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

The Hermes Standard Change Proposal

Specify the BoardId to be a true globally unique identifiere (GUID/UUID)

Voting meeting:
13th of November (Productronica / Munich)

Requesting company:
ASM AS GmbH

Service description tag:

- (Revision of V1.0)

Description:

The BoardId (as part of BoardAvailable, StartTransport, StopTransport, TransportFinished messages) must be a globally unique identifier (GUID/UUID) in accordance with https://en.wikipedia.org/wiki/Universally_unique_identifier

Use cases:

Some of us, including myself, thought that "GUID" was a generic term, leaving freedom to an implementer to choose whatever is unique within the context of the equipment.

This interpretation gives rise to several issues:
1. There is no limit on the BoardId length (except for overall message length) which is awkward in situations where you want to use BoardId as a key.
2. In fact, the BoardId itself is not even sufficient for uniqueness, but the actual unique key is always the combination of BoardId and BoardIdCreatedBy (I think we were all aware of that, hence the pair of those in StartTransport, StopTranport, TransportFinished. However only during implementation are we now realizing how annoying this is)
3. The lifespan of uniqueness is not well defined. If an equipment reboots, could it possibly restart a GUID counter???
4. Actually, GUID is quite well defined according to https://en.wikipedia.org/wiki/Universally_unique_identifier. So from reading the standard it is unclear whether we are referring to the quoted definition, which would immediately rule out the previous issues.

IIRC, on of the reasons for local (per equipment) uniqueness was the concern for equipment not capable of generating such a UUID. However, we think this reasoning was flawed because:
1. It is difficult to imagine a platform/OS that lets you implement the entire TCP/IP stack but gives you no way of generating such a UUID.
2. We require an equipment to be able to generate a locally unique ID (which is only worth its salt if the ID remains unique after re-booting). If an equipment is able to do that, then it should also be able to combine this ID with its MAC-Address, which is more or less one of the suggested ways to generate a UUID.

Functionality / communication sequences:
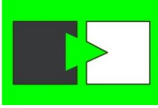
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New / changed XML messages:

The existing messages BoardAvailable, StartTransport, StopTransport, TransportFinished will be affected, but their structure remains unchanged.

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Proposed changes to standard:

2.7 Board IDs

Board individuals are identified by board IDs. These must be Globally Unique Identifiers (GUIDs) according to [ITU-T_REC_X.667], e.g. 123e4567-e89b-12d3-a456-426655440000. They are ~~Board individuals are identified by board IDs. These must be unique strings in the context of the generating machine (e.g. provided by a GUID generator),~~ generated by the first machine in a consecutive row of machines implementing the Hermes protocol. The board ID is passed from machine to machine. If a machine in a line does not implement the Hermes protocol, the board ID is lost and a new one will be generated by the next machine implementing Hermes.

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	no	Indicating the ID of the available board
◆BoardIdCreatedBy	string	non-empty string	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	yes	Identifies a collection of PCBs sharing common properties
◆FlippedBoard	int	0 .. 2	no	A value of the list below
◆TopBarcode	string	any string	yes	The barcode of the top side of the PCB
◆BottomBarcode	string	any string	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

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:

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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.

The definition of board bottom and board top side is outside of the scope of The Hermes Standard and left to the customer.

4.3 References

[IPC_SMEMA_9851]   IPC-SMEMA-9851 Mechanical Equipment Interface Standard

[ISO_7498-1]   ISO/IEC IS 7498-1: Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model. 1996

[IETF_RFC_791]   Internet Engineering Task Force: RFC791: Internet Protocol. September 1981

[IETF_RFC_2460]   Internet Engineering Task Force: RFC791: Internet Protocol, Version 6 (IPv6). September 1998

[IETF_RFC_793]   Internet Engineering Task Force: RFC793: Transmission Control Protocol. September 1981

[ITU-T_REC_X.667]   International Standard "Generation and registration of Universally Unique Identifiers (UUIDs) and their use as ASN.1 Object Identifier components

[W3C_XML_1.1]   Extensible Markup Language (XML) 1.1 (Second Edition) - W3C Recommendation 16 August 2006, edited in place 29 September 2006

[W3C_DATE_TIME]   Date and Time Formats - W3C Recommendation 15 September 1997

[W3C_XML_Schema]   XML Schema Part 2: Datatypes Second Edition - W3C Recommendation 28 October 2004

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