

# TECHNICAL REPORT



Dynamic Modules – **STANDARD PREVIEW**  
Part 6-11: Design guidelines – Software and hardware interface for optical  
multicast switches **(standards.iteh.ai)**

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INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## DYNAMIC MODULES –

**Part 6-11: Design guidelines – Software and hardware interface for optical multicast switches**

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IEC 62343-6-11, which is a Technical Report, has been prepared by subcommittee 86C: Fibre optic systems and active devices, of IEC technical committee 86: Fibre optics.

The text of this Technical Report is based on the following documents:

Draft TR	Report on voting
86C/1604/DTR	86C/1612/RVDTR

Full information on the voting for the approval of this Technical Report can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62343 series, published under the general title *Dynamic modules*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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## INTRODUCTION

An optical multicast switch (MCS) is a dynamic module that is mainly used in a reconfigurable optical add-drop multiplexer (ROADM) to realize a colourless, directionless and contentionless (CDC) function. The MCS functions as an optical switch and a non-wavelength dependent branching device. It is electrically controlled with software, which directs an input signal from one input port to the required output port. This document clarifies MCS software and hardware interfaces, which were investigated based on results from a survey by Dynamic Module Sub-Committee, Fibre Optic Standardization Committee, and OITDA (Optoelectronic Industry and Technology Development Association) in 2017. The questionnaire was sent to 24 appropriate companies all over the world via their representatives. Responses from six companies including three specific proposals for a specification were received.

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## DYNAMIC MODULES –

### Part 6-11: Design guidelines – Software and hardware interface for optical multicast switches

#### 1 Scope

This part of IEC 62343, which is a Technical Report, proposes a software and hardware interface for the optical multicast switch (MCS). This switch can be controlled by resident firmware within the interface that is intended to enable a user or host to retrieve the switch status and/or adjust relevant switch settings. The MCS is defined in IEC 62343-3-4. The technical information regarding MCS and its applications in dense wavelength division multiplexing (DWDM) systems is described in IEC TR 62343-6-4. The objective of this document is a proposal for a software and hardware interface standard of MCS.

#### 2 Normative references

There are no normative references in this document.

#### 3 Terms, definitions and abbreviated terms

##### 3.1 Terms and definitions

There are no terms or definitions in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

##### 3.2 Abbreviated terms

DWDM	dense wavelength division multiplexing
EEPROM	electrically erasable programmable read only memory
FPGA	field programmable gate array
I <sup>2</sup> C	inter integrated circuit
LVTTL	low voltage transistor-transistor logic
MCS	optical multicast switch
MEMS	micro electro mechanical systems
MPU	microprocessor
O.C.	open collector
PLC	planar lightwave circuit
ROM	read only memory
SDRAM	synchronous dynamic random access memory
UART	universal asynchronous receiver transmitter



## 4 Survey results

### 4.1 Survey contents

The survey asked for a proposal for a software and hardware interface specification for an optical multicast switch for the purpose of standardization. It was not necessary for the respondent to be related directly to the multicast switch product, its application or its development.

### 4.2 Survey conditions

The survey was distributed to 24 companies including suppliers and users from December 15, 2015 to February 8, 2016. The responses were collected in a free format.

### 4.3 The analysis of responses

After reviewing all the responses, they were classified into three groups: A, B and C, as shown in Table 1. For each group and item, the results are summarized. The analysis results are shown in the summarized specification column. The details of the summarized specification are described in Annex A.

**Table 1 – Analyzed results of software and hardware interface**

	Group A	Group B	Group C	Summarized specification
Switch hardware configuration	Twin NxM	No description	Twin 4x8, Twin 8x16	Twin NxM
Request power supply	Basically 5,0 V. It is optional to assign +15 V to vendor reserved pins.	Single supply of either 3,3 V or 5,0 V	Only 5,0 V is described	5,0 V
Communication Interface	Either RS232C or I <sup>2</sup> C: I <sup>2</sup> C-DATA (pin no. 19) I <sup>2</sup> C-CLK (pin no. 21) or UART: UART Rx (pin no. 53) UART Tx (pin no. 55)	Either RS232C or I <sup>2</sup> C or both I <sup>2</sup> C: SDA (pin no 9) SCLK (pin no. 21) RS232C: RxD (pin no. 53) TxD (pin no.55)	LVTTTL UART serial interface SERIAL RxD (pin no. 53) SERIAL TxD (pin no. 55)	Both I <sup>2</sup> C and UART(LVTTTL)
Electric connector shape	Samtec 60 pins 2 mm pitch male connector TMMH-130-01-G-D-EP. The portion "-01" designating the lead shape can be selected according to the mechanism design of the user side line card.	Samtec 60 pins 2 mm pitch male connector TMMH-130-04-F-DV-EP	60 pins 2 mm pitch male connector	60 pins (2 columns, 30 rows) 2 mm pitch male connector with guide poles
Electric connector pin assign	There is detailed information	There is detailed information	There is detailed information	We standardize the proposed specifications with content not mutually exclusive, as shown in Annex A

	Group A	Group B	Group C	Summarized specification
Alarm function	No description	No description	Abnormality of main constituting the MCS (for example, flash ROM, SDRAM, FPGA, oscillator, etc.) CPU abnormality notification by DC pin using WDT, etc. Operation abnormality notice of the PLC or MEMS drive unit (for example, temperature abnormality, control pole fault abnormality, drive driver fault, etc.) Power supply abnormality notification Internal temperature abnormality notification (when heating parts are used)	Alarm function
Reset function	There is a detailed description of the reset function	There are two descriptions: hardware reset and software reset	There is a detailed description of the reset function	Combine the reset functions of Group A and Group B and Group C

The communication format is analysed as shown in Table 2, in the same manner.

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**Table 2 – Analyzed results of communication formats**

	Group A	Group B	Group C	Proposed standard specification
Communication format (I <sup>2</sup> C)	Details descriptions are available (communication parameters, communication format, object description, Alarm FIFO operation description). Regarding the implementation of I <sup>2</sup> C, there is description that it follows [1] <sup>1</sup>	There is description about command list and pin assignment	No description	Combine the commands of Group A and Group B

<sup>1</sup> Numbers in square brackets refer to the Bibliography.

	Group A	Group B	Group C	Proposed standard specification
Communication format (RS232C)	No description	There is description of information (communication parameter, communication command) necessary for communication. Although it is described as RS232C as a communication IF, there is also a description of LVTTTL level. There is description about light intensity monitor and light attenuation setting.	No description	Although there is a RS232C method in Group B, this item is moved to the hardware interface of the UART because of the similarity
Communication format (UART)	There is detailed information (communication parameter, communication format, command explanation) used for communication	No description	There is no description, only pin assignment	Specify only the list of commands used for I <sup>2</sup> C and UART

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### 4.4 Future direction (standards.iteh.ai)

Based on the survey results, the summarized specification is shown in Annex A. In order to establish a standard specification for a MCS software and hardware interface, additional information such as timing requirements, timing diagrams of power-on and reset, communication parameters such as clock frequency/ baud rate, data/communication format, packet structure, read/write transaction are required. The Dynamic Module Sub-Committee, Fibre Optic Standardization Committee, and OITDA (Optoelectronic Industry and Technology Development Association) will make a proposal for the standard specification including this missing information.