DECREE OF THE MINISTER OF COMMUNICATION AND INFORMATION TECHNOLOGY OF THE REPUBLIC OF INDONESIA

NUMBER : 11/PER/M.KOMINFO/04/2012

ON

TECHNICAL REQUIREMENTS OF TELECOMMUNICATION EQUIPMENT OF *COARSE WAVELENGTH DIGITAL MULTIPLEXER*

BY THE GRACE OF GOD THE ALMIGHTY

MINISTER OF COMMUNICATION AND INFORMATION TECHNOLOGY OF THE REPUBLIC OF INDONESIA

Considering:

a. that in accordance with the provision of Article 71 paragraph (1) of the Government Regulation of the Republic of Indonesia Number 52 Year 2000 on Telecommunication Provision which states that every telecommunication tool and equipment manufactured, assembled, imported for trade and or use in the territory of the Republic of Indonesia shall fulfil the technical requirements;

b. that based on consideration referred to in point a, it is considered necessary to issue a Decree of the Minister of Communication and Information Technology on Technical Requirements of Telecommunication Equipment of .*Coarse-Wavelength Digital Multiplexer* (CWDM)..

Bearing in mind:

1. Law of the Republic of Indonesia Number 36 Year 1999 on Telecommunication (State Gazette of the Republic of Indonesia Number 154 Year 1999, Supplement to the State Gazette of the Republic of Indonesia Number 3881).

2. Government Regulation of the Republic of Indonesia Number 52 Year 2000 on Telecommunication Provision (State Gazette of the Republic of Indonesia Number 107 Year 2000, Supplement to the State Gazette of the Republic of Indonesia Number 3980);

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SSH : *Secure Shell*
STM : Synchronous Transport Module
TELNET : *Telecommunication Network*
V : *Volt*

4. Terms

Backplane : a group of connectors connected one another in a parallel manner in one unit.
Coarse-Wavelength Digital Multiplexing : Combining a number of wave lengths with very narrow canal spaces with the number of canals (4, 8, 16, 32, etc) . in a single optical fiber.

CHAPTER II

TECHNICAL REQUIREMENTS

1. **Raw material and Construction of Equipment**

Raw material and construction of equipment must comply with the following provisions :

a. Equipment is made of strong and solid material in line with the tropical climate;
b. The components of equipment are made of high quality material;
c. Parts of the equipment which are modular in nature must be arranged well and neatly;
d. Must be equipped with terminals of measurement and maintenance;
e. Connecting system at connecting terminals is easily done and has good nature of electricity;
f. Must be equipped with good cooling system;
g. *Backplane of* CWDM *Transponder* must have minimum one (1) kind of interface management.

2. Operation Requirement

a. Power Supply
Equipment must work well using *backplane* supply:
1) alternating current voltage of 220 Vac ± 10%, 50 Hz ± 6%; or
2) direct current voltage -48 Vdc ± 10%.

b. Environmental Condition

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Table 2. ; Characteristics of STM-64 interface (ITU-T Rec. G.691)

Parameter	Unit	Value
Digital Signal Nominal bit rate	kbps	9,953,280

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Table 3. ; Characteristics of STM-64 interface (ITU-T Rec. G.691)

Parameter	Unit	Value
Digital Signal Nominal bit rate	kbps	9,953,280

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Table 4. ; Characteristics of STM-64 interface (ITU-T Rec. G.691)

Parameter	Unit	Value
Digital Signal Nominal bit rate	kbps	9,953,280

3.. Gigabit Ethernet, with characteristics referring to Table 5

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Table 5. ; Characteristics of 1000BASE-X interface (IEEE 802.3-2008)

Parameter	Unit	Value
Signaling speed (range)	GBd	1.25 ± 100 ppm

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4.. 10G Ethernet, with characteristics referring to Tables 6, 7, 8, 9, 10, 11 and figure 2

Table 6. ; Characteristics of 10GBASE-S interface (IEEE 802.3-2008)

Parameter	Unit	Value		
Speed				
		62.5		62.5
		um		um
		MMF	MMF	MMF	MMF
		850	850	850	850
		nm	nm	nm	nm

Table 8. ; Characteristics of 10GBASE-L interface (IEEE 802.3-2008)

Parameter	Unit	Value

Table 9. ; Characteristics of 10GBASE-E interface (IEEE 802.3-2008)

Parameter	Unit	Value	
Application code		10GBASE-EW	10GBASE-ER

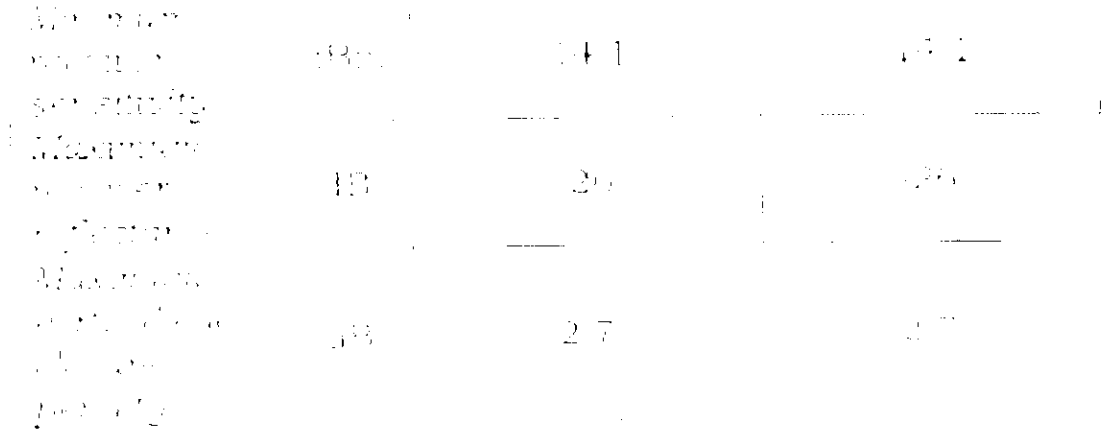
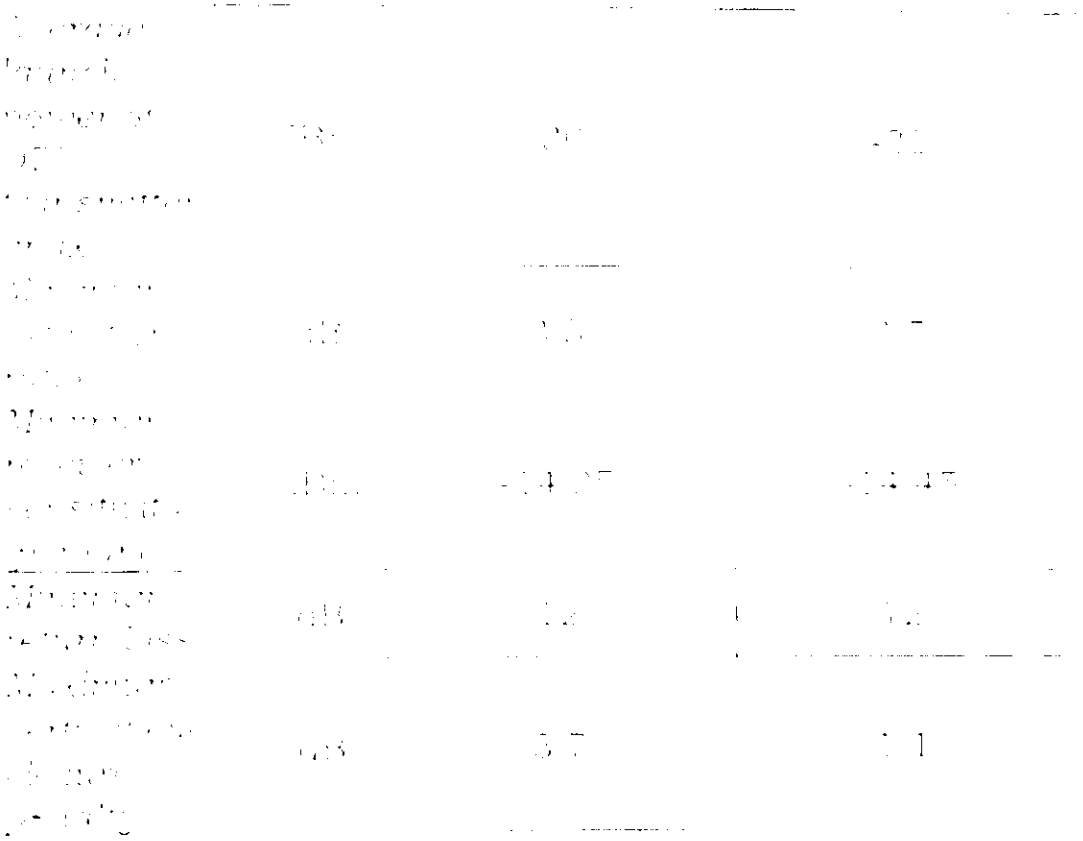


Table 10. ; Characteristics of 10GBASE-LX4 interface (IEEE 802.3-2008)

Parameter	Unit	Value



5.. STM – 256, with characteristics referring to Table

Table 10. ; Characteristics of 10GBASE-LX4 interface (IEEE 802.3-2008)

Parameter	Unit	Value	
		3.125	
			10 μm SMF
		MMF	
			1269.0 1282.4
		1293.5 1306.9	
		1318.0 1331.4	
		1342.5 1355.9	

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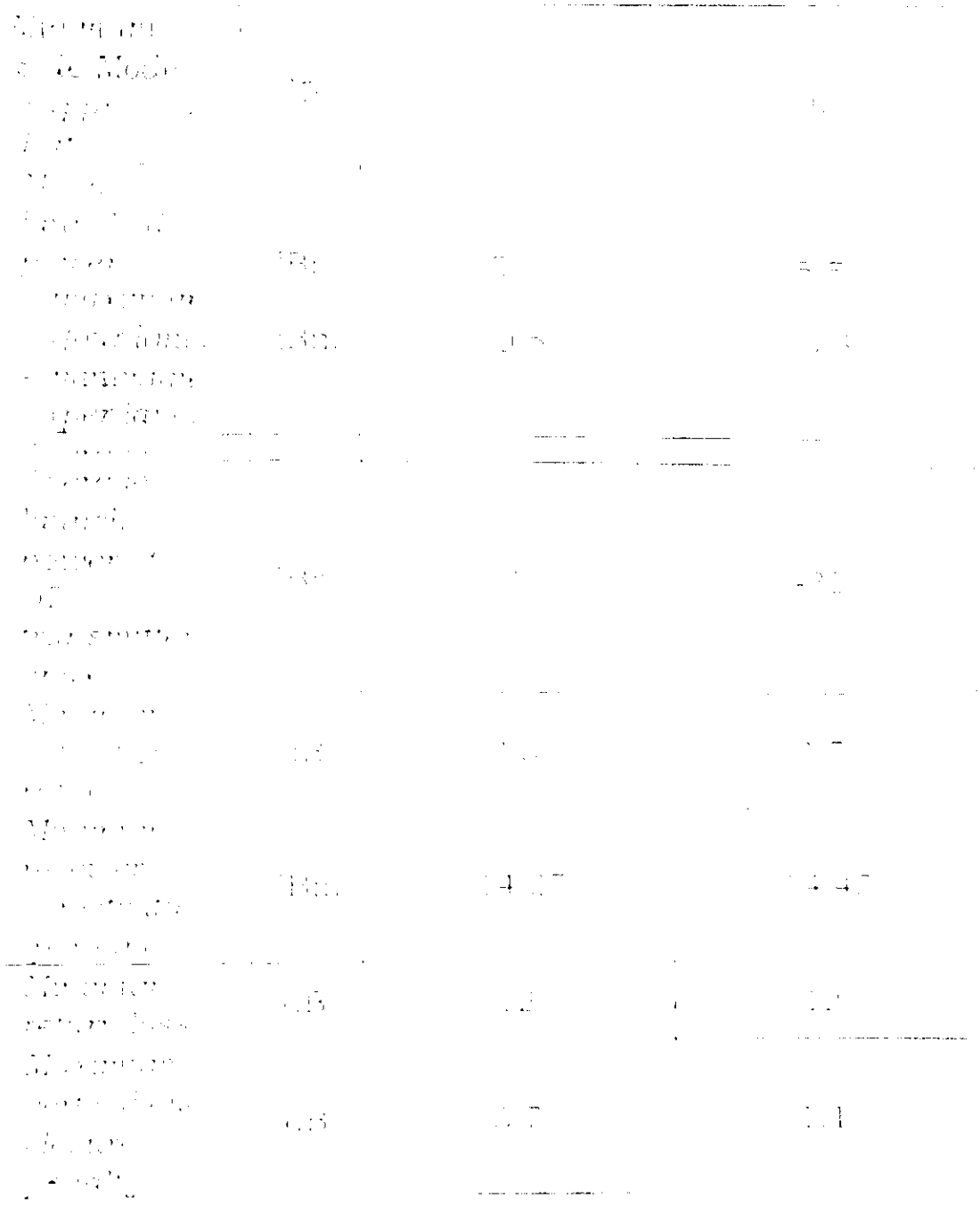

6.. 40G *Ethernet* with characteristics referring to Table

Table 9. ; Characteristics of 40GBASE-R interface (IEEE 802.3ba-2010)

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Parameter	Unit	Value	
[illegible]		10GBASE-SR	40GBASE-LR4
[illegible]		[illegible]	[illegible]
[illegible]	GBd	[illegible]	10.3125 × 103
[illegible]		[illegible]	TBD
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] MMF	B1.1, B1.3, and B6 ASME
[illegible]	[illegible]	[illegible]	1264.5-1277.5
[illegible]	[illegible]	[illegible]	1284.5-1297.5
[illegible]	nm	[illegible]	1304.5-1317.5
[illegible]	[illegible]	[illegible]	1324.5-1337.5
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	dB	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	dBm	2.4	2.3
[illegible]	dBm	7.6	4
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	dBm	2[illegible]	[illegible]30
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	dB	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	dBm	[illegible]	[illegible]11.5
[illegible]	[illegible]	[illegible]	[illegible]

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7. 100G *Ethernet,* with characteristics referring to Table

Table 9. ; **Characteristics of 100GBASE-R interface (IEEE 802.3ba-2010)**

Parameter	Unit	Value

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b.. CWDM *Optical Line Interface,* with the provision:

1) *Central frequency / wavelength* referring to Table 12;

Table 12 ; **Nominal Central Frequency (ITU-T Rec. G.694.2)**

Nominal central frequencies (nm) for spacings of 20 nm

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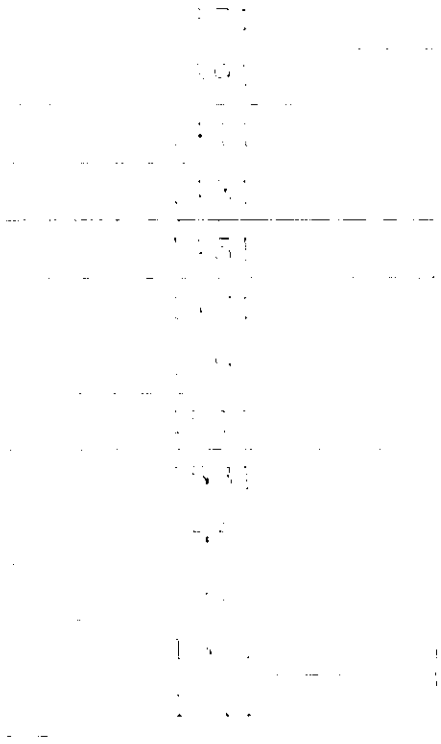

2) *Channel Spacing* 29 nm
3) *Maximum* -20 dB *width*: 1 nm; (?)
4) *Minimum Side Mode Suppression Ratio*: 30 dB; (?)
5) *Mean Launched Power*: (?)
   a) 2.5G: -10 dBm – 0 dBm; or
   b) 10G: -5 dBm - +5 dBm;
6) *Minimum Extinction Ratio* : 8.2 dB; (?)
7) *Minimum OSNR*: 18 dB; (?)
8) *Maximum Local Loop* BER: 10^{-12}; (?)
9) *Minimum Receiver Sensitivity*: (?)
   a) 2.5G: -24 dBm; or
   b) 10G / 40G: - 14 dBm;
10) *Minimum Receiver Overload*: (?)
11) *Maximum Receiver Reflectance*: -27 dB (?)

c.. Function
1) Conduct conversion and mapping of optical signal from one of the *input* format in the form of:
   a) *Ethernet* (*Gigabit Ethernet* or 10G *Ethernet*) and or
   b) STM - 16 and or STM – 64;
   into CWDM standard in accordance with ITU-T G.694.2 recommendation and the reverse;
2) Conduct the function of 3R, i.e.
   a) *Re-time*;

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b) *Re-transmit*; and
c) *Re-shape*

3) In case of *tunable* type, *transponder* must:
a) Have *Forward Error Correction* (FEC) mechanism;
b) Have the capability of arranging work frequency;
c) Have the capability of arranging emission power.

4. ***Multiplexer/Demultiplexer* Requirement**

Multiplexer / Demultiplexer at CWDM equipment must be in line with the following provisions:

a. Optical characteristics:
1) *Operating Wavelength* refers to Table 12;
2) *Insertion Loss*: ≤ 4 dB;
3) *Crosstalk*: ≥ 25 dB;
4) *Return Loss*: ≥ 40 dB;
5) *Center Wavelength Offset*: ≤ 0.05 nm;
6) *Channel Uniformity*: ≤ 3 dB.

b. Function
1) Combine and transmit *multiple signal* from a number of wavelengths in one optical fiber;
2) Has capability of supporting *unidirectional* or *bidirectional* transmission system..

5. ***Optical Amplifier Requirement***

Optical Amplifier at CWDM equipment must comply with the following provisions:

a. *Signal Gain*: 16 – 31 dB;
b. *Gain Variation*: ≤ 1.5 dB;
c. *Gain Tilt*: ≤ 1 dB / dB;
d. *Total Receive Power*: -42 dBm ~ +2 dBm;
e. *Total Transmit Power*: +6 dBm ~ +23 dBm;
f. *Spontaneous Noise Figure*: ≤ 7 dB;
g. *Return Loss* (I / O *port*): ≥ 40 dB.

6. ***Backplane* Reguirement**

Backplane of CWDM equipment must have minimum one (1) of the kinds of the following management interfaces:

a) RS 232 (EIA/TIA-232);
b) Ethernet (minimum *Fast Ethernet*) with chracteristics.

CHAPTER III

COMPLETENESS OF EQUIPMENT

CWDM tools and equipment to be tested must be furnished with :

1. Identity containing brand, *type*/model, manufacturing country, and serial number;
2. Operational guide of the Equipment in Bahasa Indonesia and or in English

CHAPTER IV

TESTING

1. **Testing Implementation**
   Testing of CWDM equipment is carried out by a Test Office that has owned accreditation from authorized institution and designated by Directorate General of Resources and Equipment of Post and Information Technology.

2. **Sampling Method**
   Sampling of test material is done at random according to test procedure based on legal regulations.

3. **Test Method**
   Test Method used is in accordance with *Standard Operating Procedure* of the respective Test Offices.

4. **Partial Testing**
   Testing may be done partially only for *transponder* module. Partial testing for *transponder* module comprises CHAPTER II (raw material and construction requirement, operation requirement, *transponder* requirement, multiplexer / demultiplexer requirement, *optical amplifier* requirement, backplane requirement, management method requirement, and electrical safety requirement and *Electromagnetic Compatibility* requirement) and the whole of CHAPTER III.

5. **Condition for Passing the Test**
   Testing result is declared PASS THE TEST, if each sample of tested material complies with all the provisions or partial provisions as regards *transponder* as indicated in these technical requirements and has been declared to pass the test by Team of Evaluators.

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MINISTER OF COMMUNICATION AND INFORMATION TECHNOLOGY OF THE REPUBLIC OF INDONESIA

Signed

TIFATUL SEMBIRING

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