The Hermes Standard Change Proposal

Define minimum requirements for strings

Voting meeting:
23th of April 2018 (NEPCON / Shanghai)

Requesting company:
GÖPEL electronic GmbH

Version change:

Revision

Service description tag:

-

Description:

If using PLCs to implement The Hermes Standart it is very helpful to have fixed dimensions for strings.

Use cases:

-

Functionality / communication sequences:

-

New / changed XML messages:

-

Proposed changes to standard:

3 Message definition

3.1 Message format

Messages use the Extensible Markup Language (XML) format, where at least version 1.1 of XML shall be supported [W3C_XML_1.1].
For character encoding UTF-8 has to be used (No other encoding may be specified in the XML declaration).
In the following sections of the document, for a better readable description of the XML data structures, tables are used instead of commonly used schema definitions.
Maximum size for every message is 64 kByte, i.e. 65536 bytes. For every string parameter there is either a fixed or minimum size that must be supported (individual values see tables).
In the tables, XML attributes are marked with the image "◆" and XML child nodes are marked with the image "📁", which in turn may consist of more XML structures.
The representation of data types (e.g. floating point numbers, boolean attributes …) shall comply with the W3C XML schema recommendation [W3C_XML_Schema].
To keep upward compatibility, any message or attribute unknown by an implementation can be ignored and discarded.

3.4 ServiceDescription

The ServiceDescription message is sent by both machines after a connection is established. The downstream machine sends its ServiceDescription first whereupon the upstream machine answers by sending its own ServiceDescription.

ServiceDescription	Type	Range	Optional	Description
◆MachineId	string	any string (minimum supported length: 80 bytes)	no	ID/name of the sending machine for identifying it in a Hermes enabled production line.
◆LaneId	int	1 .. n	no	The sending machine's lane of this connection relates to Lanes are enumerated looking downstream from right to left beginning with 1
◆Version	string	xxx.yyy (7 bytes)	no	The implemented interface version of the machine
📁SupportedFeatures	Feature []		no	List of supported features (empty for version 1.0)

The features specified in version 1.0 of this protocol have to be provided by any implementation and thus are not listed in the SupportedFeatures list of the ServiceDescription explicitly.

3.5 Notification

The Notification message is sent by both machines before a connection is terminated, e.g. after protocol errors or before shutdown. It could also be used for general notification purposes.

Notification	Type	Range	Optional	Description
NotificationCode	int	1 .. n	No	A notification code of the list below. Notification codes above 1000 are not defined by this protocol and may be used by the application
Severity	int	1 .. 4	No	A severity of the list below
Description	string	any string (minimum supported length: 254 bytes)	No	An English textual description of the notification.

The following NotificationCodes are defined:

1 Protocol error (invalid transition in the state machine, see section 2.6)
2 Connection refused because of an established connection
3 Connection reset because of changed configuration
4 Configuration error
5 Machine shutdown

Possible values for Severity:

1 Fatal error
2 Error
3 Warning
4 Info

3.6 BoardAvailable

The BoardAvailable message is sent to the downstream machine to indicate the readiness of the upstream machine to handover a PCB. When an optional attribute is received from an upstream machine, then it must be passed on (possibly altered) to the next downstream machine.

BoardAvailable	Type	Range	Optional	Description
BoardId	string	GUID (36 bytes)	no	Indicating the ID of the available board
BoardIdCreatedBy	string	~~non-empty~~ any string (minimum supported length: 80 bytes)	no	MachineId of the machine which created the BoardId (the first machine in a consecutive row of machines implementing this protocol). The MachineId is part of the Hermes configuration.
FailedBoard	Int	0 .. 2	no	A value of the list below
ProductTypeId	String	any string (minimum supported length: 254 bytes)	yes	Identifies a collection of PCBs sharing common properties
FlippedBoard	Int	0 .. 2	no	A value of the list below
TopBarcode	String	any string (minimum supported length: 254 bytes)	yes	The barcode of the top side of the PCB
BottomBarcode	String	any string (minimum supported length: 254 bytes)	yes	The barcode of the bottom side of the PCB
Length	float	positive numbers	yes	The length of the PCB in millimeter.
Width	float	positive numbers	yes	The width of the PCB in millimeter.
Thickness	float	positive numbers	yes	The thickness of the PCB in millimeter.
ConveyorSpeed	float	positive numbers	yes	The conveyor speed preferred by the upstream machine in millimeter per second
TopClearanceHeight	float	positive numbers	yes	The clearance height for the top side of the PCB in millimeter.
BottomClearanceHeight	float	positive numbers	yes	The clearance height for the bottom side of the PCB in millimeter.

GUID must match the regular expression

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[0-9a-f]{8}-[0-9a-f]{4}-[0-9a-f]{4}-[0-9a-f]{4}-[0-9a-f]{12}
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FailedBoard may be one of the following values:

0 Board of unknown quality available
1 Good board available
2 Failed board available

FlippedBoard may be one of the following values:

0 Side up is unknown
1 Board top side is up
2 Board bottom side is up

If FlippedBoard is 2 (Board bottom side is up) then TopBarcode is facing downwards and BottomBarcode is facing upwards. Same applies for TopClearanceHeight and BottomClearanceHeight.
The definition of board bottom and board top side is outside of the scope of The Hermes Standard and left to the customer.

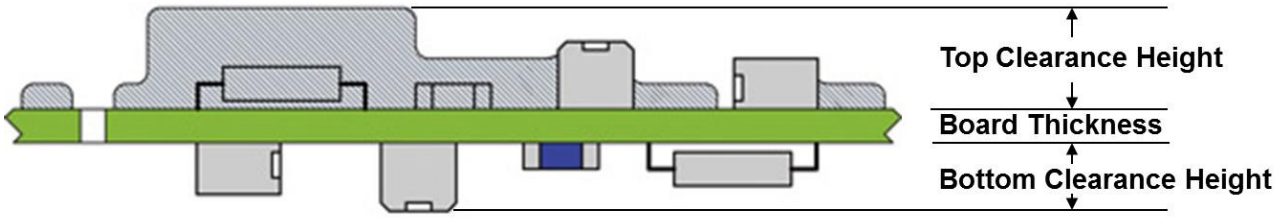

Fig. 13 Explanation for top and bottom clearance height

3.7 RevokeBoardAvailable

With the RevokeBoardAvailable message, the upstream machine signals that it is not ready anymore to handover a PCB.

RevokeBoardAvailable	Type	Range	Optional	Description

3.8 MachineReady

The MachineReady message is sent to the upstream machine to indicate the readiness of the downstream machine to accept a PCB.

MachineReady	Type	Range	Optional	Description
FailedBoard	int	0 .. 2	no	A value of the list below

FailedBoard may be one of the following values:

0 Ready to accept any board
1 Ready to accept good boards.
2 Ready to accept failed boards

3.9 RevokeMachineReady

With the RevokeMachineReady message, the downstream machine signals that it is not ready anymore to accept a PCB.

RevokeMachineReady	Type	Range	Optional	Description

3.10 StartTransport

The StartTransport message is sent to the upstream machine to initiate the PCB handover process. There is no response to this message.

StartTransport	Type	Range	Optional	Description
BoardId	string	GUID (36 bytes)	no	The ID of the board for which the transport shall be started.
ConveyorSpeed	float	positive numbers	yes	Optional parameter indicating the selected conveyor speed for the handover in millimeter per second

The downstream machine is responsible for selecting the actual conveyor speed according to the preferred conveyor speed sent in the BoardAvailable message. In general the highest possible speed supported by both machines will be selected.
If a StartTransport message is received for a BoardId which is not the one received with the last BoardAvailable message, the transport shall be canceled. This case is not to be treated as a protocol error.

3.11 StopTransport

The StopTransport message is sent by the downstream machine after it has finished the transport.

StopTransport	Type	Range	Optional	Description
TransferState	int	1 .. 3	no	See list below for possible values
BoardId	string	GUID (36 bytes)	no	The ID of the board to which the message relates to

Transfer states:

1 NotStarted: The PCB never left and hence is fully inside the upstream machine.
2 Incomplete: The transfer was cancelled in progress.
3 Complete: The transfer ended successfully.

If the BoardId does not match the one from StartTransport, this shall be treated as a protocol error. ~~:~~ Therefore, ~~hence~~ the connection would need to be re-established.

3.12 TransportFinished

The TransportFinished message is sent by the upstream machine after it finished the transport.

TransportFinished	Type	Range	Optional	Description
TransferState	int	1 .. 3	no	See list below for possible values
BoardId	string	GUID (36 bytes)	no	The ID of the board to which the message relates to

Transfer states:

1 NotStarted: The PCB never left and hence is fully inside the upstream machine.
2 Incomplete: The transfer was cancelled in progress.
3 Complete: The transfer ended successfully.

If the BoardId does not match the one from StartTransport, this shall be treated as a protocol error.~~;~~ Therefore, ~~hence~~ the connection would need to be re-established.

3.13 SetConfiguration

The SetConfiguration message is sent by an engineering station to configure the Hermes interfaces of a machine. If the sent configuration is not accepted, the machine is expected to send a Notification message (see section 3.5).

SetConfiguration	Type	Range/ Multiplicity	Optional	Description
MachineId	string	any string (80 bytes)	no	ID/name of this machine for identifying it in a Hermes enabled production line.
UpstreamConfigurations	UpstreamConfiguration []	0 .. n	no	Configuration for upstream lanes
DownstreamConfigurations	DownstreamConfiguration []	0 .. n	no	Configuration for downstream lanes

UpstreamConfiguration	Type	Range/ Multiplicity	Optional	Description
UpstreamLaneId	int	1 .. n	no	The lane on the upstream side Lanes are enumerated looking downstream from right to left beginning with 1
HostAddress	string	valid IP address or hostname (minimum supported length: 254 bytes)	no	The IP address or hostname of the upstream machine for this lane
Port	int	0 .. 65535	no	Port number on which connections shall be established

DownstreamConfiguration	Type	Range/ Multiplicity	Optional	Description
DownstreamLaneId	int	1 .. n	no	The lane on the downstream side Lanes are enumerated looking downstream from right to left beginning with 1
ClientAddress	string	valid IP address or hostname (minimum supported length: 254 bytes)	yes	The IP address or hostname of the downstream machine for this lane. If not specified, then connections from any IP address are accepted.
Port	int	0 .. 65535	no	Port number on which the server shall accept connections for this lane

It is up to the user to keep MachineIds unique.

3.14 GetConfiguration

The GetConfiguration message is sent by an engineering station to read out the current configuration of the Hermes interfaces of a machine. The machine is expected to answer with a CurrentConfiguration message.

GetConfiguration	Type	Range/ Multiplicity	Optional	Description

3.15 CurrentConfiguration

The CurrentConfiguration message is sent by a machine in response to the GetConfiguration message.

CurrentConfiguration	Type	Range/ Multiplicity	Optional	Description
MachineId	string	any string (minimum supported length: 80 bytes)	yes	ID/name of this machine for identifying it in a Hermes enabled production line.
UpstreamConfigurations	UpstreamConfiguration []	0 .. n	no	Configuration of upstream lanes
DownstreamConfigurations	DownstreamConfiguration []	0 .. n	no	Configuration of downstream lanes

For the definition of UpstreamConfiguration and DownstreamConfiguration see section 3.13.
If no MachineId has been configured yet, the CurrentConfiguration message does not contain the attribute MachineId.