The Hermes Standard Change Proposal

Further clarification of the meaning of "optional" for attributes

Voting meeting:
11th of November 2019 (productronica / Munich)

Requesting company:
ASM

Version change:

Revision

Affected versions:

1.2 and 1.0.3

Service description tag:

-

Description:

Some Hermes messages contain optional attributes. This term “optional” may be sometimes misunderstood as if it is up to a developer whether to support such an optional attribute or just leave it out. Although The Hermes Standard already specifies how optional attributes shall be handled, this specification may not yet be detailed enough. In discussions with customers and different machine vendors, many times there appeared to be too muc space for interpretation and misunderstanding. Therefore, the meaning of “optional” shall be further detailed as follows:
“Optional attributes indicate that it is not required to provide them if the information is not available. But if the information is available at the machine, e.g., barcode, then the optional attributes shall be set. When an optional attribute is received from an upstream machine, then it must be passed on (possibly altered) to the next downstream machine.”

Use cases:

-

Functionality / communication sequences:

-

New / changed XML messages:

-

Proposed changes to standard:

3 Message format

…

3.6 BoardAvailable

The BoardAvailable message is sent to the downstream machine to indicate the readiness of the upstream machine to handover a PCB.

Optional attributes indicate that it is not required to provide them if the information is not available. But if the information is available at the machine, e.g., barcode, then the optional attributes should be set. 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 / Multiplicity	Optional	Description
BoardId	string	GUID (36 bytes)	no	Indicating the ID of the available board.
BoardIdCreatedBy	string	non-empty 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.
Weight	float	positive numbers	yes	The weight of the PCB in grams.

WorkOrderId	string	any string (minimum supported length: 80 bytes)	yes	Identifies the work order for production of the PCB.

GUID must match the regular expression
`[0-9a-f]{8}-[0-9a-f]{4}-[0-9a-f]{4}-[0-9a-f]{4}-[0-9a-f]{12}`

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.

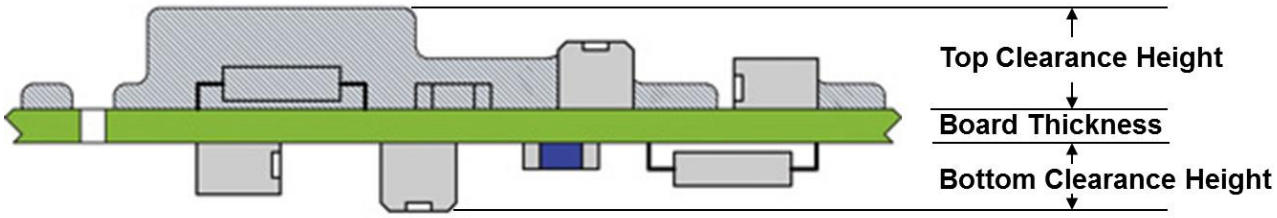

Fig. 1 Explanation for top and bottom clearance height

3.16 BoardForecast

The BoardForecast message is sent to the downstream machine to indicate some changes / command execution are needed or to give advanced information about the next board but a PCB is not yet available. If the ForecastId attribute is set then the downstream machine must at some point respond with a MachineReady carrying the same ForecastId. If needed downstream machine must send a RevokeMachineReady message first. If the forecasted product is not accepted by the downstream machine, then it must respond with a Notification of type “BoardForecastError”.
Optional attributes indicate that it is not required to provide them if the information is not available. But if the information is available at the machine, e.g., barcode, then the optional attributes should be set. When an

optional attribute is received from an upstream machine, then it must be passed on (possibly altered) to the next downstream machine.

Note: The function of BoardForecast is optional. If FeatureBoardForecast is specified in the ServiceDescription, it must be fully supported. Otherwise it can be ignored.

BoardForecast	Type	Range / Multiplicity	Optional	Description
ForecastId	string	any string (minimum supported length: 80 bytes)	yes	Indicating the ID of forecast message. The ID must be unambiguous and e.g. can be a timetamp or a GUID.
TimeUntilAvailable	float	positive numbers	yes	Number of seconds until a board may be available at downstream machine.
BoardId	string	GUID (36 bytes)	yes	Indicating the ID of the board that will be handed over as next. e.g. in case of product change this attribute will not be sent.
BoardIdCreatedBy	string	any string (minimum supported length: 80 bytes)	yes	MachineId of the machine which created the BoardId.
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 next PCB.
BottomBarcode	string	any string (minimum supported length: 254 bytes)	yes	The barcode of the bottom side of the next 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.
Weight	float	positive numbers	yes	The weight of the PCB in grams.
WorkOrderId	string	any string (minimum supported length: 80 bytes)	yes	Identifies the work order for production of the PCB.

The attributes definition are identical to the BoardAvailable message.

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

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

3.17 SendBoardInfo

The SendBoardInfo message is sent to the downstream machine as response of a received QueryBoardInfo message to transfer stored information about one of the last boards (see section **Fehler! Verweisquelle konnte nicht gefunden werden.**). If the upstream machine cannot find any board information it will nevertheless send the SendBoardInfo message without the BoardId and BoardCreatedBy attributes.
Machines supporting the feature FeatureSendBoardInfo shall be able to store and supply upon request the info of at least the last 50 handled boards.
Optional attributes indicate that it is not required to provide them if the information is not available. But if the information is available at the machine, e.g., barcode, then the optional attributes should be set.

Note: The function of SendBoardInfo is optional. If FeatureSendBoardInfo is specified in the ServiceDescription, it must be fully supported. Otherwise it can be ignored.

SendBoardInfo	Type	Range / Multiplicity	Optional	Description
BoardId	string	GUID (36 bytes)	yes / no	The ID of the board which data has been requested. This attribute will not be sent if the board information has not been found.
BoardIdCreatedBy	string	non-empty string (minimum supported length: 80 bytes)	yes / no	MachineId of the machine which created the BoardId. This attribute will not be sent if the board information has not been found.
FailedBoard	Int	0 .. 2	yes / no	A value of the list below. This attribute will not be sent if the board information has not been found.
ProductTypeId	string	any string (minimum supported length: 254 bytes)	yes	Identifies a collection of PCBs sharing common properties.
FlippedBoard	Int	0 .. 2	yes / no	A value of the list below. This attribute will not be sent if the board information has not been found.
TopBarcode	string	any string (minimum supported length: 254 bytes)	yes / no	The barcode of the top side of the next PCB. This attribute is mandatory if it has been in the QueryBoardInfo message.
BottomBarcode	string	any string (minimum supported length: 254 bytes)	yes / no	The barcode of the bottom side of the next PCB. This attribute is mandatory if it has been in the QueryBoardInfo message.
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.
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.

WorkOrderId	string	any string (minimum supported length: 80 bytes)	yes	Identifies the work order for production of the PCB.

The attributes definition are identical to the BoardAvailable message.

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

3.23 BoardArrived

The BoardArrived message is sent via Hermes vertical channel to a supervisory system to indicate that a PCB has arrived at this machine. The BoardArrived message shall be sent immediately after sending the corresponding StopTransport message.
Optional attributes indicate that it is not required to provide them if the information is not available. But if the information is available at the machine, e.g., barcode, then the optional attributes should be set.

Note: The function of BoardArrived is optional. If FeatureBoardTracking is specified in the SupervisoryServiceDescription, it must be fully supported. Otherwise it can be ignored.

BoardArrived	Type	Range / Multiplicity	Optional	Description
MachineId	string	any string (minimum supported length: 80 bytes)	no	ID / name of this machine for identifying it in a Hermes enabled production line.
UpstreamLaneId	int	1 .. n	no	The lane on the upstream side. Lanes are enumerated looking downstream from right to left beginning with 1.
UpstreamInterfaceId	string	any string (minimum supported length: 80 bytes)	yes	The ID of the transportation interface on the upstream side.
MagazineId	string	any string (minimum supported length: 80 bytes)	yes	Barcode of a magazine, required to identify the magazine from which the Board was transferred.
SlotId	int	1 .. n	yes	Indicates the slot in the magazine, enumerated from bottom to top, beginning with 1.
BoardTransfer	int	1 .. 3	no	A value of the list below
BoardId	string	GUID (36 bytes)	no	Indicating the ID of the available board
BoardIdCreatedBy	string	non-empty 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 used for the PCB transfer 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.
Weight	float	positive numbers	yes	The weight of the PCB in grams.
WorkOrderId	string	any string (minimum supported length: 80 bytes)	yes	Identifies the work order for production of the PCB.

GUID must match the regular expression
`[0-9a-f]{8}-[0-9a-f]{4}-[0-9a-f]{4}-[0-9a-f]{4}-[0-9a-f]{12}`

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

BoardTransfer may be one of the following values:

1 Transferred: Board arrived from upstream machine via Hermes or SMEMA.
2 Loaded: Board was loaded from a magazine or a stack of Boards.
3 Inserted: Board was manually inserted into the machine.

3.24 BoardDeparted

The BoardDeparted message is sent via Hermes vertical channel to a supervisory system to indicate that a PCB has left this machine. The BoardDeparted message shall be sent immediately after sending the corresponding TransportFinished message.
Optional attributes indicate that it is not required to provide them if the information is not available. But if the information is available at the machine, e.g., barcode, then the optional attributes should be set.

Note: The function of BoardDeparted is optional. If FeatureBoardTracking is specified in the SupervisoryServiceDescription, it must be fully supported. Otherwise it can be ignored.

BoardDeparted	Type	Range / Multiplicity	Optional	Description
MachineId	string	any string (minimum supported length: 80 bytes)	no	ID / name of this machine for identifying it in a Hermes enabled production line.
DownstreamLaneId	int	1 .. n	no	The lane on the downstream side. Lanes are enumerated looking downstream from right to left beginning with 1.
DownstreamInterfaceId	string	any string (minimum supported length: 80 bytes)	yes	The ID of the transportation interface on the downstream side.
MagazineId	string	any string (minimum supported length: 80 bytes)	yes	Barcode of a magazine, required to identify the magazine to which the Board was transferred.
SlotId	int	1 .. n	yes	Indicates the slot in the magazine, enumerated from bottom to top, beginning with 1.
BoardTransfer	int	1 .. 3	no	A value of the list below.
BoardId	string	GUID (36 bytes)	no	Indicating the ID of the available board.
BoardIdCreatedBy	string	non-empty 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 used for the PCB transfer 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.
Weight	float	positive numbers	yes	The weight of the PCB in grams.
WorkOrderId	string	any string (minimum supported length: 80 bytes)	yes	Identifies the work order for production of the PCB.

GUID must match the regular expression
`[0-9a-f]{8}-[0-9a-f]{4}-[0-9a-f]{4}-[0-9a-f]{4}-[0-9a-f]{12}`

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

BoardTransfer may be one of the following values:

1 Transferred: Board moved to downstream machine via Hermes or SMEMA.
2 Unloaded: Board was unloaded into a magazine.
3 Removed: Board was manually taken out of the machine.

3.25 SendWorkOrderInfo

The SendWorkOrderInfo message is sent via Hermes vertical channel from a supervisory system to a machine to provide the work order and the initial board data for a PCB or a set of PCBs. If the supervisory system cannot find any work order information it will nevertheless send the SendWorkOrderInfo message without any attributes except QueryId, if provided upon reqeuest.
Optional attributes indicate that it is not required to provide them if the information is not available. But if the information is available at the supervisory system, e.g., barcode, then the optional attributes should be set.

Note: The function of SendWorkOrderInfo is optional. If FeatureSendWorkOrderInfo is specified in the SupervisoryServiceDescription, it must be fully supported. Otherwise it can be ignored.

SendWorkOrderInfo	Type	Range / Multiplicity	Optional	Description
QueryId	string	any string (minimum supported length: 80 bytes)	yes / no	ID of QueryWorkOrderInfo this message refers to. This attribute is mandatory if it has been in the QueryWorkOrderInfo message.
WorkOrderdId	string	non-empty string (minimum supported length: 80 bytes)	yes	Identifies the work order for production of the PCB.
BoardId	string	GUID (36 bytes)	yes	Indicating the ID of the available board.
BoardIdCreatedBy	string	non-empty string (minimum supported length: 80 bytes)	yes	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	yes / no	A value of the list below. This attribute will not be sent if the board information has not been found.
ProductTypeId	string	any string (minimum supported length: 254 bytes)	yes	Identifies a collection of PCBs sharing common properties.
FlippedBoard	int	0 .. 2	yes / no	A value of the list below. This attribute will not be sent if the board information has not been found.
TopBarcode	string	any string (minimum supported length: 254 bytes)	yes / no	The barcode of the top side of the PCB. This attribute is mandatory if it has been the barcode in the QueryWorkOrderInfo message.
BottomBarcode	string	any string (minimum supported length: 254 bytes)	yes / no	The barcode of the bottom side of the PCB. This attribute is mandatory if it has been the barcode in the QueryWorkOrderInfo message.
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 used for the PCB transfer 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.
Weight	float	positive numbers	yes	The weight of the PCB in grams.

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