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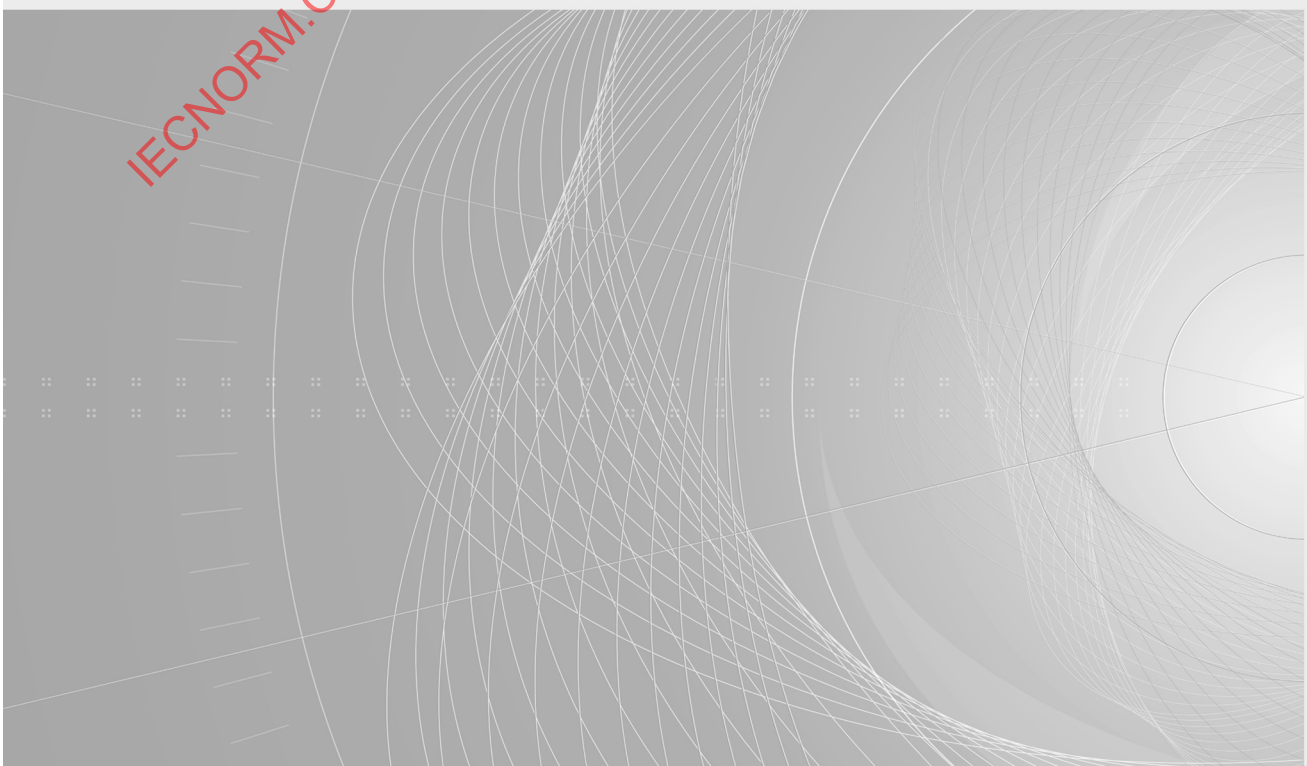
TECHNICAL REPORT

Dynamic modules –
Part 6-2: Design guide – Software and hardware interfaces – Survey results



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DYNAMIC MODULES –

Part 6-2: Design guide – Software and hardware interfaces – Survey results

FOREWORD

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IEC 62343-6-2, which is a technical report, has been prepared by subcommittee 86C: Fibre optic systems and active devices, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition published in 2009. It constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) the survey results of the software and hardware interface of OCM have been added as Annex B, which was presented at the IEC Seattle meeting in 2010. The results are in agreement with the general conclusion of the first edition.

b) OPMON (optical performance monitor) in the body of the text has been changed to OCM (optical channel monitor) for consistency with the latest definitions.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
86C/1124/DTR	86C/1149/RVC

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 publication 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 publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

A bilingual version of this publication may be issued at a later date.

DYNAMIC MODULES –

Part 6-2: Design guide – Software and hardware interfaces – Survey results

1 Scope

This part of IEC 62343, which is a technical report, clarifies dynamic module interfaces, which should be standardized, based on the surveys. Annex A is a summary of survey responses by region and Annex B provides survey results specific to the optical channel monitor (OCM).

The object of this technical report is to propose a software and hardware interface standard of dynamic modules. The dynamic modules addressed are defined in the IEC 62343 series.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

None.

3 Survey outline

3.1 Survey contents

a) Types of dynamic modules (supplier/user)

b) Standard of the control interface which was dealt with in the past (supplier)

c) Standard of the control interface which is planned to be offered from now on (supplier)

d) Standard of the control interface which is requested and used (user)

e) Comments about the standard of a typical control interface (supplier/user)

f) Opinions about standardization of the control interface (supplier/user)

3.2 Survey conditions

a) Request to 55 companies

(81 departments: users, suppliers, representatives of suppliers)

b) Received 28 effective replies

Users: 12 companies

Suppliers: 13 companies

Both: 3 companies

c) Survey period

From September to October 2004

4 Interface definition

The layer structure of the interface of a dynamic module is shown in Figure 1. There are an optical component and two microprocessors for control, and there are three interfacing points: interface A, interface B and interface C.

Interface A is the electric fundamental interface portion of the core optical device and the optical component. It is, for example, analogue interface, the electric power directly impressed to a conductor or a motor. Moreover, it is thought that many proprietary specifications are changed according to the TTL/CMOS level digital interfaces with a simple conversion circuit. This interface point is defined as the fundamental interface group.

As a second interface group, there are dual port RAM and I^2C, etc., which are used at interface B. These interfaces have spread widely and are adopted as standard interfaces in equipment by the system side.

The interface used at interface C is classified into a third interface group. There is a bus form, which is original with a system vendor etc., and Ethernet and PCI/compact-PCI bus are classified into this interface C.

In addition, traditional interfaces such as GP-IB and RS232C are also classified as interface C. RS485 and USB, which are considered a substitution for RS232C, are also classified into this. Since these interfaces are easy to treat for use with PC, their use has spread widely.

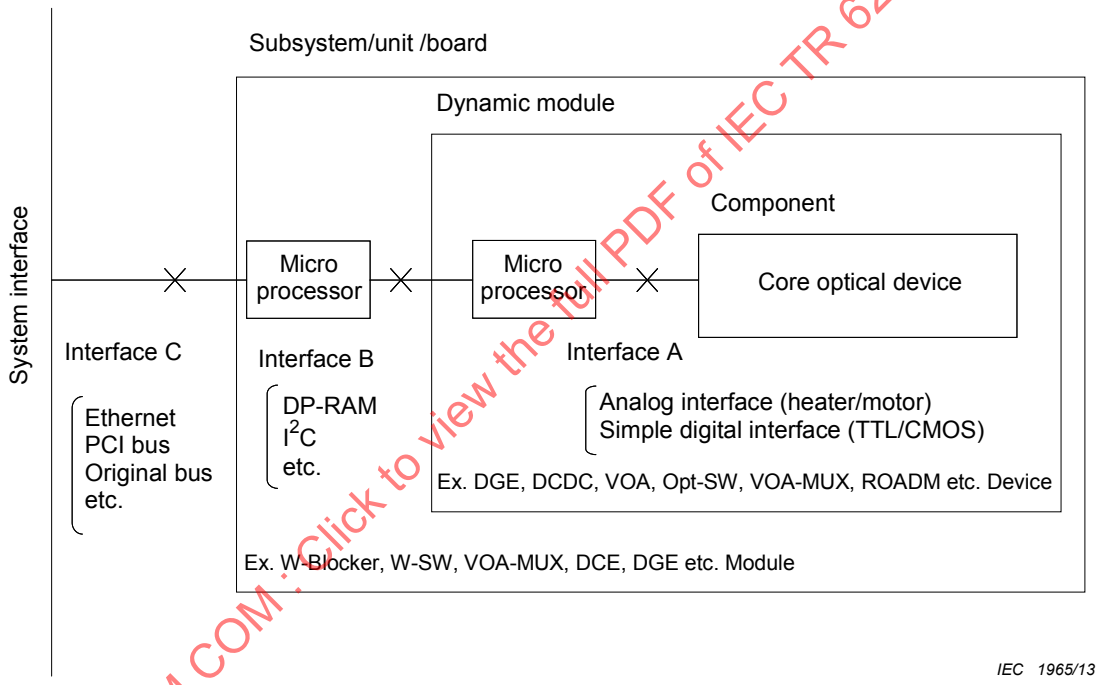

Figure 1 – Layer structure of dynamic module interface

5 Survey results

5.1 Types of dynamic modules

The survey results concerning the types of modules in current use are shown in Table 1. There are many kinds of dynamic modules such as wavelength blockers, wavelength switches and dynamic chromatic dispersion compensators (DCDC).

NOTE This survey was carried out in 2004. In early 2007, the latest information on dynamic modules was investigated. Since 2004, WSS (wavelength selective switch) has been one of the most attractive dynamic modules. It is found that the software and hardware interface of WSS is only DP-RAM. Moreover, the other dynamic modules have continued to use almost the same interfaces as those in 2004.This result is identical to the result shown in the first edition of IEC 62343-6-2.

Table 1 – Types of dynamic modules

Type of dynamic module	Supplier	User
Wavelength blocker (W-Blocker)	2	4
Wavelength switch (W-SW)	4	4
Variable optical attenuator-multiplexer (VOA-MUX)	4	4
Dynamic channel equalizer (DCE)	2	3
Dynamic gain equalizer (DGE) (including dynamic gain flattening filter)	4	5
Dynamic slope equalizer (DSE) (including dynamic gain tilt equalizer, variable slope attenuator)	2	3
Dynamic chromatic dispersion compensator (DCDC)	4	4
Dynamic polarization-mode dispersion compensator (DPMDC)	3	3
Tuneable filter (TF) (including dynamic bandpass filter)	4	5
Variable optical attenuator, single channel type (VOA-s)	8	11
Variable optical attenuator, array type (VOA-a)	7	5
Optical spatial switch, 1x2/2x2 (OSW-12)	7	12
Optical spatial switch, MxN, 2<M, 2<N (OSW-MN)	7	5
Reconfigurable optical add/drop multiplexers (ROADM)	5	3
Optical channel monitor (OCN)	4	6
Arrayed waveguide grating with automatic temperature control (AWG)	3	6

5.2 Standard of the control interface which was used in the past (supplier)

The survey results for standard of the control interface that was used in the past are shown in Table 2. Various interfaces are used for a demand from users, a proposal from suppliers, repair, support or management because no standardization exists. RS232C is mostly adopted for each reason.

Table 2 – Standard of the control interface which was used in the past

Interface	Number of companies	User demand	Supplier proposal	For management
Ethernet	2	3	0	0
I^2C	4	3	3	0
SCSI	0	0	0	0
GP-IB	6	3	5	2
RS232C	10	5	16	4
RS485	2	1	1	1
USB	2	1	1	0
Dual port RAM	4	2	5	0
Shift register	0	0	0	0
VME bus	0	0	0	0
PCI/compact-PCI bus	1	0	1	0
TTL/CMOS proprietary spec	4	2	2	0
Analogue control	3	0	7	0
Motor controlled	4	3	3	0

5.3 Standard of the control interface that is planned to be offered from now on (supplier)

The standard of the control interface planned to be offered from now on by the supplier is shown in Table 3.

Table 3 – Standard of the control interface that is planned to be offered from now on

Interface	Number of companies	User demand	Supplier proposal	Maintain same as before
Ethernet	3	3	1	0
I^2C	3	2	0	1
SCSI	0	0	0	0
GP-IB	4	2	1	2
RS232C	9	3	4	13
RS485	2	1	0	1
USB	4	1	3	0
Dual port RAM	3	1	1	4
Shift register	0	0	0	0
VME bus	0	0	0	0
PCI/Compact-PCI bus	0	0	0	0
TTL/CMOS proprietary spec	3	2	0	1
Analogue control	2	1	4	0
Motor controlled	2	0	0	4

5.4 Standard of the control interface which is requested and exists (user)

The survey results about the standard of the control interface that is requested and exists are shown in Table 4. There are some interfaces that no longer exist, although there remains a strong request, for example, Ethernet and I^2C.

Table 4 – Standard of the control interface which is requested and exists

Interface	Number of companies (requested)	Number of modules (requested)	Number of companies (existing)	Number of modules (existing)
Ethernet	1	3	0	0
I^2C	1	16	0	0
SCSI	0	0	0	0
GP-IB	1	16	3	11
RS232C	3	18	4	5
RS485	0	0	0	0
USB	0	0	0	0
Dual port RAM	3	20	2	4
Shift register	1	1	1	1
VME bus	0	0	0	0
PCI/compact-PCI bus	1	2	1	1
TTL/CMOS proprietary spec	7	12	7	11
Analogue control	4	7	5	9
Motor controlled	1	1	3	4

5.5 Comments about the standard of a typical control interface (supplier/user)

Several comments can be made about each control interface as follows:

- Dual port RAM: high-speed, flexible, intelligent, FPGA design is required
- Analogue interface is necessary for very high-speed control signal
- I2C: Easy to treat, flexible, low-speed
- RS232C: Standard interface for PC, appropriate for management or maintenance, low-speed

5.6 Opinions about standardization of control interface (supplier/user)

Almost all opinions agree to standardize the control interface and appreciate the standardization activities very much. However, there are still some suspicious opinions that it is very difficult to standardize the control interface.

6 Priority for standardization

The usage level of each dynamic module is classified into production level and research level. We can judge that the priority for standardization is high, when there are much usages of production level. From the results shown in Table 5, it can be clarified that the priority of standardization of VOA and OSW was high at the time we made this survey.

Table 5 – Priority for standardization

Type of dynamic module	Total	Production level	Research level	Unclear	Points
W-Blocker	4	1	1	2	2,0
W-SW	4	2	1	1	2,5
VOA-MUX	4	1	1	2	2,0
DCE	3	1	1	1	1,5
DGE	5	2	1	2	3,0
DSE	3	1	1	1	1,5
DCDC	4	2	1	1	2,5
DPMDC	3	1	1	1	1,5
TF	5	2	2	1	2,5
VOA-s	11	9	1	1	9,5
VOA-a	5	4	1	0	4,0
OSW-12	12	8	2	2	9,0
OSW-MN	5	3	1	1	3,5
ROADM	3	2	0	1	2,5
OCM	6	3	0	3	4,5
AWG	6	3	1	2	4,0
NOTE Production level = 1 point, Research level = 0 points, Unclear = 0,5 points.					

7 Conclusion

There are three interface points in general. The second interface group, interface B, is considered the most suitable interface for standardization today. However, the suitable interface is dependent on the performance and the function of a dynamic module (Figure 2). DP-RAM is basically suitable for intelligent dynamic modules, including high-speed control. However, in some cases there are exceptions depending on the module. For example, I^2C is suitable for the simple dynamic module with low speed control. Analogue interface is also required for very high-speed control signal.

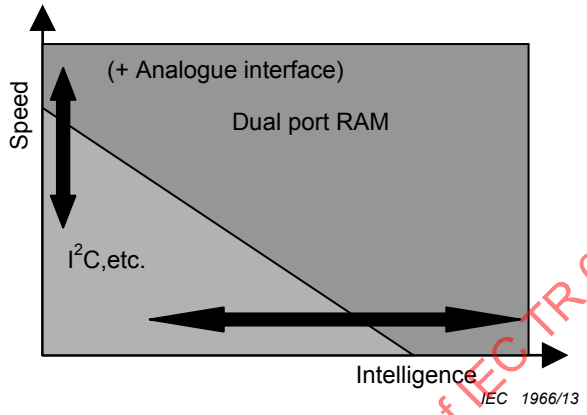

Figure 2 – Feature of interface

There are a variety of demands, commands and parameters about software and hardware interfaces depending on the modules. In some cases, there is the possibility to use interface A or interface C.

Annex A
(informative)

A summary of responses from each surveyed region

Tables A.1, A.2 and A.3 show the responses for HW and SW interfaces received from Japan, Europe and North America, respectively.

Table A.1 – HW and SW interfaces for dynamic modules (Japan)

	W-blocker	W-SW	VOA-MUX	DCE	DGE	DSE	DCDC	DPMDC	TF	VOA-s	VOA-a	OSW-12	OSW-MN	ROADM	OCM	AWG
Ethernet																
I^2C																
SCSI																
GP-IB	○	○	○	○	○	○	○	○	○	○						○
RS232C		○			○										○	○
RS485																
USB																
Dual port RAM	○	○												○	○	
SPI																
Shift register												○				
VME bus																
PCI/compact-PCI bus															○	
TTL/CMOS proprietary spec										○	○	○	○	○	○	
Analogue control										○	○	○				○
Motor controlled							○			○		○				

Table A.2 – HW and SW interfaces for dynamic modules (Europe)

	W-blocker	W-SW	VOA-MUX	DCE	DGE	DSE	DCDC	DPMDC	TF	VOA-s	VOA-a	OSW-12, OSW-MN	ROADM	OPMON	AWG
Ethernet															
I^2C	○	○	○	○	○	○	○	○	○	○	○	○	○		○
SCSI															
GP-IB															
RS232	○	○	○	○	○	○	○	○	○	○	○	○	○		○
RS485															
Dual port RAM															
SPI															
TTL/CMOS proprietary spec															
Analogue control															
Motor controlled															

Table A.3 – HW and SW interfaces for dynamic modules (North America)

	W-blocker	W-SW	VOA-MUX	DCE	DGE	DSE	DCDC	DPMDC	TF	VOA-s	VOA-a	OSW-12	OSW-MN	ROADM	OCM	AWG
Ethernet													○			
I^2C									○				○			
SCSI																
GP-IB													○			
RS232	○	○							○	○	○	○	○			
RS485									○				○			
Dual port RAM	○	○														
SPI													○			
TTL/CMOSproprietary spec												○				
Analogue control									○	○	○					
Motor controlled									○			○				

Annex B
(informative)

Survey results for the software/hardware interface of an optical channel monitor (OCM)

B.1 Survey conditions

Four questions were asked of 39 companies, including representatives of foreign companies; replies were received from 9 suppliers and 7 users.

B.2 Questions (Q1-Q4)

Q1. The interface of OCM that is currently supplied or was supplied (customer demand, supplier proposal, for management).

Q2. The future interface of OCM (customer demand, supplier proposal, maintain same as before, standard).

Q3. The pin assignment and the function of OCM, which is already adopted, or any appropriate specification to standardize regardless of the presence of the products.

Q4. The interface of OCM, which is used and any appropriate interface to standardize (requested, supplied, standard).

B.3 Survey results (Q1)

Table B.1 shows the survey results for Question 1.

Table B.1 – Survey results (Q1)

	Customer demand	Supplier proposal	For management
Dual port RAM	5	2	0
GP-IB	1	0	0
I^2C	3	1	0
RS232	4	4	1
RS485	0	0	0
TTL/CMOS proprietary spec	0	1	0
USB	1	3	0
Analogue readout	1	3	0
Others	1 UART	1 UART	1 UART

B.4 Survey results (Q2)

Table B.2 shows the survey results for Question 2.

Table B.2 – Survey results (Q2)

	Customer demand	Supplier proposal	Maintain same as before	Standard
Dual port RAM	3	1	3	2
GP-IB	1	0	0	0
I2C	5	1	0	1
RS232	2	3	4	1
RS485	0	0	0	0
TTL/CMOS proprietary spec	1	0	0	0
USB	2	1	1	1
Analogue readout	1	1	2	0
Others	1 UART	1 UART	1 UART	1 UART

B.5 Survey results (Q3)

Detailed information was provided by four companies. Three companies use dual port RAM with 16-bit data bus. The other uses RS232. It will be very difficult to make an agreement to unify their specifications.

B.6 Survey results (Q4)

Table B.3 shows the survey results for Question 4.

Table B.3 – Survey results (Q4)

	Requested	Supplied	Standard
Dual port RAM	8	7	8
GP-IB	3	2	2
I^2C	4	2	3
RS232	9	12	5
RS485	0	0	1
TTL/CMOS proprietary spec	1	1	1
USB	3	3	3
Analogue readout	2	0	0
Others	3 UART, LAN, SNMP	2 UART, LAN	3 UART, LAN, DVI/HDMI

B.7 Conclusion

The survey results of OCM show close agreement with the general survey results, as shown in the body of this technical report.