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TECHNICAL STANDARD OF FREE SPACE OPTICS TELECOMMUNICATION DEVICES

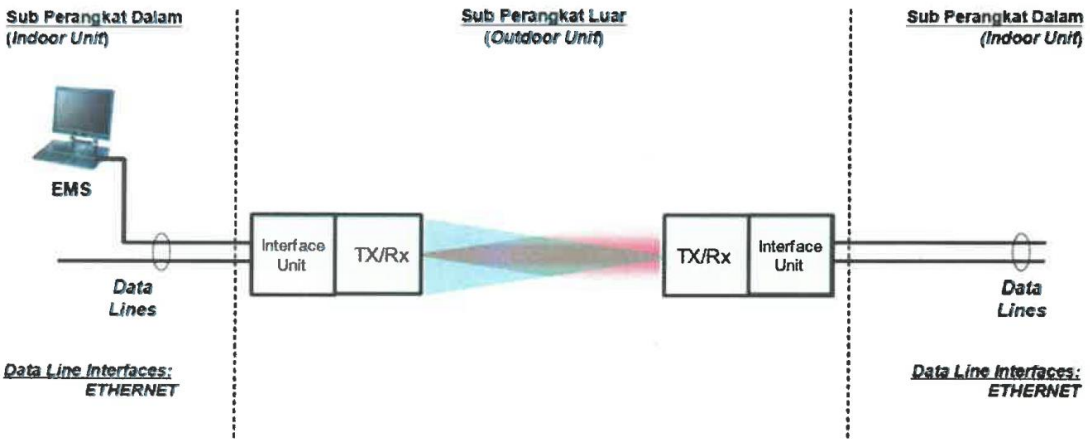
CHAPTER 1

GENERAL REQUIREMENTS

A. Definition

Free Space Optics Telecommunication Equipment is a device that uses light propagation in the air medium to transmit information with the configuration of point-to-point and Line-of-sight relationships.

B. Configuration Example



Picture 1 - Example of Free Space Optics Telecommunication Device Configuration

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CHAPTER II
TECHNICAL STANDARDS

A. General Requirements

Every Free Space Optics Telecommunication Equipment must meet the general characteristics, namely:

1. Power Supply

Free Space Optics Telecommunication Equipment can be supplied with either AC or DC power. For the AC power supply, the device must operate normally with a supply of 220 V ± 10 % and a frequency of 50 Hz ± 6 %. In the case that the device uses an external power source, such as an AC adapter, that supply must not affect the device's operability.

2. EMC

a. Emission

The following emission measurements should be made on the Free Space Optics Telecommunication Equipment whenever possible:

1) The radiation emission of Free Space Optics Telecommunication Equipment must meet the Class B requirements specified in Table A.4 and Table A.5 in accordance with clause 4 of SNI ISO/IEC CISPR 32;
2) Conduction emissions at the DC power port of Free Space Optics Telecommunication Equipment must meet the Class B requirements specified in Table A. 10 in accordance with clause 4 of SNI ISO/IEC CISPR 32:
3) Conduction emission at AC supply port Free Space Optics Telecommunication Equipment with special AC/DC power converter must meet Class B requirements specified in Table A.10 in accordance with clause 4 of SNI ISO/IEC CISPR 32 (Free Space Optics Telecommunication Equipment with DC power port which is supplied

with a special AC/DC power adapter or converter is considered a Free Space Optics Telecommunication Equipment with AC power supply (clause 3.1.1 SNI ISO/IEC CISPR 32)); and

4) The conduction emission at the wired network port must comply with the Class B standards specified in Table A.12 in accordance with clause 4 of SNH ISO/IEC CISPR 32.

b. Immunity

The following immunity measurements must be carried out on Free Space Optics Telecommunication Equipment whenever possible and must comply with the provisions of SNI ISO/IEC CISPR 35:

1) RF electromagnetic fields (80 MHz to 1 GHz) in the enclosure of the Free Space Optics Telecommunication Equipment;
2) Electrostatic discharge in the casing of the Free Space Optics Telecommunication Equipment;
3) Fast transients (common mode) on the DC power supply port and those with cables longer than 3 m;
4) 0.15 MHz to 80 MHz common mode RF on DC and AC power supply ports with cables longer than 3 m;
5) Voltage dips and interrupts on AC power supply ports Free Space Optics Telecommunication Equipment with dedicated AC/DC power converter; and
6) Power surge, common mode and differential mde on power supply ort Free Space Optics Telecommunication Equipment with dedicated AC/DC converter.

The fulfillment of this immunity is enforced if there are at least 2 (two) domestic test centers that are accredited by the National Accreditation Committee for the scope of ISO/IEC CISPR 35 or SNI ISO/IEC CISPR 35.

3. Electrical Safety
    a. Electrical safety assessment Free Space Optics Telecommunication Equipment must meet the standards specified in IEC 60950-1 or IEC 62368-1 based on the following assumptions:
        1) Free Space Optics Telecommunication Equipment is supplied with a dedicated external power supply (AC/DC converter or adapter/charger);
        2) Free Space Optics Telecommunication Equipment operates with SELV in an environment where overvoltage of the telecommunications network is not possible. SELV refers to a voltage that does not exceed 42.4 V peak or 60 V DC.
    b. For the safety assessment of Free Space Optics Telecommunication Equipment carried out with a risk-based approach, the following process specified in IEC 62368-1 should be used:
        1) identification of energy sources in Free Space Optics Telecommunication Equipment
        2) classification of energy sources (impact on body or combustible material, such as possible injury or ignition);
        3) identification of efforts to protect energy sources; and take into account the effectiveness of safeguards by
        4) taking into account the compliance criteria or standards specified in the IEC standard 62368-1.
4. Laser Safety

    Lasers used in optical interfaces must meet Class 1 or Class 1M standards according to IEC 60825.

B. Interface Interoperability Requirements
1. Ethernet

    The ethernet interface must comply with the relevant IEEE 802.3 standard.
2. SDH

    In the event that the device has an interface with SDH technology, the interface

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characteristics must comply with one or more protocol types STM-16 (ITU-T Rec G.957) and/or STM-64 (ITU-T Rec G.691) with the specifications on Table 1, Table 2, Table 3 and/or Table 4

Table 1 - STM-16 Interface Specification (ITU-T Rec G.957)

Parameter	Unit	Value					
Digital Signal Nominal bit rate	kbps	2 488 320 (**Based on** ITU-T G.707)					
Application code		I-16	S-16.1	S-16.2	L-16.1	L-16.2	L-16.3
Operating wavelength range	nm	1266-1360	1260-1360	1430-1580	1280-1335	1500-1580	1500-1580
Source type		MLM	SLM	SLM	SLM	SLM	SLM
Spectral characteristics:							
- *max* RMS *width*	nm	4	-	-	-	-	-
- *max* -20 db *width*	nm	-	1	< 1	1	< 1	< 1
- *min side mode suppression ration*	dB	-	30	30	30	30	30
Mean lauched power:							
- *maximum*	dBm	-3	0	0	+3	+3	+3
- *minimum*	dBm	-10	-5	-5	-2	-2	-2
Minimum sensitivity	dBm	-18	-18	-18	-27	-28	-27
Maximum reflectance	dB	-27	-27	-27	-27	-27	-27

Table 2 - Intra Office STM-64 Interface Specification (ITU-T Rec G.691)

Parameter	Unit	Value					
Digital Signal Nominal bit rate	kbps	9 953 280					
Application code		I-64.1r	I-64.1	I-64.2r	I-64.2	I-64.3	I-64.5
Operating wavelength range	nm	1260-1360	1290-1330	1530-1565	1530-1565	1530-1565	1530-1565
Source type		MLM	SLM	SLM	SLM	SLM	SLM
Min side mode suppression ratio	dB	-	30	30	30	30	30
Mean lauched power:							
- *maximum*	dBm	-1	-1	-1	-1	-1	-1
- *minimum*	dBm	-6	-6	-5	-5	-5	-5
Minimum reeciver sensitivity	dBm	-11	-11	-14	-14	-13	-13
Maximum reflectance	dB	-14	-14	-27	-27	-27	-27

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Table 3 - Short Haul STM-64 Interface Specification (ITU-T Rec G.691)

Parameter	Unit	Value						
Digital Signal Nominal bit rate	kbps	9 953 280						
Application code		S-64.1	S-64.2a	S-64.2b	S-64.3a	S-64.3b	S-64.5a	S-64.5b
Operating wavelength range	nm	1260-1360	1290-1330	1530-1565	1530-1565	1530-1565	1530-1565	1530-1565
Source type		MLM	SLM	SLM	SLM	SLM	SLM	SLM
Min side mode suppression ration	dB	30	30	30	30	30	30	30
Mean lauched power: *- maximum* *- minimum*	 dBm dBm	 +5 +1	 -1 -5	 +2 -1	 -1 -5	 +2 -1	 -1 -5	 +2 -1
Minimum receiver sensitivity	dBm	-11	-18	-14	-17	-13	-17	-13
Minimum receiver reflectance	dB	-14	-27	-27	-27	-27	-27	-27

Table 4 - Long Haul STM-64 Interface Specification (ITU-T Rec G.691)

Paraneter	Unit	Value				
Digital Signal Nominal bit rate	kbps	9 953 280				
Application code		L-61.1	L-64.2a	L-64.2b	L-64.2c	L-64.3
Operating wavelength range	nm	1290-1320	1530-1565	1530-1565	1530-1565	1530-1565
Min side mode suppression ratio	dB	30	ffs	ffs	ffs	ffs
Mean lauched power: *- maximum* *- minimum*	 dBm dBm	 +7 -4	 +2 -2	 13 10	 +2 -2	 13 10
Minimum reeciver sensitivity	dBm	-19	-26	-14	-26	-13
Maximum reflectance	dB	-27	-27	-27	-27	-27