The Hermes Standard
for "M-to-M" in SMT Assembly

The Hermes Standard Change Proposal

Work Order Handling

Voting meeting:
28th of January 2019 (APEX / San Diego)

Requesting company:
Workgroup "Hermes Vertical"

Version change:

Minor

Affected versions:

1.1

Service description tag:

FeatureQueryWorkOrderInfo
FeatureSendWorkOrderInfo

Description:

Today Hermes communication is mainly horizontal with the only exception of the Hermes service port to query and set the Hermes configuration. However, horizontal communication from machine to machine alone is not sufficient - Hermes needs to be connected to supervisory systems, e.g. MES, to query work order info and related board data from a supervisory system when a board arrives at a machine.
This new feature requires the Hermes-Vertical Channel, which connects supervisory systems to Hermes machine-to-machine communication.

Use cases:

- Transfer board related data from supervisory system ~~to begin~~ at the beginning of the Hermes line
- Query board related data when reinserting a board at a machine

Functionality / communication sequences:

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New / changed XML messages:

Two new messages: QueryWorkOrderInfo and SendWorkOrderInfo

Proposed changes to standard:

2 Technical concept

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2.5 Communication with supervisory system (vertical channel)

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2.5.3 Protocol states and protocol error handling

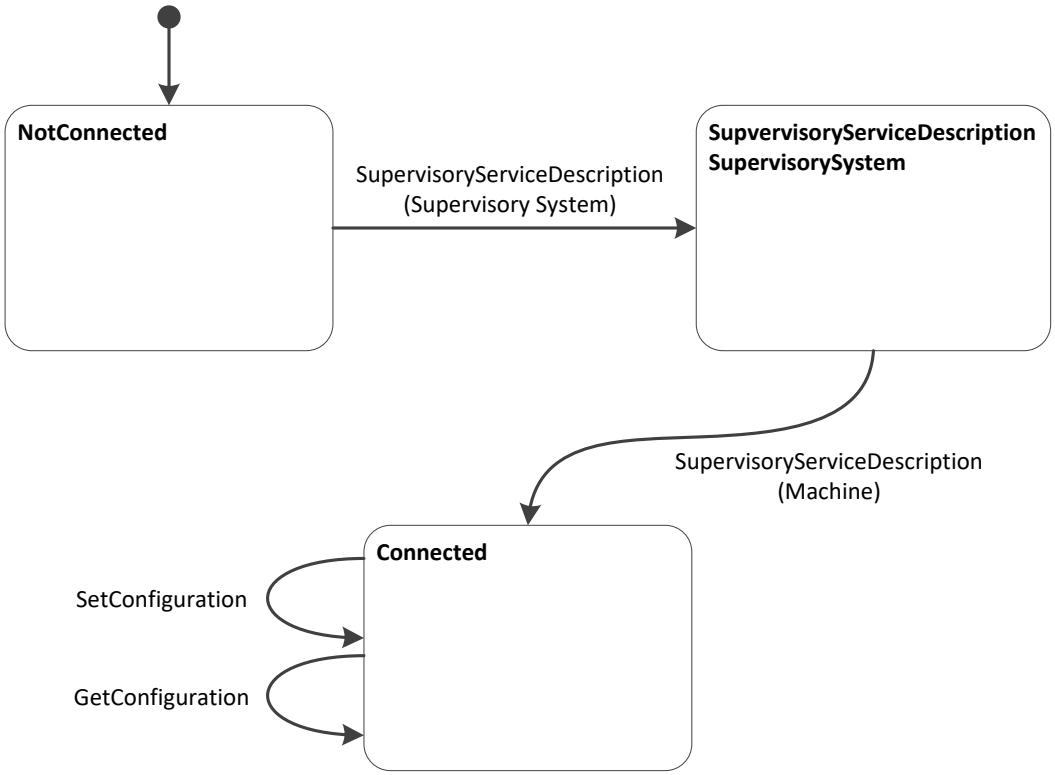

Fig. 22 Hermes interface states on vertical channel

Fig. 22 lists all states and transitions of a Hermes interface corresponding to the communication with supervisory systems. The state is the comprehensive state of the interface rather than the state of one of the involved communication partners.

The messages may only be sent if they trigger the corresponding transition shown in the state chart. Any message defined in this standard, except "Notification", ~~and~~ "CheckAlive", "QueryWorkOrderInfo" and "SendWorkOrderInfo", which is received not triggering a transition is interpreted as a protocol error. In case of a protocol error the connection is terminated. The interface may start over with a new connection. Any unknown message, which is received, shall be ignored and discarded to keep upward compatibility.

3 Message Definition

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3.22 SupervisoryServiceDescription

The SupervisoryServiceDescription message is sent by both machine and supervisory system after a connection is established. The supervisory system sends its SupervisoryServiceDescription first whereupon the machine answers by sending its own SupervisoryServiceDescription.

SupervisoryServiceDescription	Type	Range	Optional	Description
SystemId	String	any string (minimum supported length: 80 bytes)	no	ID / name of the sending machine or supervisory system for identifying it in a Hermes enabled production line.
Version	String	xxx.yyy (7 bytes)	no	The implemented interface version of the machine or supervisory system
SupportedFeatures	SupervisoryFeature []		no	List of supported supervisory features (empty for version 1.0)

SupervisoryFeature	Type	Range	Optional	Description
FeatureConfiguration	FeatureConfiguration		yes	Indication of configuration functions implementation
FeatureCheckAliveResponse	FeatureCheckAliveResponse		yes	Indication of CheckAliveResponse function implementation
FeatureQueryWorkOrderInfo	FeatureQueryWorkOrderInfo		yes	Indication of QueryWorkOrderInfo function implementation
FeatureSendWorkOrderInfo	FeatureSendWorkOrderInfo		yes	Indication of SendWorkOrderInfo function implementation

xxx.yyy must match the regular expression

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[1-9][0-9]{0,2}\.[0-9]{1,3}
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3.25 QueryWorkOrderInfo

The QueryWorkOrderInfo message is sent via Hermes vertical channel from a machine to a supervisory system to query the work order and initial board data for a PCB or a set of PCBs. Three scenarios are covered:

1) PCBs arrive within a magazine
2) A stack of PCBs arrives
3) A PCB is inserted and its barcode is known

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

QueryWorkOrderInfo	Type	Range	Optional	Description
QueryId	string	any string (minimum supported length: 80 bytes)	yes	Indicates the ID of QueryWorkOrder message. The ID must be unambiguous and e.g. can be a timestamp or a GUID.
MachineId	string	any string (minimum supported length: 80 bytes)	no	ID / name of this machine for identifying it in a Hermes enabled production line.
MagazineId	string	any string (minimum supported length: 80 bytes)	yes	Barcode of a magazine, required to identify the magazine.
SlotId	int	1 .. n	yes	Indicates the slot in the magazine, enumerated from bottom to top, beginning with 1.
Barcode	string	any string (minimum supported length: 254 bytes)	yes	The barcode 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}
```

3.26 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.

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	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	yes	The length of the PCB in millimeter.

		numbers		
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

```
[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