IEC 62343-3-4

Edition 1.0 2018-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Dynamic modules –
Part 3-4: Performance specification templates – Multicast optical switches

Modules dynamiques –
Partie 3-4: Modèles de spécification de performance – Commutateurs optiques multidiffusions

IEC 62343-3-4:2018-04(en-fr)

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FOREWORD

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International Standard IEC 62343-3-4 has been prepared by subcommittee 86C: Fibre optic systems and active devices, of IEC technical committee 86: Fibre optics.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
86C/1506/FDIS	86C/1508/RVD

Full information on the voting for the approval of this International Standard 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- withdrawn,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.

INTRODUCTION

A multicast optical switch (MCOS) is a dynamic module (DM), which is mainly used in a reconfigurable optical add-drop multiplexer (ROADM) system to realize colourless, directionless and contentionless (CDC) function. A multicast optical switch functions as an optical switch and a non-wavelength selective fibre optic branching devices. The technical information regarding multicast optical switches and their applications in dense wavelength division multiplexing (DWDM) systems is described in IEC TR 62343-6-4.

DYNAMIC MODULES –

Part 3-4: Performance specification templates – Multicast optical switches

1 Scope

This part of IEC 62343 provides a performance specification template for multicast optical switches. The object is to provide a framework for the preparation of performance specifications or product specifications of multicast optical switches.

Specification parameters required in this document are considered as essential in the product specifications or performance specifications.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61290-7-1, *Optical amplifiers – Test methods – Part 7-1: Out-of-band insertion losses – Filtered optical power meter method*

IEC 61300-2-14, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-14: Tests – High optical power*

IEC 61300-3-2, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-2: Examination and measurements – Polarization dependent loss in a single-mode fibre optic device*

IEC 61300-3-3, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-3: Examinations and measurements – Active monitoring of changes in attenuation and return loss*

IEC 61300-3-6, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-6: Examinations and measurements – Return loss*

IEC 61300-3-7, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-7: Examinations and measurements – Wavelength dependence of attenuation and return loss of single mode components*

IEC 61300-3-20, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-20: Examinations and measurements – Directivity of fibre optic branching devices*

IEC 61300-3-21, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-21: Examinations and measurements – Switching time*

IEC 61300-3-32, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-32: Examinations and measurements – Polarization mode dispersion measurement for passive optical components*

IEC 61300-3-38, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-38: Examinations and measurements – Group delay, chromatic dispersion and phase ripple*

IEC 61300-3-50, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-50: Examinations and measurements – Crosstalk for optical spatial switches*

IEC 62343-1:2016, *Dynamic modules – Part 1: Performance standards – General conditions*

IEC 62343-5-2, *Dynamic modules – Part 5-2: Test methods – 1 x N fixed-grid WSS – Dynamic crosstalk measurement*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

3.1
multicast optical switch
MCOS
dynamic module, which has port configuration of $N \times M$, including N of $1 \times M$ non-wavelength selective branching devices and M of $N \times 1$ optical switches

Note 1 to entry: $N \geq 2$ and $M \geq 2$, in general.

Note 2 to entry: Generally, for the N port side, an add/drop functional block is connected; for the M port side, a transponder functional block is connected. If required, a tuneable optical filter functional block is connected between this module and the transponder functional block.

Note 3 to entry: The MCOS has electrical interface to control switches.

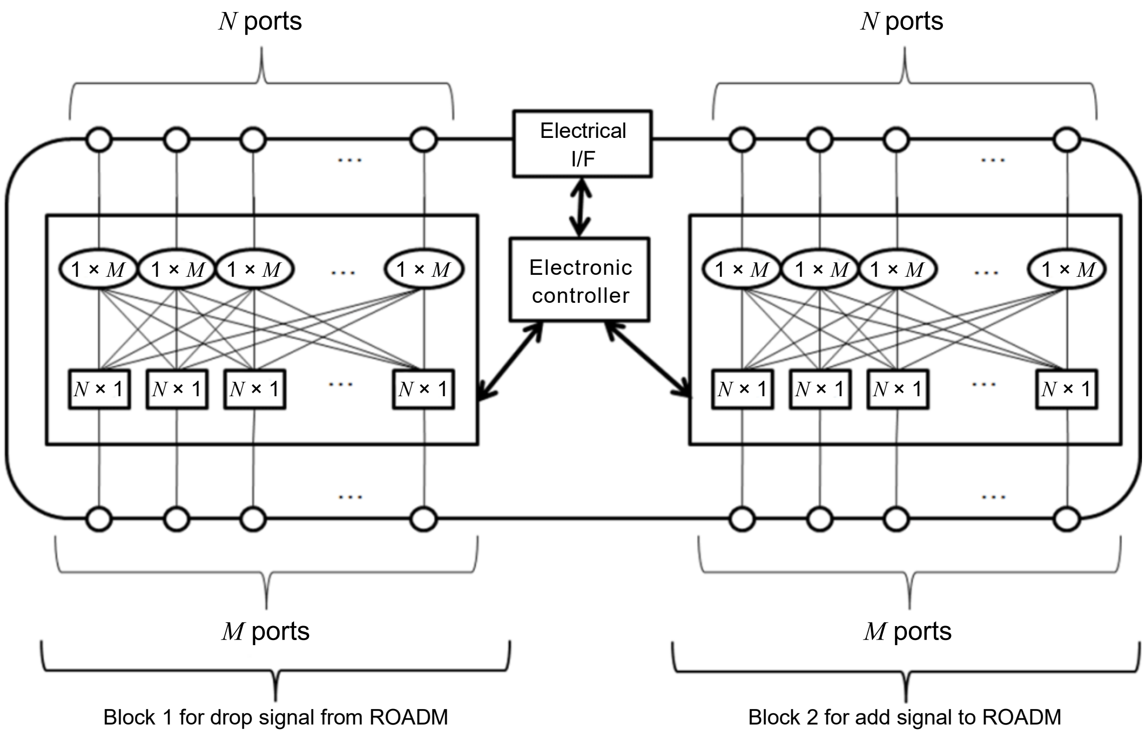
Note 4 to entry: Non-blocking switches are employed for the $N \times 1$ optical switch element of the MCOS.

Note 5 to entry: A general function block diagram is shown in Figure 1. It consists primarily of two optical blocks. Block 1 is prepared for the drop signal and Block 2 for the add signal.

Note 6 to entry: Generally, this module works optically in both directions: N side to M side, and M side to N side.

Note 7 to entry: Generally, block state of the MCOS module is supported for each side port by the block state for $N \times 1$ optical element or by similar technology.

Note 8 to entry: This comment applies to the French language only.



Key

1 × *M* — 1 × *M* optical branching device

N × 1 — *N* × 1 optical switch

IEC

Figure 1 – Functional block diagram of the MCOS

3.2
***N* side insertion loss difference between different ports**
IL_{diffN}
difference between the maximum and minimum insertion loss at an *N* side port for a specified set of an *M* side port

3.3
***M* side insertion loss difference between different ports**
IL_{diffM}
difference between the maximum and minimum insertion loss at an *M* side port for a specified set of an *N* side port

3.4
crosstalk
ratio of the output power of the isolated input port to the output power of the conducting input port for an output port

3.5
cumulative crosstalk
ratio of the output power between signal power from the conducting input port and the cumulative signal power from all of the relevant isolated input port

Note 1 to entry: Assume output port *k* has relevant input port 1, 2, 3, …*N*, and the conductive port pair is only port *i* to port *k*, and the other input ports are in a non-conductive state to output port *k*. The same optical input power is applied to all input ports. The output power appearing in port *k* from port *i* is expressed as P_i. With this condition, cumulative crosstalk is calculated as:

$$-10\log_{10}\left(\frac{\sum_{j\neq i}^{N} P_j}{P_i}\right)$$

where

P is the optical power measured at output port k from conductive port i;

P_j is the optical power measured at output port k from isolated port j.

Note 2 to entry: Generally, cumulative crosstalk has different values for different signal directions: N side to M side, and M side to N side in an N x M module.

Note 3 to entry: Defined in optical signal with averaged polarization and the same wavelength.

3.6
dynamic crosstalk
crosstalk that is attributed to both channel crosstalk (due to same wavelength and/or other wavelengths) and port isolation, predicted to change during switching operation in MCOS module

Note 1 to entry: Hitless operation means that there is no influence on other performance during the switching operation.

[SOURCE: IEC 62343-3-3:2014, 3.15, modified – The term "transient crosstalk" has been replaced by "dynamic crosstalk", and the abbreviated term "WSS" has been replaced by "MCOS" in the definition.]

3.7
latency time
t_l
<switching from isolated state to conducting state> elapsed time for the output power of a specified output port to reach 10 % of its steady-state value from the time the actuation energy is applied, when switching from an isolated state to conducting state, normally-off for a non-latching switch, or a latching switch

Note 1 to entry: See Figure 2.

[SOURCE: IEC 60876-1:2014, 3.3.5.1]

3.8
latency time
t_l'
<switching from conducting state to isolated state, normally-off for a non-latching switch> elapsed time for the output power of a specified output port to reach 90 % of its steady-state value from the time the actuation energy is removed, when switching from a conducting state to isolated state, normally-off for a non-latching switch

Note 1 to entry: See Figure 2.

[SOURCE: IEC 60876-1:2014, 3.3.5.2]

3.9
latency time
t_l'
<switching from conducting state to isolated state, for a latching switch> elapsed time when the output power of a specified output port reaches 90 % of its steady-state value from the time the actuation energy is applied, when switching from a conducting state to isolated state, for a latching switch

Note 1 to entry: See Figure 2.

[SOURCE: IEC 60876-1:2014, 3.3.5.3, modified – Note 1 has been deleted.]

3.10
rise time
t_r
elapsed time when the output power of the specified output port rises from 10 % of the steady-state value to 90 % of the steady-state value

[SOURCE: IEC 60876-1: 2014, 3.3.6, modified – The symbol t_r has been added.]

3.11
fall time
t_f
elapsed time when the output power of the specified output port falls from 90 % of the steady-state value to 10 % of the steady-state value

[SOURCE: IEC 60876-1:2014, 3.3.7, modified – The symbol t_f has been added.]

3.12
bounce time
t_b
<switching from isolated state to conducting state> elapsed time when the output power of a specified output port maintains between 90 % and 110 % of its steady-state value from the first time the output power of a specified output port reaches to 90 % of its steady-state value

Note 1 to entry: See Figure 2.

[SOURCE: IEC 60876-1:2014, 3.3.8.1]

3.13
bounce time
t_b'
<switching from conducting state to isolated state> elapsed time when the output power of a specified output port maintains between 0 % and 10 % of its steady-state value from the first time the output power of a specified output port reaches 10 % of its steady-state value

Note 1 to entry: See Figure 2.

[SOURCE: IEC 60876-1:2014, 3.3.8.2]

3.14
switching time
t_s
<switching from isolated state to conducting state> elapsed time from actuation to the time when the output power of a specified output port maintains between 90 % and 110 % of its steady-state value:

$$t_s = t_l + t_r + t_b$$

where

t_l is the latency time;

t_r is the rise time;

t_b is the bounce time.

Note 1 to entry: See Figure 2 a), 2 b) and 2 c).

3.15
switching time
t_s'
<switching from conducting state to isolated state> elapsed time from actuation to the time when the output power of a specified output port falls below 10 % of the steady state level:

$$t_s' = t_l' + t_f + t_b'$$

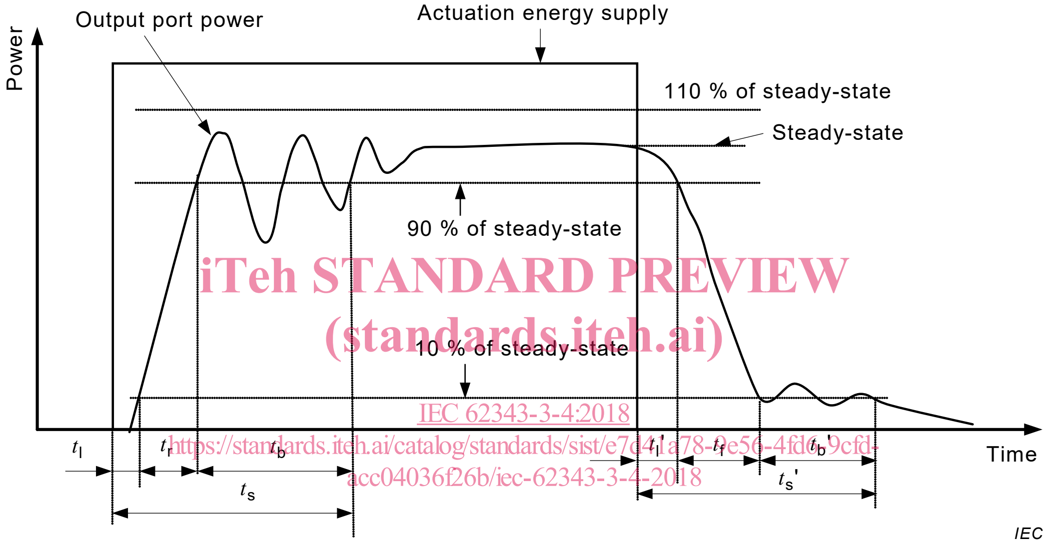
where

t_l' is the latency time;

t_f is the fall time;

t_b' is the bounce time

Note 1 to entry: See Figure 2 a), 2 b) and 2 c)



Key

t_s, t_s' switching time

t_l, t_l' latency time

t_r rise time

t_f fall time

t_b, t_b' bounce time

a) – Non-latching switch, normally-off