ45-to-DB9 and RJ45-to-DB25 adapter kits are shipped with each system. When making these custom adapters, refer to the following diagram of the pinout for the RJ45 serial ports on the terminal servers.



Description	Part Number	SMN Number
LIS Adapter (RJ45-to-DB9)	615-4187-01	10328539
LIS Adapter (RJ45-to-DB25)	615-4187-02	10317239

10 ASCII Character Codes

Character	ASCII Code (Hexa-decimal)	Character	ASCII Code (Hexa-decimal)	Character	ASCII Code (Hexa-decimal)
NUL	00	+	2B	V	56
SOH	01	,	2C	W	57
STX	02	-	2D	X	58
ETX	03	.	2E	Y	59
EOT	04	/	2F	Z	5A
ENQ	05	0	30	[	5B
ACK	06	1	31	\	5C
BEL	07	2	32	]	5D
BS	08	3	33	^	5E
HT	09	4	34	_	5F
LF	0A	5	35	‘	60
VT	0B	6	36	a	61
FF	0C	7	37	b	62
CR	0D	8	38	c	63
SO	0E	9	39	d	64
SI	0F	:	3A	e	65
DLE	10	;	3B	f	66
DC 1 (X_ON)	11	<	3C	g	67
DC 2 (TAPE)	12	=	3D	h	68
DC 3 (X_OFF)	13	>	3E	i	69
DC 4(TAPE)	14	?	3F	j	6A

Character	ASCII Code (Hexa-decimal)	Character	ASCII Code (Hexa-decimal)	Character	ASCII Code (Hexa-decimal)
NAK	15	@	40	k	6B
SYN	16	A	41	l	6C
ETB	17	B	42	m	6D
CAN	18	C	43	n	6E
EM	19	D	44	o	6F
SUB	1A	E	45	p	70
ESC	1B	F	46	q	71
FS	1C	G	47	r	72
GS	1D	H	48	s	73
RS	1E	I	49	t	74
US	1F	J	4A	u	75
SP	20	K	4B	v	76
!	21	L	4C	w	77
"	22	M	4D	x	78
#	23	N	4E	y	79
$	24	O	4F	z	7A
%	25	P	50	{	7B
&	26	Q	51	|	7C
’	27	R	52	} (Alt Mod)	7D
(	28	S	53	~	7E
)	29	T	54	DEL (Rub Out)	7F
*	2A	U	55	DEFAULT LRC*	7F

11 Multiple LIS Connections

You can connect multiple LIS to one Atellica Data Manager server.

The protocols in this chapter support 1 or multiple LIS. Each LIS connection can consist of 1 or 2 communication channels. The following connection options are available with 2 LIS connections:

	LIS1	LIS 2
Option 1	1 TCP connection Inbound and Outbound together	1 TCP connection Inbound and Outbound together
Option 2	2 TCP Connections • Inbound • Outbound	2 TCP Connections • Inbound • Outbound
Option 3	1 Serial connection Inbound and Outbound together	1 Serial connection Inbound and Outbound together
Option 4	2 Serial Connections • Inbound • Outbound	2 Serial Connections • Inbound • Outbound

NOTE: Other combinations are possible if LIS 1 uses serial and LIS 2 uses TCP.

Each LIS is fully configurable and independent of the other, except for the following relationship logic. The term Requesting LIS refers to the LIS from which a request was sent, or from where the data originated:

- Sample IDs are the unique identifier in the Atellica Data Manager software, so Sample IDs must be unique for all LIS.
- The Atellica Data Manager software is designed to operate with unique Patient IDs across all connected LIS. As the LIS is considered the master system from which the most current data originates, the Atellica Data Manager software always accepts updates to patient records from the originating LIS.

  NOTE: If Patient IDs might be duplicated from different LIS, then you should turn off the **demographics download to the instrument** option.

  The following logic is used for Sample IDs reused across multiple LIS:

  – If a Sample ID is reused and the Patient ID is different, then the Atellica Data Manager rejects the order.

  – If the Sample ID is reused and the Patient ID is the same then the following occurs:

    – If the LIS is the same as the original LIS then the Atellica DM software updates the Demographics.

    – If the LIS is different than the original LIS then the Atellica DM software rejects the Demographic updates.

Uploading of Results

Each time a sample is sent from LIS to the Atellica DM system, the sample is tagged with a Requesting LIS. When results are generated, the Atellica DM system only uploads the results to the Requesting LIS.

An operator can upload test results to multiple LIS if required. You can configure this to be done automatically or do it one time only.

NOTE: Once the sample is tagged in the Atellica DM software for a Requesting LIS this also will accommodate add-ons and reruns. All reruns and reflex tests will be uploaded to the Requesting LIS.

Quality Control

The **Dynamically administer QC Instruments** checkbox is selected by default.

When selected, if an LIS sends a workorder for a sample, the sample is tagged with the Requesting LIS. Whenever an analyzer reports a result for that test, the result is uploaded to the Requesting LIS and the Atellica DM software also tags that analyzer as a QC Instrument for that LIS. All subsequent QC results from that analyzer are uploaded to that LIS.

NOTE: QC uploading configuration is automatically set up and controlled by the Atellica Data Manager software as normal test processing occurs. For results sent to an LIS from a specific analyzert, all QC information from that analyzer is also sent.

An operator can upload QC results to multiple LIS if required. You can configure this to be done automatically, or do it one time only.

LIS Channel for the Biorad Program

You can purchase an additional LIS communication channel, which allows the Atellica DM software to communicate with a Biorad program. This enables QC data to flow from the Atellica DM server to Biorad servers in real time, as opposed to programming the Atellica Data Manager server to export files in Biorad format every <*n*> minutes.

12 Hard-coded Comments

In certain instances, the Atellica DM system can add hard-coded comments. The following sections explain these by comment type.

Sample Comment

- Results discarded - sample reuse time has elapsed for sample '<SampleIdentifier>' ('<InstrumentName>' - '<DateTime>')
- '<LASChannelName>' (flag code '<LASFlagCode>') : <LASFlagExpansion>

Result Instrument Comment

- LIS Modified by '<LISChannelName>'

Result Parse Comment & QC Result Parse Comment

- Not a number; no computation performed (<AdditionalText>)
- Unknown result choice (<AdditionalText>)

Possible values of the <AdditionalText> from the comments above are:

- Comma not allowed in numeric result input
- Unit conversion error: source unit not found
- Unit conversion error: Target unit not found
- No unit conversion possible from <UnitName> to <UnitName>
- Cannot determine mantissa and exponent without an input value.
- <Value> is not a valid decimal value
- Cannot determine mantissa and exponent without an error indication.
- Unit record '<UnitName>' not available
- For test '<TestName>', result choice '<ResultChoice>' is ambiguous. Legal choices are '<ResultChoiceList>'
- For test '<TestName>', result choice '<ResultChoice>' is illegal. Legal choices are '<ResultChoiceList>'

Result User Comment

Cancelled on LAS : '<UserSuppliedText>'

Patient Comment, QC Result Instrument Comment, QC Result User Comment, and Result Range Comment

No hard-coded comments are added by the Atellica DM software.

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