

SEMI A1.1-0918

SPECIFICATION FOR MEDIA INTERFACE FOR A HORIZONTAL COMMUNICATION (HC) BETWEEN EQUIPMENT

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1 Purpose

1.1 The purpose of this Subordinate Standard is to provide Ethernet based media interface specifications for SEMI A1, Specification for Horizontal Communication (HC) between Equipment for Factory Automation System, (hereinafter referred to as A1 HC) that are commonly usable between control entities such as programmable logic controllers (PLCs) or personal computers (PCs) from different suppliers regardless of their different fieldbus supports. A factory in which A1 HC would be applied generally uses PLCs and PCs for equipment control.

2 Scope

2.1 This Subordinate Standard covers 'Media Interfaces' portion of communication tiers which is shown in Figure 3 in A1 HC.

2.1.1 This Subordinate Standard covers Ethernet based Media Interface specifications which uses TCP.

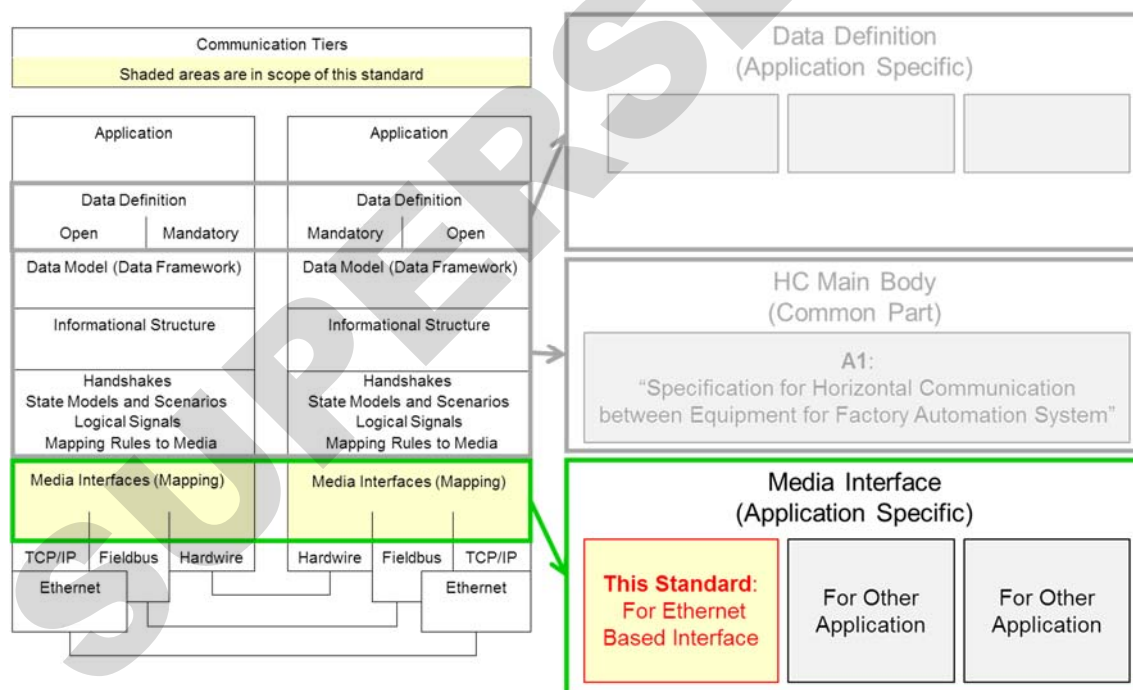


Figure 1
Position of This Subordinate Standard on HC Tiers

2.1.2 This Subordinate Standard covers interface specifications that are used between fabrication components such as a unit, equipment or a cluster of equipment, which are used as independent entities to form a fabrication line from material transportation perspective. This Subordinate Standard does not care about interface specification between equipment in a cluster.

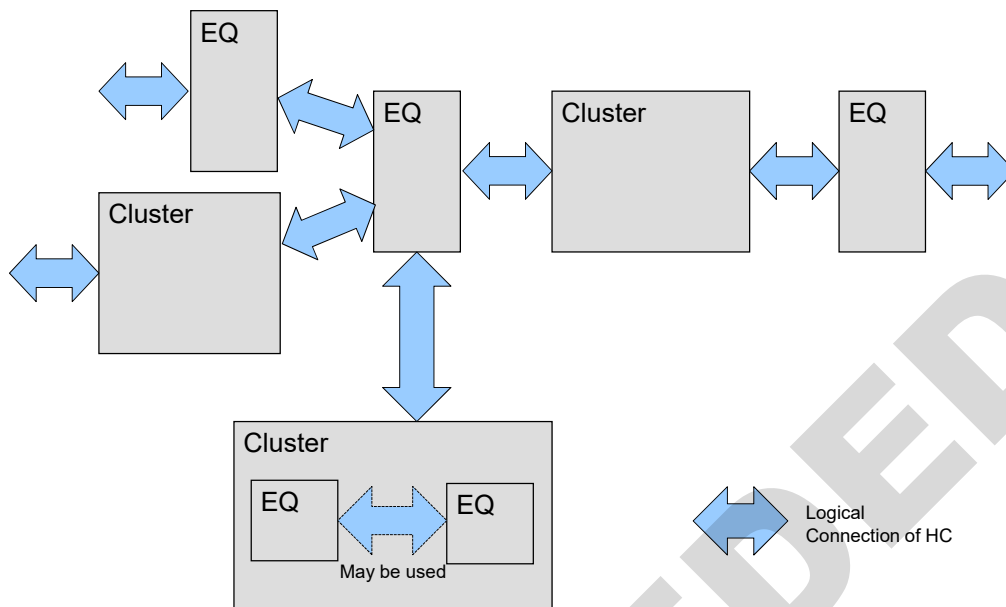


Figure 2
Logical Connection of HC

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Referenced Standards and Documents

3.1 SEMI Standards and Safety Guidelines

SEMI A1 — Specification for Horizontal Communication Between Equipment for Factory Automation System

3.2 IEEE Standard¹

IEEE 802.3 — Ethernet

3.3 IETF Document²

IETF RFC 793 — Transmission Control Protocol

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

4 Terminology

4.1 Abbreviations and Acronyms

4.1.1 CB — communication block

4.1.2 DB — data block

4.1.3 DH — data handshake

4.1.4 DR — data receiver

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² The IETF documents can be obtained from The Network Information Center, Network Solution, 14700 Park Meadow Drive, Suite 200, Chantilly, VA 22021, USA.

4.1.5 *DS* — data sender

4.1.6 *EQ* — equipment

4.1.7 *GD* — general data

4.1.8 *HC* — horizontal communication

4.1.9 *MD* — material data

4.1.10 *MH* — material handshake

4.1.11 *PC* — personal computer

4.1.12 *PLC* — programmable logic controller

4.1.13 *RB* — receive block

4.1.14 *SB* — send block

4.1.15 *VC* — vertical communication

4.2 Definitions

4.2.1 *communication block (CB)* — an informational block in HC Controller, which is used to communicate data blocks between HC controllers. One A1 HC 'Line' has one communication block. One communication block consists of one Line CB and required number of Track CB(s).

4.2.2 *data block (DB)* — a group of data which represents A1 HC communication signals which shall be transferred at a same time as one message for synchronization purpose.

4.2.3 *HC controller* — a controller which is a node of Ethernet and performs communication per A1 HC in equipment. In general, PLC or PC is used as HC controller.

4.2.4 *Line CB* — a part of communication block which contains Line Information including GD. Line CB consists of Line SB and Line RB.

4.2.5 *Line Acknowledge DB* — a data block which contains Line Information signals from Data Receiver to Data Sender.

4.2.6 *Line Transfer DB* — a data block which contains Line Information signals including GD from Data Sender to Data Receiver.

4.2.7 *Line RB* — a part of Line CB which contains Line Information signals including GD for Data Receiver.

4.2.8 *Line SB* — a part of Line CB which contains Line Information signals including GD for Data Sender.

4.2.9 *Track CB* — a part of communication block which contains Track Information including MD for one Track. One Track shall have one Track CB. Each Track CB consists of Track SB and Track RB.

4.2.10 *Track DB* — a data block which contains Track Information signals including MD for one Track.

4.2.11 *Track RB* — a part of Track CB which contains the data to be received as Track DB from other equipment.

4.2.12 *Track SB* — a part of Track CB which contains the data to be sent as Track DB to other equipment.

4.3 The terminology in SEMI A1 shall be referred for the following definitions.

4.3.1 *Data Handshake*

4.3.2 *General Data*

4.3.3 *Horizontal Communication*

4.3.4 *Line*

4.3.5 *Line Information*

4.3.6 *Logical Signal*

4.3.7 *Material Data*

4.3.8 *Material Handoff Handshake*

4.3.9 *Material Handshake*

4.3.10 *Mode Resolution*

4.3.11 *Port*

4.3.12 *Track*

4.3.13 *Track Information*

4.3.14 *Vertical Communication*

5 Convention

5.1 *Data Type Expression* — The following data type expression is used in this Standard.

Table 1 Data Type Expression

<i>Type</i>	<i>Definition</i>
BOOL	1-bit Boolean: TRUE (Signal On) = 1, FALSE (Signal Off) = 0
BYTE	8-bit binary data
CHAR	Single-byte ASCII character
STRUCT	Structured data
UINT8	8-bit unsigned integer
UINT16	16-bit unsigned integer
UINT32	32-bit unsigned integer

6 Requirements

6.1 This section defines the data block structure.

6.1.1 *Relationship Between A1 HC Signals and Data Block* — A1 HC signals consists of one Line Information and required number of Track Information.

6.1.1.1 *Line Information* — Line Information consists of two Data Handshakes; one for send GD, the other for receive GD. Each Data Handshake consists of GD and Data Handshake signals. Line Information is mapped to Line CB. Data Handshake to send GD is mapped to Line SB, Data Handshake to receive GD is mapped to Line RB.

6.1.1.2 *Track Information* — Track Information consists of one Material Handshake. Material Handshake uses two sets of Material Handshake signals. One set is output and is mapped to Track SB, the other set is input and is mapped to Track RB. A port which has Sender capability shall have MD in Track SB, a port which has Receiver capability shall have MD in Track RB.