DEMATIC

DAI

Host Interface Specification

of the

Warehouse Control System

for

Toll Enterprise
Prestons, NSW

Digital Applications International Limited
Milan Court, Europa Way, Bird Hall Lane, Cheadle Heath, Stockport SK3 0WZ, United Kingdom
Tel: +44 161 374 6000 Fax: +44 161 374 6100 Web: www.dai.co.uk

Document Roles and Responsibilities

Responsibility	Name	Company	Title / Role
Original Authors	Owen Lucas Kevin Lomax	DAI DAI	WCS Design Engineer Design Consultant
Reviewer/approver	Leon Land	Toll	Project Manager
Reviewer/approver			
Reviewer/approver			
Reviewer	David Bonner	Dematic	Systems Engineer
Reviewer	Richard Masters	Dematic	Project Director

Related Documents

Document Title	Version[1]	Company
Project Enterprise Business Requirements Document	2.01	Toll
System Specification	A3	Dematic
WCS Functional Design Specification	1.0	DAI

[1] Relevant version at time of release of this document

CONTENTS

1 INTRODUCTION

This document describes all message and information exchanges between the Host and the Warehouse Control System to be supplied by Dematic for Toll's distribution facility in Prestons, New South Wales.

The functionality provided by WCS is described in a separate Functional Design Specification (FDS) document.

2 INTERFACE-RELATED LOGIC

This section describes interface-related aspects of various areas of WCS functionality. The aim is to avoid too much of this detail needing to be included in the main FDS descriptions.

2.1.1 SKU Master Maintenance

2.1.1.1 New / Changed SKUs

SKU master details are maintained on the Host and transmitted to WCS using the SKU Master Update message (SMU – Section 3.4.1) whenever a SKU is created or updated.

2.1.1.2 SKU Deletion from WCS

The SMU message provides the Host with the ability to delete a SKU from WCS. However, it is unclear whether this will be used in practice. To avoid an unwanted build-up of obsolete SKUs on WCS, a SKU is automatically deleted from WCS after a configurable period of there being no activity associated with that SKU i.e. no stock or orders.

The Host can keep active but rarely-used SKUs 'alive' by refreshing all active SKUs to WCS on a regular basis.

WCS considers a SKU to be refreshed by the Host whenever it is referenced in a message from the Host.

2.1.2 Inventory Tracking

The Host's view of the inventory within the WCS automation domain is on the basis of a single WCS-controlled location. Quantities of specific SKUs are tracked in various categories. Whenever WCS reports a quantity adjustment or an inventory level confirmation to the Host it does so by reporting all of the following:

- Client
- SKU code
- WCS availability (reflects any WCS hold state)
- Quantity (absolute or change depending on the context)

2.1.2.1 Implied Inventory Changes

Most changes to inventory are implied as a result of planned events (e.g. receiving/despatch) typically instigated or expected by the Host. These adjustments are reported to the Host via particular messages relating to those events. These are:

Event	Reported By	Implied Stock States
New stock received by WCS	PLC message from WCS	An inventory uplift of the quantity specified. Initially assumed to be available (un-held) stock.
Stock confirmed as picked against a specified shipping label ID	OLC message from WCS	An inventory reduction by the amount confirmed as picked. Assumed to have been picked from available stock.

2.1.2.2 Explicit Inventory Adjustments

Changes to inventory status or quantity that are not covered by the implied messages described above are reported to the Host as follows. In all of these cases there are no assumptions regarding stock status which is always defined explicitly in the appropriate message.

Event	Reported By
Stock quantity adjustments	SLA – Section 3.5.1
Stock becoming available (no hold states) or unavailable (one or more hold states) on WCS.	SAA – Section 3.5.2

2.1.2.3 Inventory Synchronisation

Under normal circumstances the WCS inventory levels recorded by WCS and the Host should stay in line. As a check and to cover any eventuality that causes them to diverge, WCS provides the ability for a complete upload of the WCS inventory to be triggered at a configurable time of day.

At the configured time, the following sequence on WCS occurs:

1. WCS locks its database (no updates possible – processes will pause)
2. WCS snapshots the inventory information to memory (a few seconds only)
3. WCS unlocks the database allowing normal processing to continue
4. WCS writes the snapshot data to a local file
5. The stock balance values are sent to the Host via a series of SBD messages (Section 3.5.6)

SKUs that have zero inventory (across all host state/availability combinations) are omitted from the snapshot.

For the purposes of inventory synchronisation,

WCS **does not** include:-

- Inbound stock cases that have been pre-notified by the Host but not yet reported to the Host as received (i.e. stock status = ***expected*** or ***incoming***)

WCS **does** include:-

- Stock that has been reserved or picked for an order but not yet notified to the Host as packed
- Stock that is flagged as ***outside*** or ***missing*** on WCS, as this has not yet been written off or reported as a quantity adjustment to the Host

2.1.3 Receiving

Incoming stock is pre-notified to WCS by the Host but does not become part of WCS inventory until it is physically received into the warehouse by WCS.

2.1.4 Order Fulfilment

The normal sequence of messages for processing an order is as follows (* indicates the possibility of multiple messages):-

From Host	From WCS	Notes
ORD		Order header (Section 3.4.5)
ORL*		Multiple order lines (Section 3.4.6)
	OLC*	Order Line Complete (Section 3.5.5). Sent for each line in a despatch unit once the despatch unit is fully packed
	VEH*	Vehicle Closure (Section 3.5.7). Sent for each despatch unit in a trailer when the trailer is closed for despatch

2.1.4.1 Order Status Notification

WCS provides periodic updates to the Host on the current status of an order. An OSU message is sent when the order reaches key states within WCS (e.g. planned, despatched).

2.1.4.2 Order/Line Abandon on WCS

If an order or part of an order is abandoned on WCS then the final OSU message will be sent for the order without OLC messages having reported the full quantity packed for the order.

2.2 Interface Protocol

2.2.1 Protocol Overview

Message exchanges between WCS and the Host are achieved using multiple TCP/IP sockets connections.

There are three message streams in each direction (Section 2.2.2). For each stream, a Sender and a Receiver process are defined on both WCS and the Host. Connections are established between Sender and Receiver pairs.

For each stream, there are two 2-way connections, one for messages from WCS to the Host and corresponding acknowledgements, and one for the reverse:

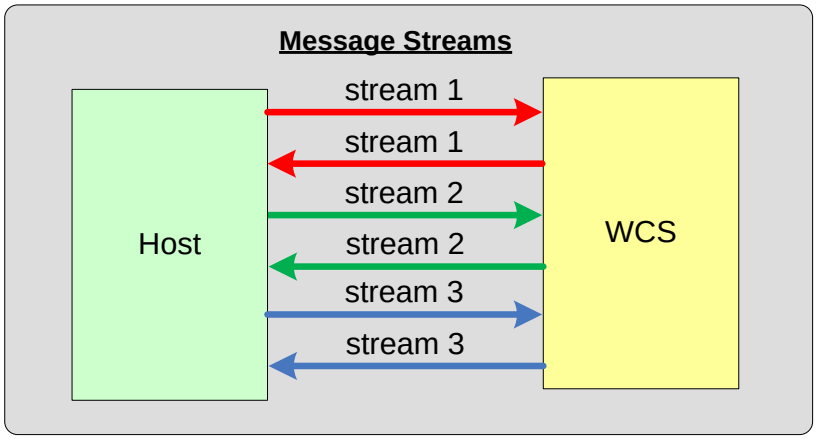
Connection 1:	Host sends message	WCS replies with acknowledge
Connection 2:	WCS sends message	Host replies with acknowledge

Connection processes on both WCS and the Host are programmed using standard TCP/IP socket communication software, to establish client/server connections.

To ensure integrity of data, every message sent must be matched by a corresponding acknowledge (positive or negative) from the receiving process before going on to send subsequent messages from an outgoing message queue i.e. there is only ever one outstanding unacknowledged message on each connection.

If a sender process does not receive a reply within a configurable timeout period (parameter on WCS) the message is resent indefinitely until an acknowledgement is received.

2.2.2 Multiple Message Streams



There are three messaging streams available in each direction between the Host and WCS. Messages queued in one direction on the same stream will be transmitted in the sequence they are added to the queue. Messages using different streams may overtake each other.

WCS places no restrictions on which messages can be received on which stream (though Section 3.3 indicates which stream is likely to be used for each type of message).

Message IDs (Section 2.2.8) are allocated by the sender from the same pool regardless of which stream the messages are being sent through. This can result in messages being received with their message IDs out of sequence (not an issue).

2.2.3 Establishing Connections

For each connection, the receiver is designated the server and the sender is the client in TCP/IP terms. An online sender sends out a connection request to a listening receiver. If a receiver is not available, the sender retries the connection periodically until the receiver accepts a request.

WCS is a dual system but an alias IP address is used which always refers to the currently-online server.

The connections are entirely independent of each other (although they are established via the same physical network). Thus connection failure on one link (e.g. WCS to Host) does not mean that the other links (e.g. Host to WCS) is considered failed (i.e. WCS could continue to receive and acknowledge data from the Host in this example). Loss of one link but not the others probably indicates a software problem (as a hardware fault would be expected to take down all connections). If a connection is lost then the sender automatically attempts to regain the connection.

2.2.4 Message Exchange

Once a connection is accepted then a continuous cycle of message and acknowledgement is the normal operation for each connection i.e. the sender sends a message on the appropriate link and awaits an acknowledgement reply on the same link.

When a message is received, it is validated and secured to disk before the acknowledgement is sent to the sender on the same link.

All messages have a common format starting with an STX character (ASCII 2) and ending with an ETX character (ASCII 3). Section 3.1.3 gives more detail on the common message structure.

2.2.5 Message Acknowledgement

Messages are acknowledged by the receiver process as confirmation that the message has been received and processed (e.g. data secured on disk). The acknowledge can be either positive or negative to indicate whether the message contents were accepted or rejected.

An acknowledgement message uses the standard message format except that the message ID number is a reflection of that in the message being acknowledged (except for NAK – see below).

The acknowledgement message types are as shown below. *[Note that the message names 'ACK', 'NAK' & 'CAN' do not refer to the ASCII control codes of the same name.]*

ACK	"Acknowledge". Message received, content validation successful and data secured i.e. ***ACK = "OK"***
NAK	"Negative Acknowledge". Possible message corruption detected – retry required. Detected by incorrectly formatted message header or a character count not matching the number of characters received between STX & ETX. i.e. ***NAK = "Sorry I missed that. Could you please say it again?"***
CAN	"Cancel". A correctly-formatted message header was received but there is a problem with processing the content. No retry required. A reason text is given in the response (Section 3.2.3). i.e. ***CAN = "I hear exactly what you say so please don't repeat yourself, but I cannot act because ...."***

The format of these protocol-level messages is defined in Section 3.2.

If an error is detected by a sender during receipt of an acknowledgement message, it should be treated as a NAK i.e. the original message should be re-sent.

Note that acknowledgements (negative or positive) are only sent in response to a message encapsulated between the STX & ETX characters. If either of these control characters is missing then no acknowledgement is sent at all which should cause the sender to re-send after a timeout period. The reason for this is to avoid any timing issues cause by the receiver and sender each timing out and the receiver sending a NAK around the same time that the sender performs a re-send.

2.2.6 Failure to Receive Messages

If no message is received from the Host within a configurable time period but the TCP connection is still established, WCS raises a 'Host Message Receive' alarm.

2.2.7 Loss of Connection

If a sender or receiver detects that a connection has been lost then any message that has not yet been fully sent or received is abandoned (as not yet transferred) and the process resets from the start by establishing a new outgoing connection (sender) or waiting for an incoming connection (receiver).

While no connection is present, this is highlighted on WCS as an alarm.

2.2.8 Message ID

Every message (other than a NAK message) contains a “message ID” which is generated by the sender and reflected back by the receiver in the acknowledgement message as a synchronisation check.

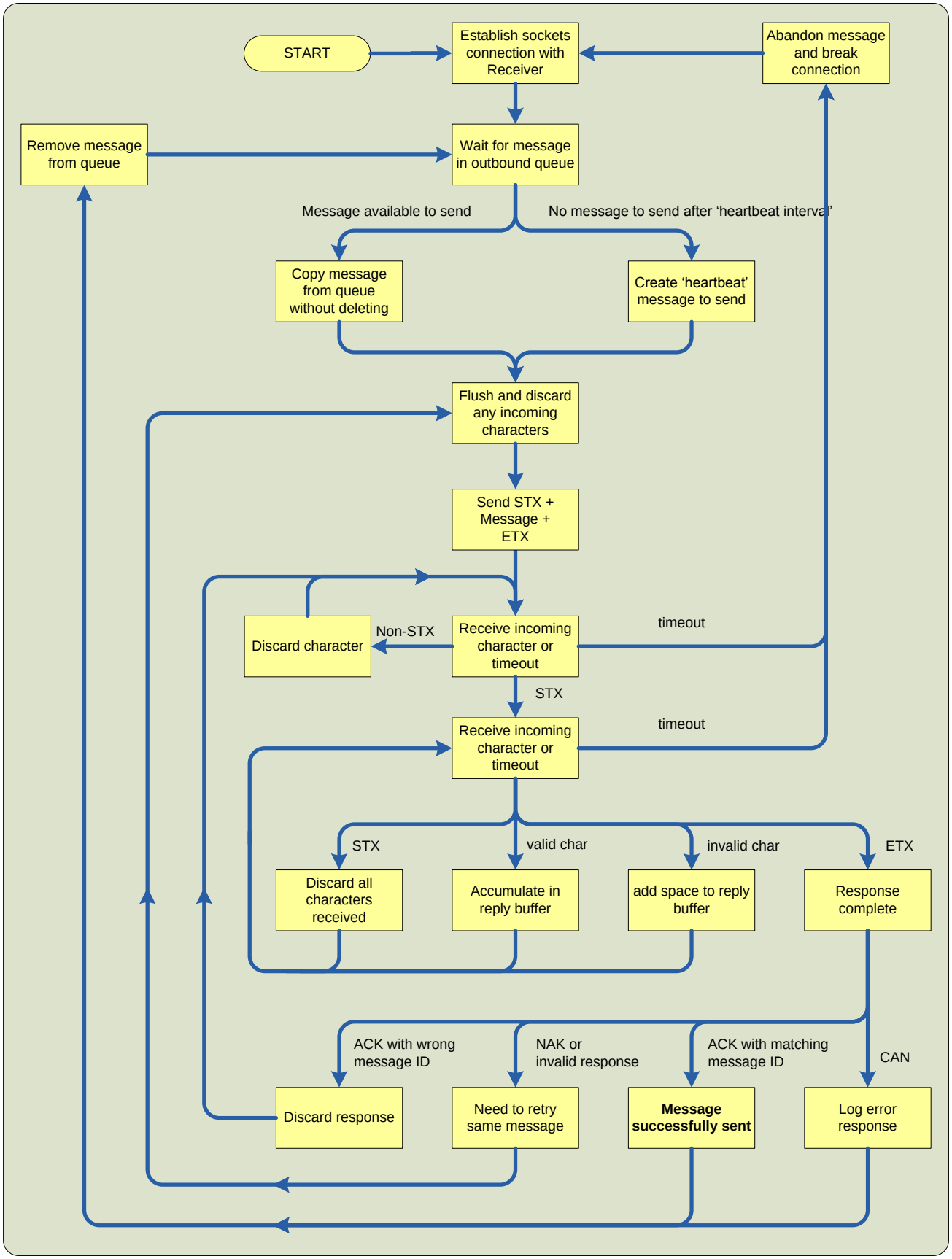
If two consecutive messages are received with the same message ID and the earlier message had been successfully processed and acknowledged (ACK) then the receiver does not process the second message but simply repeats the ACK sent previously, the assumption being that the previous acknowledgement was lost.

If a sender receives a reply which does not match the ID of the sent message, the reply is ignored and the sender continues to wait for a correct ID (subject to timeout).

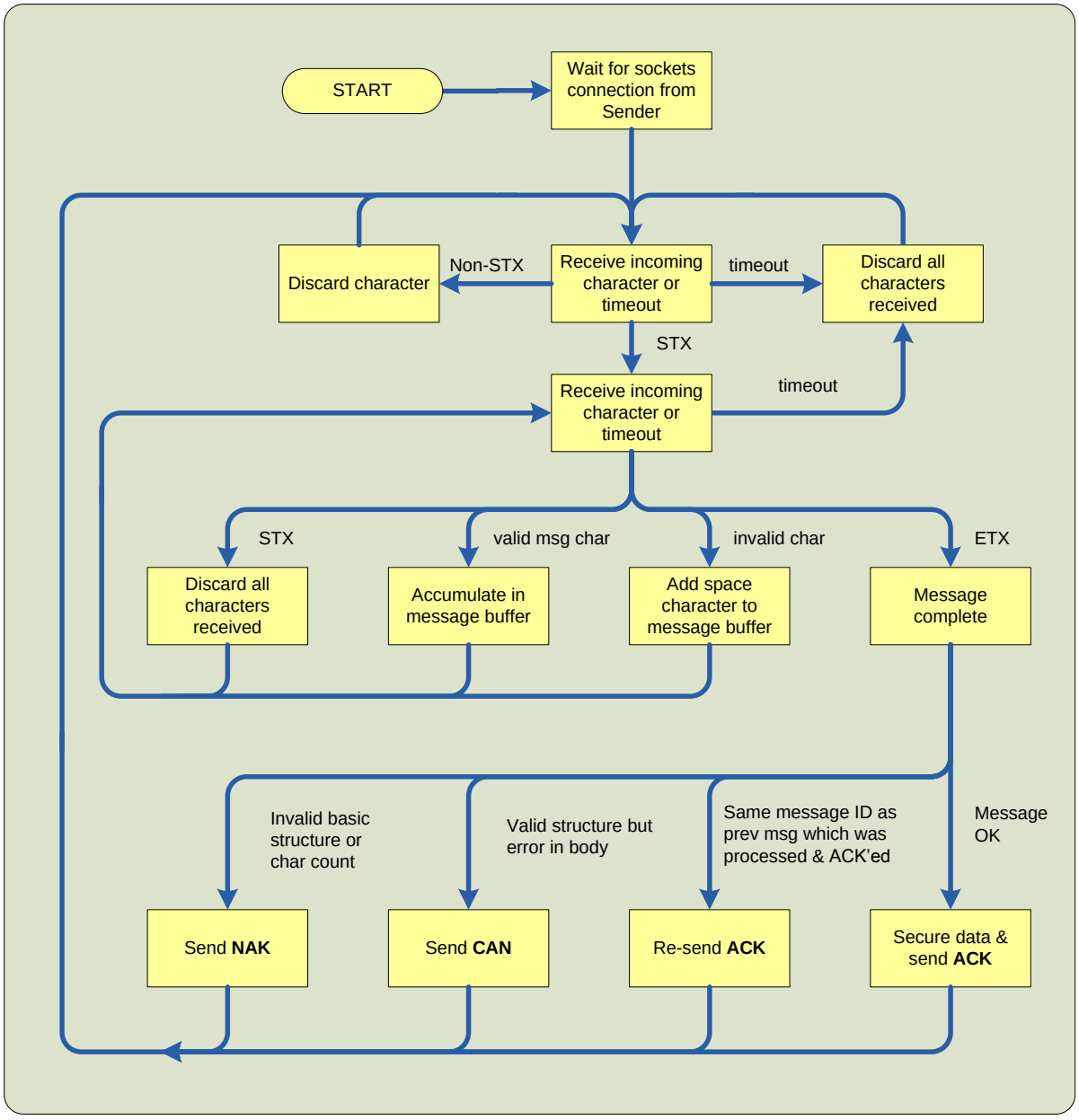
The ID number is normally assigned incrementally in the range 000000001 to 999999999 then back to 000000001 (zero is not used). The receiver must not assume that the message IDs should be in sequence and only need check whether the ID is different from that in the previous message (i.e. a sequence should not be assumed).

Each message direction (Host to WCS and WCS to Host) has an independent sequence of message IDs generated by the sender. The same ID sequence is used across all data streams (i.e. there will be gaps in the sequence as seen on any one stream where the ‘missing’ IDs have been used on the other stream). This has the advantage of making each message uniquely identified regardless of which stream it was sent on.

2.2.9 Message Sending Logic



2.2.10 Message Receiving Logic



3 MESSAGE FORMATS

3.1.1 Character Set

Each message comprises a number of fixed-length fields of printable 8-bit characters assumed to represent the Windows-1252 character set i.e.

Message Characters:

Codes	Representing
0 to 31	Special control characters – not valid as message characters (converted to space) [see below for special usage of codes 2 & 3]
32 to 126	Standard printable ASCII characters (letters, numbers and punctuation)
127	The 'del' character – not valid as a message character (converted to space)
128 to 191	Various special printable characters. For example:- 128: € (Euro symbol) 163: £ (Pound sign) 189: ½ (half symbol)
192 to 255	Accented characters

In addition, the entire message is encapsulated between the non-printable ASCII control characters STX (code 2) and ETX (code 3).

Each field (including message header fields) is terminated by the "|" (bar) character (ASCII Decimal 124; Hex 7c). This character remains valid inside a fixed-length message field where it will not be interpreted as a field terminator.

There is a limit of 8,000 characters in any one message (i.e. all characters between STX & ETX as reflected in the message length field). A 5-digit message length field is retained in case this needs to be increased at a future date.

3.1.2 Field Formats Key

In the following sub-sections, the following abbreviations are used to describe particular fixed-length message field formats. This table shows how the formats are represented in the fixed-length messages to/from the Host.

Generic message field formats:

Format code	Description	Null value
I*n*	Integer, padded with leading zeroes. For example, in I5 format -3 is represented as -0003 and +3 is represented as 00003	all zeroes
U*n*	Unsigned integer, padded with leading zeroes	all zeroes
F*n*	Fixed-length alphanumeric text string of n characters. Padded with trailing spaces	all spaces
N*w.d*	Decimal numeric. w is overall field length. d is the number of digits after the decimal. For readability, the decimal point character is included in the message field. The value before the decimal is padded to the left with zeroes and the value after the decimal is padded to the right with zeroes. For example, in N6.2 format -3.7 is represented as -03.70 and +3.7 is represented as 003.70	all zeroes
YN	Yes/no flag in F1 format: Y=yes, N = no	n/a[1]
D8	8-digit date: yyyymmdd	all zeroes
T6	6-digit time of day to the second: hhmmss	all zeroes
T4	4-digit time of day to the minute: hhmm	all zeroes
DT14	14-digit date & time to the second = D8+T6: yyyymmddhhmmss	all zeroes
DT12	12-digit date & time to the minute = D8+T4: yyyymmddhhmm	all zeroes

3.1.3 Common Message Structure

Every message has the same basic structure:

<STX><character count>|<message type>|<message ID>|<message data>|<ETX>

Message element	Format	Description	Example
STX		Start of message character (ASCII 2)	
Character count	U5	Number of characters between STX & ETX	00064
Message Type	F4	Message type	WXYZ
Message ID	U9	A value assigned by the sender (Section 2.2.8)	123456789
Message data	multiple fields	Content of messages (length depends on message type)	
ETX		End of message character (ASCII 3)	

Note: all messages of the same type are the same fixed length. The length may be different for each message type.

Example message:
<STX>00065|WXYZ|123456789|<field 1>|<field 2>|<field 3>|<ETX>

[1] YN flags cannot have a null value. 'Y' or 'N' must be sent. If a null value is required then the field should be defined as a F1 instead of YN.

3.2 Protocol Messages (both directions)

3.2.1 ACK – Positive Acknowledge

There is no message body in an ACK message. The overall message length (between <STX> and <ETX>) is 21.

e.g. <STX>00020|ACK |000010299|<ETX>

3.2.2 NAK – Negative Acknowledge

There is no message body in a NAK message. The overall message length is 21.

e.g. <STX>00021|NAK |000000000|<ETX>

As NAK indicates a possible message corruption then the message ID in the incoming message may itself be missing or corrupted. For this reason the message ID in a NAK message is always zero and need not be checked on receipt. A NAK is always assumed to refer to the last message sent.

On receiving a NAK response, the sender re-sends the last message (using the same message ID). If the message is repeatedly NAK'ed this is likely to indicate a software fault. By default the WCS sender will resend a NAK'ed message indefinitely, however it is possible to configure the sender to abandon resend attempts after a specific number of resends have been NAK'ed. A WCS parameter sets this maximum number of resend attempts. Setting the parameter to zero configures the WCS sender never to abandon message resends. Note that the count of resend attempts only includes those resends that are acknowledged with a valid NAK message, not those which result in a timeout or an acknowledgement message containing an error.

3.2.3 CAN – Cancel Acknowledge

Field	Format	Description
Cancel Reason	F60	'Free-format' description of fail reason

The overall message length (including protocol characters but excluding <STX> and <ETX>) is 82.

e.g.
<STX>00082|CAN |000018277|Pallet with this LP does not exist
|<ETX>

A CAN message indicates successful receipt but unsuccessful validation of a received message and the cancel reason is used to indicate why. The handling of CAN'ed messages is system-dependent, since it normally indicates a software fault.

Receipt of a CAN message by the WCS sender process results in an alarm being logged containing the entire message contents. No automatic recovery is attempted and the message is treated as though it had been sent successfully so as not to block further transmissions on the link.

3.2.4 Heartbeat Messages

HBT (there is no further data in this message)

The overall message length (including protocol characters but excluding <STX> and <ETX>) is 21.

e.g. <STX>00021|HBT |000017722|<ETX>

The sender sends an HBT message to the receiver after a period of inactivity on either stream, i.e. if there are no messages to send and the sender is not awaiting an ACK message from the receiver for a message previously sent.

On WCS, the minimum period of inactivity (in seconds) to wait before sending a HBT message to the Host is defined by a configuration parameter.

3.3 Message Summary

The following message types are identified (in addition to the protocol messages – Section 3.2). The Stream column indicates which of the communications streams (Section 2.2.2) would normally be used to send the message.

3.3.1 Messages from Host to WCS

Message	Purpose	Stream	Section
SMU	**SKU Master Update.** Updates WCS with SKU master details	1	3.4.1
EXS	**Expected Sales details.** Contains the expected sales forecast for a SKU for future days	1	3.4.2
PAH	**Pre Advice Header**. Notifies WCS of incoming stock for a particular supplier. Followed by one or more PAL messages (one per pre advice line)	3	3.4.3
PAL	**Pre Advice Line** detail	3	3.4.4
ORD	**Order** header. Notifies WCS of an order requirement for a particular customer. Followed by one or more ORL messages (one per order line)	2	3.4.5
ORL	**Order line** detail	2	3.4.6

3.3.2 Messages from WCS to Host

Message	Purpose	Stream	Section
SLA	**Stock Level Adjustment**. Sent when stock quantity changes other than as a result of normal receipt or delivery against an order	1	3.5.1
SAA	**Stock Availability Adjustment.** Sent when a quantity of stock changes status between Held and Available	1	3.5.2
PLC	**Pre advice Line Complete.** Sent once WCS has completed receipt of stock for a pre-advice line	3	3.5.3
PSU	**Pre advice Status Update.** Sent when the status of a pre-advice order changes (e.g. closed)	3	3.5.4
OLC	**Order Line Complete.** Sent once WCS has completed picking and packing of a despatch unit to define its contents	2	3.5.5
OSU	**Order Status Update.** Sent when the status of an order changes (e.g. planned, despatched).	2	3.5.6
VEH	**Vehicle Closure.** Sent for each despatch unit on a trailer when the trailer is closed	2	3.5.7
SBD	**Stock Balance Detail**. Details of WCS stock inventory of all SKUs at a snapshot time	1	3.5.8

3.4 Message Details from Host to WCS

The Description column for all messages indicates any validation WCS performs on the field value, and the action WCS takes when processing the field value.

Fields for which this column is blank are ignored by WCS.

3.4.1 SMU – SKU Master Update

Field	Format	Description
Action	F1	'A' – amend a SKU already known to WCS for the same Client and SKU Code, or create a new SKU 'D' – delete a SKU already known to WCS for the same Client and SKU Code
Client	F10	Client that owns the SKU. Creates client record in WCS if not already known
SKU Code	F50	The combination of Client and SKU Code forms the unique key in WCS for the SKU
Description	F80	Default description for SKU on WCS screens
Long Description	F200	
Unit Barcode	F50	Unit barcode, or the SKU Code if no unit barcode defined. Must be unique among the SKUs owned by the client
Division	F15	
Brand	F15	Brand that owns the SKU. Creates brand record in WCS if not already known
Department	F30	
Product Group	F30	
Product Class	F30	
Product Fulfilment Type	F10	Required by WCS only for pre-advice reports
Story	F30	
Indent	YN	'Y' – this is an indent SKU, each unit of which is a case containing a ratio pack of multiple different items 'N' – this is a retail SKU
Unit Height	U10	mm
Unit Length	U10	mm
Unit Width	U10	mm
Style Code	F30	Used when selecting the module of the storage multishuttle in which a tote containing the SKU should be stored
Style Description	F30	
Colour	F30	
Size	F10	Required by WCS only for pre-advice reports and Vassing lists
Fabric	F30	
Country of Origin	F30	
Pack Quantity	U7	Applies only to indent SKUs
SKU Value	N12.3	AUD
Unit Weight	U7	g
Unit Volume	U12	mm^3
Mechable	F1	'Y' – SKU is mechable 'S' – SKU is semimechable 'N' – SKU is nonmechable
Fragile	YN	'Y' – order lines of the SKU should not be despatched in a satchel
Foldable	YN	'Y' – SKU can be folded for packing
Nestable	YN	'Y' – SKU can be nested with other items of the same SKU for packing
Nestable Percentage	U3	The percentage of the unit volume that each additional item of the SKU will take up when packed with other items of the same SKU. Applies only to nestable SKUs

Hanging Length	F5	'LONG' or 'SHORT', or blank if unknown. Used when recommending an aisle in which a GOH trolley containing the SKU should be stored
Dangerous Goods	YN	Required by WCS only for despatch labels
DG UN Code	F4	
DG Class	F4	
DG Sub Class	F4	
DG Description	F40	
DG Flashpoint	F4	
DG Net Volume	U10	
DG Net Volume Unit	F10	
Proper Shipping Name	F40	
Additional Shipping Name	F40	
Cubiscan Required	YN	'Y' – WCS is required to send incoming stock for Cubiscan process, if any of values Unit Height, Unit Length, Unit Width, Unit Weight, Unit Volume is 0
Store Ready Sequencing Value A	F30	Used for sorting lines in an order into pick sequence if value of any Sort Sequence field in ORD message is 'A'
Store Ready Sequencing Value B	F30	Used for sorting lines in an order into pick sequence if value of any Sort Sequence field in ORD message is 'B'
Store Ready Sequencing Value C	F30	Used for sorting lines in an order into pick sequence if value of any Sort Sequence field in ORD message is 'C'
Store Ready Sequencing Value D	F30	Used for sorting lines in an order into pick sequence if value of any Sort Sequence field in ORD message is 'D'
Store Ready Sequencing Value E	F30	Used for sorting lines in an order into pick sequence if value of any Sort Sequence field in ORD message is 'E'
Store Ready Sequencing Value F	F30	Used for sorting lines in an order into pick sequence if value of any Sort Sequence field in ORD message is 'F'
Store Ready Sequencing Value G	F30	Used for sorting lines in an order into pick sequence if value of any Sort Sequence field in ORD message is 'G'
Store Ready Sequencing Value H	F30	Used for sorting lines in an order into pick sequence if value of any Sort Sequence field in ORD message is 'H'
Store Ready Sequencing Value I	F30	Used for sorting lines in an order into pick sequence if value of any Sort Sequence field in ORD message is 'I'
Store Ready Sequencing Value J	F30	Used for sorting lines in an order into pick sequence if value of any Sort Sequence field in ORD message is 'J'

3.4.2 EXS – Expected Sales

Field	Format	Description
Client	F10	Client that owns the SKU. Must already be known to WCS
SKU Code	F50	The combination of Client and SKU Code forms the unique key in WCS for the SKU. Must already be known to WCS
Date of Sales Day 1	D8	First sales date
Sales Day 1 Quantity	U6	Expected sales for first date. Applies only if Date of Sales Day 1 is valid
Date of Sales Day 2	D8	Second sales date
Sales Day 2 Quantity	U6	Expected sales for second date. Applies only if Date of Sales Day 2 is valid
Date of Sales Day 3	D8	Third sales date
Sales Day 3 Quantity	U6	Expected sales for third date. Applies only if Date of Sales Day 3 is valid
Date of Sales Day 4	D8	Fourth sales date
Sales Day 4 Quantity	U6	Expected sales for fourth date. Applies only if Date of Sales Day 4 is valid
Date of Sales Day 5	D8	Fifth sales date
Sales Day 5 Quantity	U6	Expected sales for fifth date. Applies only if Date of Sales Day 5 is valid
Date of Sales Day 6	D8	Sixth sales date
Sales Day 6 Quantity	U6	Expected sales for sixth date. Applies only if Date of Sales Day 6 is valid
Date of Sales Day 7	D8	Seventh sales date
Sales Day 7 Quantity	U6	Expected sales for seventh date. Applies only if Date of Sales Day 7 is valid

3.4.3 PAH – Pre-advice Header

Field	Format	Description
Client	F10	Client that owns the pre-advice. Creates client record in WCS if not already known
Pre-advice ID	F20	The combination of Client and Pre-advice ID forms the unique key in WCS for the pre-advice. Must not already be known to WCS
Pre-advice Type	F10	‘FLAT‘ – stock is received in cases ‘GOH’ – stock is received hanging
Due Date & Time	DT14	
Supplier Name	F20	
Shipment Reference	F20	
Container Reference	F20	
Carrier Reference	F20	
Mode of Transport	F10	
Number of Lines	U4	The number of lines on the pre-advice. Must be greater than 0. This should match the number of PAL messages received for the pre-advice

3.4.4 PAL – Pre-advice Line

Field	Format	Description
Client	F10	Client that owns the pre-advice. Must already be known to WCS
Pre-advice ID	F20	The combination of Client and Pre-advice ID forms the unique key in WCS for the pre-advice. Must already be known to WCS
Line ID	U6	Must be unique among the lines for the pre-advice
SKU Code	F50	The combination of Client and SKU Code forms the unique key in WCS for the SKU. Must already be known to WCS
Quantity Due	U6	The number of units expected to be received. Must be greater than 0
Garment Type	F30	'BOX' – stock is received in cases and is to be stored flat 'GOH' – stock is received in cases and is to be despatched to be steamed 'GOH-A' – stock is received hanging and is to be stored hanging The combination of SKU Code and Garment Type must be unique among the lines for the pre-advice
Product Type	F30	
Supplier Code	F30	Required by WCS only for pre-advice reports
Supplier Category	F30	Required by WCS only for pre-advice reports
Pack Code	F30	Required by WCS only for pre-advice reports
Units Per Pack	U7	
PO Brand	F30	
PO Number	F30	

3.4.5 ORD – Order Header

Field	Format	Description
Client	F10	Client that owns the order. Creates client record in WCS if not already known
Brand	F15	Brand that owns the order. Creates brand record in WCS if not already known. If consignment already known to WCS, must belong to same brand
WMS Order ID	F20	The combination of Client and WMS Order ID forms the unique key in WCS for the order
Order Type	F25	Defines the method by which lines in the order are picked and despatched. The combination of Brand and Order Type forms the unique key in WCS for the order processing configuration
Assembly Date & Time	DT14	The latest time at which orders in the consignment should be despatched. Used by WCS as a secondary picking priority. If consignment already known to WCS, the earlier time of this value and the previous value is used
Deliver By Date & Time	DT14	
Order Date & Time	DT14	
Carrier Name	F25	Carrier by which the order will be despatched. Creates carrier record in WCS if not already known
Carrier Service Level	F25	Required by WCS only for despatch manifests
Carrier Consignment	F50	Group of one or more orders that may be picked and despatched together. Creates consignment record in WCS if not already known. Must not be blank. Must not be already known to WCS as a consignment that has been fully or partly released for picking
Carrier Consign Prefix	F10	Required by WCS only for despatch labels and despatch manifests
Carrier Depot code	F20	Required by WCS only for despatch labels
Carrier ATL Flag	YN	Authority To Leave. 'N' – Signature Required label to be applied to despatch unit
Carrier ATL Text	F25	
Carrier Charge Account	F10	Required by WCS only for despatch labels
Carrier Service Code	F2	Required by WCS only for despatch labels
Carrier Charge Code	F1	Required by WCS only for despatch labels
Carrier Product Code	F20	Required by WCS only for despatch labels
Carrier Line Commod	F2	Required by WCS only for despatch labels
Carrier Security Flag	YN	Required by WCS only for despatch labels
Carrier Routing Text 1	F25	Required by WCS only for despatch labels
Carrier Routing Text 2	F25	
Sender Address 1	F60	Required by WCS only for despatch labels
Sender Address 2	F60	Required by WCS only for despatch labels
Sender Town	F60	Required by WCS only for despatch labels
Sender County	F60	Required by WCS only for despatch labels

Field	Format	Description
Sender Country	F25	
Sender Postcode	F20	Required by WCS only for despatch labels
Return Address 1	F60	
Return Address 2	F60	
Return Town	F60	
Return County	F60	
Return Country	F25	
Return Postcode	F20	
Delivery Contact	F25	Required by WCS only for despatch labels
Delivery Name	F50	Required by WCS only for despatch labels and despatch manifests
Delivery Address 1	F60	Required by WCS only for despatch labels and despatch manifests
Delivery Address 2	F60	Required by WCS only for despatch labels
Delivery Address 3	F60	Required by WCS only for despatch labels
Delivery Town	F60	Required by WCS only for despatch manifests
Delivery County	F60	Required by WCS only for despatch manifests
Delivery Country	F25	Required by WCS only for despatch labels and despatch manifests
Delivery Postcode	F20	Required by WCS only for despatch labels and despatch manifests
Contact Phone	F25	Required by WCS only for despatch labels
Contact Email	F256	
Invoice Number Reference	F35	Required by WCS only for returns slips and Vassing lists
Invoice Name	F50	Required by WCS only for despatch labels, returns slips and Vassing lists
Invoice Address 1	F60	Required by WCS only for despatch labels and returns slips
Invoice Address 2	F60	Required by WCS only for despatch labels and returns slips
Invoice Town	F60	Required by WCS only for despatch labels
Invoice County	F60	Required by WCS only for despatch labels
Invoice Country	F25	
Invoice Postcode	F20	Required by WCS only for despatch labels
Invoice Contact Phone	F25	Required by WCS only for returns slips
Invoice Contact Email	F256	
Order Reference	F35	Required by WCS only for Vassing lists
Purchase Order	F35	
Currency	F3	
Tax Rate	N12.3	
Tax Amount	N12.3	
Discount	N12.3	
Freight Cost	N12.3	
Invoice Total	N12.3	
Invoice Subtotal	N12.3	

Field	Format	Description
Credit Card Name	F30	
Credit Card Number	F30	
Credit Card Type	F30	
Department Number	F10	
Advertised Date	DT14	
For Hub Code	F10	
Hub Name	F50	
Hub Address 1	F60	
Hub Address 2	F60	
Hub Town	F60	
Hub County	F60	
Hub Country	F25	
Hub Postcode	F20	
Customer group	F15	
Customer ID	F15	Populated if the order is to be despatched for a specific customer. The Store ID field will also be populated if that customer is to collect the order from the store
Store ID	F20	Populated if the order is to be despatched to a store. Creates store record in WCS if not already known
Sort Sequence 1	F1	Specifies which of SMU message fields Store Ready Sequencing Value A through to Store Ready Sequencing Value J is the first sequence by which WCS sorts lines in the consignment when planning DUs and scheduling GTP picks. Blank if the lines in the consignment should be sorted by order. If an order already known to WCS for this consignment and order type, this value supersedes the sequence for that order
Sort Sequence 2	F1	Specifies which of SMU message fields Store Ready Sequencing Value A through to Store Ready Sequencing Value J is the second sequence by which WCS sorts lines in the consignment when planning DUs and scheduling GTP picks. Blank if the lines in the consignment should be sorted by order. If an order already known to WCS for this consignment and order type, this value supersedes the sequence for that order
Sort Sequence 3	F1	Specifies which of SMU message fields Store Ready Sequencing Value A through to Store Ready Sequencing Value J is the third sequence by which WCS sorts lines in the consignment when planning DUs and scheduling GTP picks. Blank if the lines in the consignment should be sorted by order. If an order already known to WCS for this consignment and order type, this value supersedes the sequence for that order

Field	Format	Description
Sort Sequence 4	F1	Specifies which of SMU message fields Store Ready Sequencing Value A through to Store Ready Sequencing Value J is the fourth sequence by which WCS sorts lines in the consignment when planning DUs and scheduling GTP picks. Blank if the lines in the consignment should be sorted by order. If an order already known to WCS for this consignment and order type, this value supersedes the sequence for that order
Sort Sequence 5	F1	Specifies which of SMU message fields Store Ready Sequencing Value A through to Store Ready Sequencing Value J is the fifth sequence by which WCS sorts lines in the consignment when planning DUs and scheduling GTP picks. Blank if the lines in the consignment should be sorted by order. If an order already known to WCS for this consignment and order type, this value supersedes the sequence for that order
Sort Sequence 6	F1	Specifies which of SMU message fields Store Ready Sequencing Value A through to Store Ready Sequencing Value J is the sixth sequence by which WCS sorts lines in the consignment when planning DUs and scheduling GTP picks. Blank if the lines in the consignment should be sorted by order. If an order already known to WCS for this consignment and order type, this value supersedes the sequence for that order
Sort Sequence 7	F1	Specifies which of SMU message fields Store Ready Sequencing Value A through to Store Ready Sequencing Value J is the seventh sequence by which WCS sorts lines in the consignment when planning DUs and scheduling GTP picks. Blank if the lines in the consignment should be sorted by order. If an order already known to WCS for this consignment and order type, this value supersedes the sequence for that order
Sort Sequence 8	F1	Specifies which of SMU message fields Store Ready Sequencing Value A through to Store Ready Sequencing Value J is the eighth sequence by which WCS sorts lines in the consignment when planning DUs and scheduling GTP picks. Blank if the lines in the consignment should be sorted by order. If an order already known to WCS for this consignment and order type, this value supersedes the sequence for that order
Sort Sequence 9	F1	Specifies which of SMU message fields Store Ready Sequencing Value A through to Store Ready Sequencing Value J is the ninth sequence by which WCS sorts lines in

Field	Format	Description
		the consignment when planning DUs and scheduling GTP picks. Blank if the lines in the consignment should be sorted by order. If an order already known to WCS for this consignment and order type, this value supersedes the sequence for that order
Sort Sequence 10	F1	Specifies which of SMU message fields Store Ready Sequencing Value A through to Store Ready Sequencing Value J is the tenth sequence by which WCS sorts lines in the consignment when planning DUs and scheduling GTP picks. Blank if the lines in the consignment should be sorted by order. If an order already known to WCS for this consignment and order type, this value supersedes the sequence for that order
Max Order Wait Date	D8	Specifies the latest date on which WCS automatically releases orders in the consignment for picking. If consignment already known to WCS, the earlier date of this value and the previous value is used
Carton Fill Percentage	U3	Specifies the percentage volume of a large carton occupied by all the lines in the consignment at which WCS schedules the release of orders in the consignment for picking. If consignment already known to WCS, this value supersedes the previous value
Invoice Required	YN	
Packing List Required	YN	'Y' – Pack list to be inserted into one despatch unit of each order type in the consignment
Instructions	F180	
Label Instructions	F50	Required by WCS only for despatch labels
Label Instructions 2	F50	Required by WCS only for despatch labels
Label Instructions 3	F50	Required by WCS only for despatch labels
Packing Instructions	F50	
Vas Instructions	F50	
Vassing Required in Order	YN	
Return Slip Required	YN	'Y' – Returns slip to be inserted into one despatch unit of the order
VIP Required	YN	
Hold	YN	'Y' – WCS never automatically releases orders in the consignment for picking. If consignment already known to WCS, this value supersedes the previous value
Text 1	F200	
Text 2	F200	
Num 1	U7	
Num 2	U7	
Check 1	YN	

Field	Format	Description
Check 2	YN	
Date 1	DT14	
Date 2	DT14	
Number of Order Lines	U5	The number of lines in the order. Must be greater than 0. This should match the number of ORL messages received for the order

3.4.6 ORL – Order Line

Field	Format	Description
Client	F10	Client that owns the order. Must already be known to WCS
WMS Order ID	F20	The combination of Client and WMS Order ID forms the unique key in WCS for the order. Must already be known to WCS
Line ID	U6	Must be unique among the lines in the order
SKU	F50	The combination of Client and SKU Code forms the unique key in WCS for the SKU. Must already be known to WCS
Quantity	U6	The number of units to be picked and despatched. Must be greater than 0
Customer SKU ID	F30	
Product Price	N12.3	
Tax Amount	N12.3	
Item Discount	N12.3	
RRP	N12.3	
Net Price	N12.3	
Retail Price	N12.3	
Unit Price	N12.3	
VAS Type	F10	
VAS Instruction	F200	
Gift Wrapping	YN	'Y' – Pick carton into which the line is picked to be routed to a pack station configured for gift wrapping. Each item in the line to be wrapped individually
Gift Message	F200	If populated, message to be printed at pack station when each item in the line is handled. Applies only if value of Gift Wrapping field is 'Y'

3.5 Message Details from WCS to Host

The Description column for all messages indicates the value with which WCS populates the field.

Fields for which this column is blank are not populated by WCS.

3.5.1 SLA – Stock Level Adjustment

This message is sent by WCS to report an exceptional change in stock quantity.

Field	Format	Description
Client	F10	The combination of Client and SKU Code forms the unique key in WCS for the SKU
SKU Code	F50	
Available	YN	'Y' – change to quantity of available stock 'N' – change to quantity of unavailable stock
Change	I6	Adjustment in quantity. Both positive and negative adjustments are allowed. Must not be 0
Reason Code	F10	Reason selected by user making the adjustment, or configured in WCS for automatic adjustment
Adjustment Notes	F50	Reason text entered by user making the adjustment, or configured in WCS for automatic adjustment
Adjust Stock Status	F10	

3.5.2 SAA – Stock Availability Adjustment

This message is sent by WCS to report a change in stock availability. The selection of WCS hold states which affect stock availability (if any) is configurable on WCS.

Field	Format	Description
Client	F10	The combination of Client and SKU Code forms the unique key in WCS for the SKU
SKU Code	F50	
New Available	F1	'Y' – stock changing from unavailable to available 'N' – stock changing from available to unavailable
Quantity	U6	Quantity of the SKU affected by the change. Must not be 0

3.5.3 PLC – Pre-advice Line Complete

This message is sent by WCS for each line in a pre-advice when the pre-advice is confirmed closed. There will be no more than 1 PLC message sent for each pre-advice line. All the PLC messages must be sent for a pre-advice before the PSU message is sent.

Field	Format	Description
Client	F10	The combination of Client and Pre-advice ID forms the unique key in WCS for the pre-advice
Pre-advice ID	F20	
Line ID	U6	As provided in the PAL message from the Host
SKU Code	F50	The combination of Client and SKU Code forms the unique key in WCS for the SKU
Quantity Due	U6	The expected quantity for this pre-advice line
Quantity Received	U6	The quantity received in for the pre-advice. Must be at least 1

3.5.4 PSU – Pre-advice Status Update

This message is sent when a pre-advice is confirmed closed. There will be exactly 1 message sent for each pre-advice. All the PLC messages must be sent for a pre-advice before the PSU message is sent.

Field	Format	Description
Client	F10	The combination of Client and Pre-advice ID forms the unique key in WCS for the pre-advice
Pre-advice ID	F20	
Status	F15	‘Complete’ – at least 1 PLC message sent for the pre-advice ‘Cancelled’ – no PLC message sent for the pre-advice

3.5.5 OLC – Order Line Complete

This message is sent by WCS when a despatch unit is packed. All the OLC messages must be sent for an order before the OSU message with Status value Packed is sent.

Field	Format	Description
Client	F10	The combination of Client and WMS Order ID forms the unique key in WCS for the order
WMS Order ID	F20	
Line ID	U6	As provided in the ORL message from the Host
SKU Code	F50	The combination of Client and SKU Code forms the unique key in WCS for the SKU
SKU Quantity	U6	Quantity picked for the order line in the despatch unit (may be all or part of the originally-requested quantity). Must be at least 1
Carton ID	U50	The despatch label for the despatch unit. Note that this field is used for all despatch unit types
Carton Type	F10	The despatch unit type. Valid field values: 'Case' 'M Carton' 'L Carton' 'Oversized' 'Satchel' 'Pallet' 'GOH'

3.5.6 OSU – Order Status Update

This message is sent by WCS when an order reaches the specified state in WCS for the first time. All the OLC messages must be sent for an order before the OSU message with Status value Packed is sent. All the VEH messages must be sent for an order before the OSU message with Status value Despatched is sent.

Field	Format	Description
Client	F10	The combination of Client and WMS Order ID forms the unique key in WCS for the order
WMS Order Id	F20	
Status	F15	The state that the order has reached for the first time in WCS. Valid field values: 'Received' 'Planned' 'Packed' 'Despatched' 'Abandoned' 'Deleted'

3.5.7 VEH – Vehicle Closure

This message is sent by WCS for each despatch unit loaded onto a trailer when that trailer is closed. All the VEH messages must be sent for an order before the OSU message with Status value Despatched is sent.

Field	Format	Description
Client	F10	Client that owns the contents of the despatch unit
Carton ID	U50	The despatch label for the despatch unit. Note that this field is used for all despatch unit types
Pallet ID	U50	The pallet (if any) on which the despatch unit is located. If the despatch unit is itself a pallet, the despatch label
Carton Weight	N12.3	kg The recorded weight of the despatch unit. The calculated weight, if no weight recorded for the despatch unit
Carton Volume	N12.3	cm^3 The calculated volume of the despatch unit
Carton Height	U10	mm The recorded height of the despatch unit. 0 if no height recorded for the despatch unit
Carton Length	U10	mm The recorded length of the despatch unit. 0 if no length recorded for the despatch unit
Carton Width	U10	mm The recorded width of the despatch unit. 0 if no width recorded for the despatch unit
Trailer	F10	Must not be blank
Trailer Shipped Date & Time	DT14	Date and time trailer confirmed closed

3.5.8 SBD – Stock Balance Detail

A sequence of these messages may sent by WCS at a configurable time of each day. Up to 30 records are reported in one SBD message. There is no more than 1 record in each sequence for each SKU.

Field	Format	Description
Last SBD Flag	YN	Indicates if this is the last SBD of the current sequence
Number of Records	U2	Number of records reported in this message (**max 30**)
The following fields are repeated for each record reported in this message:		
Client	F10	The combination of Client and SKU Code forms the unique key in WCS for the SKU
SKU Code	F50	
Available Quantity	U8	Quantity of stock in corresponding availability (not sent if both values are 0)
Unavailable Quantity	U8	
Stock Status	F10	

Document History

V0.1 16 Sept 2016 KL
Initial draft version
V0.2 13 Dec 2016 ODL
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V0.3 6 Jan 2017 ODL
Updates following further discussions with Toll following finalised client requirements
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Updates following changes, mainly for despatch labels
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Between versions of this document, changes are normally highlighted using Word's change tracking.