- Unofficial translation -

Notification of the National Telecommunications Commission

On Technical Standards for Telecommunication Equipment

Re: Optical Communication System

Whereas it is deemed appropriate to prescribe technical standards for optical communication system, and that telecommunication equipment used in telecommunication business which have effects on the provision of telecommunication services is required to meet specified technical standards;

Pursuant to Section 51 (6) (21) and Section 78 of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunication Services B.E. 2543 (2000), which contains certain provisions regarding the restriction of the rights and freedom of an individual as permitted to be done under the law by Article 29, together with Article 35, Article 36, Article 43, Article 45, Article 46, Article 47, Article 61 and Article 64 of the Constitution of the Kingdom of Thailand; as well as Section 32 paragraph one of the Telecommunications Business Act B.E. 2544 (2001), which contains certain provisions regarding the restriction of the rights and freedom of an individual as permitted to be done under the law by Article 29, together with Article 35, Article 36, Article 41, Article 43 and Article 45 of the Constitution of the Kingdom of Thailand, the National Telecommunications Commission hereby issues the Notification on Technical Standards for Telecommunication Equipment regarding Optical Communication System, as detailed in the Standard No. NTC TS 2001-2550 appended hereto.

This Notification shall come into force 180 days after the date of its publication in the Government Gazette.

Announced on the 27th day of December B.E. 2550 (2007)

General Choochart Promphrasid

Chairman of the National Telecommunications Commission

Technical Standards for Telecommunication Equipment

NTC TS 2001-2550

Optical Communication System

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Technical Standards for Telecommunication Equipment

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Optical Communication System

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Optical Communication System

1. Scope

This technical standard specifies the minimum technical characteristics for optical communication system, both free space optical communication and optical fiber communication.

This technical standard aims to harmonize standards for optical communication system, taking into account relevant attributes as appropriate, such as the structures of the link and network system, transmission and reception of signals, quality of signals, and safety, covering both optical and electrical requirements.

2. Link and network system

Definition **Link** is the point-to-point communication between a transmitter and a receiver, which is generally composed of an optical transmitter, an optical receiver, and a transmission line, which may be via free space or optical fiber.

Network system is the system of links composed of at least a pair of transceiver stations, with a technical management system that enables the communication within the same network or to other networks. Examples of the network systems according to sizes may include access network, local area network, metropolitan area network, and wide area network, etc.

Requirement The structure of network system and the link between transmitters and receivers used for telecommunications shall follow the National Telecommunications Commission's requirements.

3. Transmitter

Definition **Transmitter** is an optical transmitter from the originating station, which may consist of an electrical-to-optical converter, a signal processor, a multiplexer and an optical driver, that is used for transforming optical signals into suitable shapes and powers for use.

Requirement Transmitters shall conform to the National Telecommunications Commission's requirements, the Thailand Industrial Standards, or other equivalent international standards.

Transmitters using laser as carrier shall be installed and used with safety requirement in conformity with Thai Industrial Standards or other equivalent international standards.

4. Receiver

Definition **Receiver** is an optical receiver at the terminal station, which may consist of an optical-to-electrical converter, a signal processor, a de-multiplexer and an amplifier, and is used for transforming the signals into suitable shapes and powers for further transmission.

Requirement Receivers shall conform to the National Telecommunications Commission's requirements, Thai Industrial Standards, or other equivalent international standards.

Receivers using laser as carrier shall be installed and used with safety requirement in conformity with Thai Industrial Standards or other equivalent international standards.

Remarks Transceivers shall meet the requirements for both transmitters and receivers.

5. Transmission line

Definition **Transmission line** is a medium in the communication network through which optical signals travel, e.g. free space and optical fiber.

Requirement

5.1 The determination of transmission routes in free space optical network shall conform to the National Telecommunications Commission's requirements.

5.2 Optical fiber transmission line

5.2.1 The physical and technical characteristics of optical fibers shall conform to the Thailand Industrial Standards, or other equivalent international standards.

5.2.2 The installation and connection shall conform to the National Telecommunications Commission's requirements, the Thailand Industrial Standards, or other equivalent international standards.

5.2.3 The physical and mechanical characteristics, materials, durability, installation and electrical requirements shall conform to Thai Industrial Standards, or other equivalent international standards.

5.2.4 Components of the transmission line, such as an amplifier, a repeater, a dispersion compensator, and an isolator, shall have technical characteristics compatible with the operational link and durable under working conditions. The installation and use of such components shall conform to the National Telecommunications Commission's requirements, Thai Industrial Standards, or other equivalent international standards.

6. Quality of signal

Definition **Quality of signal** refers to the characteristics of the signals that will indicate the satisfaction with the provision of services.

Requirement

6.1 The quality of analogue signal at the input of a receiver shall have the signal-to-noise ratio (SNR) at least 38 dB.

6.2 The quality of digital signal at the input of a receiver shall have the bit error rate (BER) equal to or less than 10^{-10}, as per the ITU-T Recommendation G. 983.1: Broadband optical access systems based on Passive Optical Networks (PON).

6.3 The quality of service (QoS) of communication systems and networks shall conform to the ITU-T Recommendation G. 1010: End-user multimedia QoS categories.

6.4 The system availability of optical communication systems shall conform to the following ITU-T recommendations:

(1) ITU-T Recommendation G. 820: Relationships among ISDN, IP-based network and physical layer performance Recommendations.

(2) ITU-T Recommendation G. 821: Error performance of an international digital connection operating at a bit rate below the primary rate and forming part of an Integrated Services Digital Network.

(3) ITU-T Recommendation G. 822: Controlled slip rate objectives on an international digital connection.

(4) ITU-T Recommendation G. 823: The control of jitter and wander within digital networks which are based on the 2048 kbit/s hierarchy.

(5) ITU-T Recommendation G. 824: The control of jitter and wander within digital networks which are based on the 1544 kbit/s hierarchy.

(6) ITU-T Recommendation G. 825: The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH).

(7) ITU-T Recommendation G. 826: End-to-end error performance parameters and objectives for international, constant bit-rate digital paths and connections.

(8) ITU-T Recommendation G. 827: Availability performance parameters and objectives for end-to-end international constant bit-rate digital paths.

(9) ITU-T Recommendation G. 828: Error performance parameters and objectives for international, constant bit-rate synchronous digital paths.

(10) ITU-T Recommendation G. 829: Error performance events for SDH multiplexer and regenerator sections.

6.5 The management of networks from mid-level upward shall conform to ITU-T Recommendation M. 3010: Principles for a telecommunications management network

6.6 The design of backbone/core networks shall accommodate signal reduction, which causes system margin, at least 3 dB for the initial use, based on the calculation formulae as per relevant ITU-T recommendations.