TTC STANDARDS

# JJ-50.30

## Physical Layer Specifications of 155520kbit/s Optical Subscriber Line

Version 1

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THE TELECOMMUNICATION TECHNOLOGY COMMITTEE

# Introduction

This document provides the TTC original Standards formulated and put into effect by the Technical Assembly. It contains unabbreviated version of 'JJ-' Standards, which have not been defined as international standards.

In case of dispute, the original to be referred is the Japanese version of the text.

We trust that greater understanding of TTC Standards by a wider range of users will further contribute to the development of telecommunications.

# JJ-50.30 Physical Layer Specifications of 155520kbit/s Optical Subscriber Line

## 1. Relations with international standards

JJ-50.30 standard describes the physical layer specifications at the line interface (LI) of 155520kbit/s optical subscriber line that provides services such as domestic ATM leased line.

## 2. History of revised versions

| Version | Date | Outline |
|---|---|---|
| 1 | Nov. 25, 1999 | Established |

## 3. Others

(1) References

TTC standards: JT-G707 and JT-G957

ITU-T recommendation: G.652

JIS: C5973 and C6835

IEC: 793-2

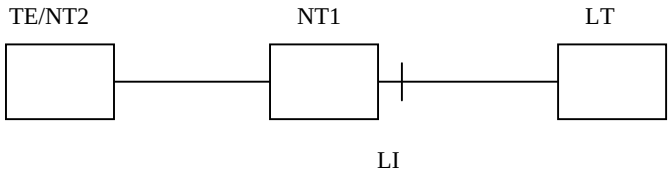
Contents

# 1. Introduction

JJ-50.30 standard describes the physical layer specifications at the line interface (LI) of 155520kbit/s optical subscriber line that provides services such as domestic ATM leased line.

# 2. Reference configuration

Figure 2-1/JJ-50.30 shows the reference configuration. An interface point LI is adjacent to the NT1 on its network side.




NT1: Network Termination 1 LT: Line Termination

NT2: Network Termination 2 TE: Terminal Equipment

Figure 2-1/JJ-50.30 Reference configuration

# 3. Interface conditions

## 3.1 Bit rate

The bit rate at the line interface is 155520kbit/s.

The NT1 transmits signals synchronously with the timing received from the network. In the absence of a valid clock derived from the network, the accuracy of free run frequency is 155520kHz±20ppm.

## 3.2 Connector

An F04 type single optical fiber connector (JIS C 5973) is used at the line interface for transmitting and receiving each.

## 3.3 Transmission medium

Two optical fibers are used as transmission medium at the line interface. The optical fiber is SM type and complies with ITU-T recommendation G.652 (corresponding to IEC 793-2B1.1a or JIS C 6835 SSMA-10/125).

## 3.4 Optical conditions

The optical conditions at the line interface comply with TTC standard JT-G957 L-1.1.

The line coding is scrambled 2-level-NRZ and the convention used for optical logic level is positive (emission of light for a binary ‘1’ and no emission of light for a binary ‘0’).

### 3.5 Logical conditions

#### 3.5.1 Frame structure

The frame applied to the line interface is STM-1 and the path mapped into STM-1 is only VC-4. The frame structure complies with TTC standard JT-G707. Figure 3-1/JJ-50.30 shows the frame structure.

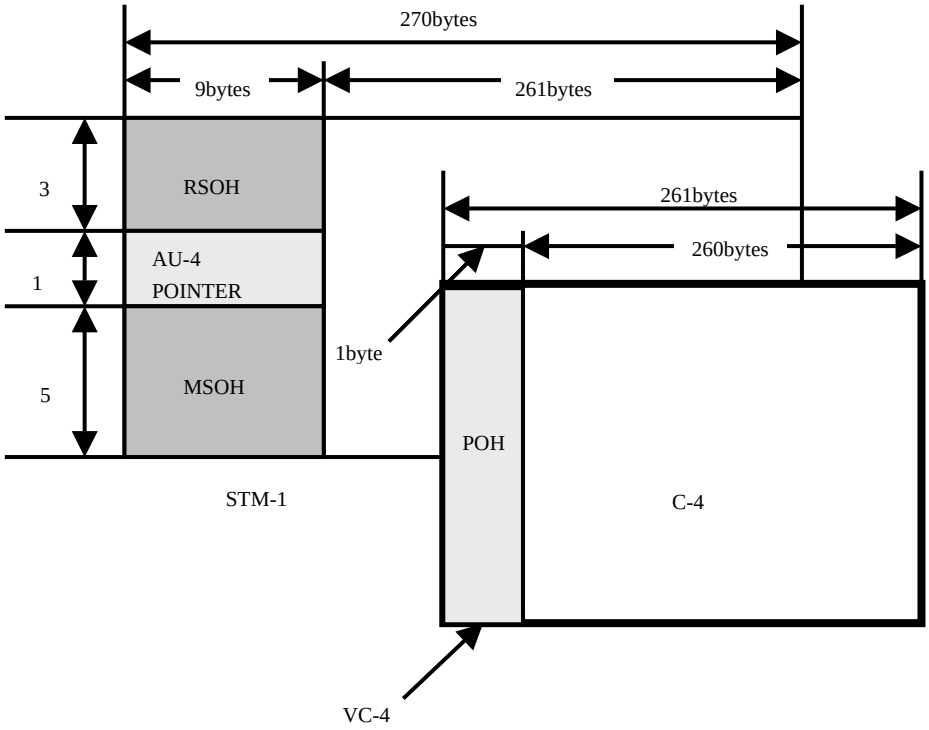



Figure 3-1/JJ-50.30 Frame structure

### 3.5.2 Overhead

Figure 3-2/JJ-50.30 shows the mappings of the SOH bytes of STM-1, the POH bytes of VC-4 and the AU-4 pointer.

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | byte | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | A1 | A1 | A1 | A2 | A2 | A2 | C1 (J0) | + | + | | 1 | J1 |
| STM-1 RSOH | 2 | B1 | - | - | E1 | - | - | F1 | - | - | | 2 | B3 |
| | 3 | D1 | - | - | D2 | - | - | D3 | - | - | | 3 | C2 |
| AU-4 POINTER | 4 | H1 | Y | Y | H2 | 1* | 1* | H3 | H3 | H3 | | 4 | G1 |
| | 5 | B2 | B2 | B2 | K1 | - | - | K2 | - | - | | 5 | F2 |
| | 6 | D4 | - | - | D5 | - | - | D6 | - | - | | 6 | H4 |
| STM-1 MSOH | 7 | D7 | - | - | D8 | - | - | D9 | - | - | | 7 | F3 |
| | 8 | D10 | - | - | D11 | - | - | D12 | - | - | | 8 | K3 |
| | 9 | Z1 (S1) | - | - | Z2 | - | Z2 (M1) | E2 | - | - | | 9 | N1 |

VC-4 POH

+: 10101010

-: undefined (NT1 -> LT: undefined LT -> NT1: don't care)

Y: 1001SS11 (S bit is undefined.)

1*: 11111111

Figure 3-2/JJ-50.30 Mappings of overheads

Table 3-1/JJ-50.30 shows definitions of STM-1 SOH and AU-4 pointer. Table 3-2/JJ-50.30 shows definitions of VC-4 POH.

Table 3-1/JJ-50.30 Definitions of STM-1 SOH and AU-4 pointer

| Overhead type | | Function | Coding | Note |
|---|---|---|---|---|
| RSOH | A1 | Frame alignment | 11110110 | Complies with TTC JT-G707 |
| | A2 | Frame alignment | 00101000 | Complies with TTC JT-G707 |
| | C1(J0) | Frame ID number | NT1 -> LT: 00000001<br>LT -> NT1: don't care | Complies with TTC JT-G707 |
| | B1 | undefined | * | |
| | E1 | undefined | * | |
| | F1 | undefined | * | |
| | D1 - D3 | undefined | * | |
| AU-4 pointer | H1, H2 | AU-4 pointer | Prescribed coding | Complies with TTC JT-G707 |
| | | Positive/negative stuffing indication | | Complies with TTC JT-G707 |
| | | P-AIS | H1=H2=11111111 | Complies with TTC JT-G707 |
| | H3 | Pointer action | Negative stuffing | Complies with TTC JT-G707 |
| MSOH | B2 | Error monitoring | BIP-24 | Complies with TTC JT-G707 |
| | K1 | undefined | * | |
| | K2 (b1 - b5) | undefined | * | |
| | K2 (b6 - b8) | MS-RDI | Normal: 000<br>MS-RDI: 110 | Complies with TTC JT-G707 |
| | D4 - D12 | undefined | * | |
| | Z1 (S1) | undefined | * | |
| | Z2 | R-INH, LOOP2 | Refer to sections 4.3 and 4.4 | |
| | Z2 (M1) | MS-REI<br>(Section error reporting) | 10000000 - 10011000: 0-24 errors<br>10011001 – 11111111: no error | Complies with TTC JT-G707 |
| | E2 | undefined | * | |

* NT1 -> LT: undefined LT -> NT1: don't care

Table 3-2/JJ-50.30 Definitions of VC-4 POH

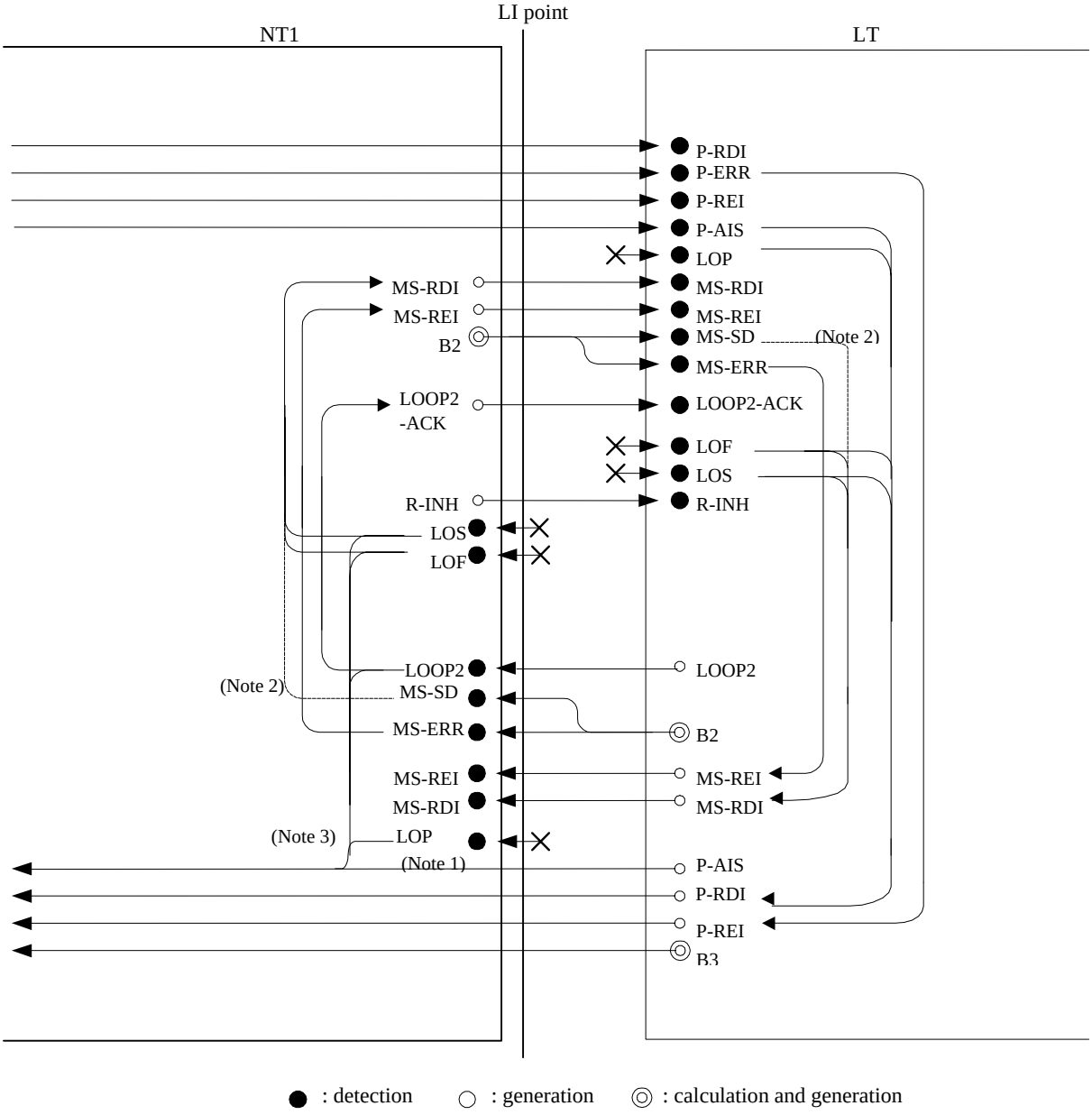
| Overhead type | | | Function | Coding | Note |
|---|---|---|---|---|---|
| POH | J1 | | Path trace | * | |
| | B3 | | Error monitoring | BIP-8 | Complies with TTC JT-G707 |
| | C2 | | Signal label | Prescribed coding | Complies with TTC JT-G707 |
| | G1 | (b1 - b4) | P-REI | 0000 - 1000: 0 - 8 errors<br>1001 - 1111: no error | Complies with TTC JT-G707 |
| | | (b5) | P-RDI | 0: normal<br>1: P-RDI | Complies with TTC JT-G707 |
| | | (b6 - b8) | undefined | * | |
| | F2 | | undefined | * | |
| | H4 | | undefined | * | |
| | F3 | | undefined | * | |
| | K3 | | undefined | * | |
| | N1 | | undefined | * | |

* NT1 -> LT: undefined LT -> NT1: don’t care

# 4. Transportation of maintenance and operation information

## 4.1 Alarm transportation diagram

Figure 4-1/JJ-50.30 shows the alarm transportation diagram at the line interface.




(Note 1) The NT1 may not detect LOP, when it doesn't have pointer process.

(Note 2) MS-RDI generation in the case of detecting MS-SD is an option.

(Note 3) Since P-AIS generation in the case of detecting LOS, LOF, LOOP2 or LOP is an internal action of the NT1, this standard does not prescribe it. This figure shows an example.

Figure 4-1/JJ-50.30 Alarm transportation diagram

### 4.2 Alarm detection and generation conditions

Table 4-1/JJ-50.30 shows the conditions of alarm detection and release, and Table 4-2/JJ-50.30 shows the conditions of alarm generation and release. Refer to sections 4.3 and 4.4 about R-INH and LOOP2.

Table 4-1/JJ-50.30 Conditions of alarm detection and release

| Type | | Detection condition | Release condition |
|---|---|---|---|
| Loss of input signal | LOS | Loss of input signal | Recovery of input signal |
| Loss of frame alignment | LOF | Detection of 5 successive inconsistent frame synchronization pattern | Recovery of frame synchronization (Detection of 2 successive coincident frame synchronization pattern) |
| Degradation of multiple section error rate | MS-SD | Transmission error rate detected by BIP-24 (B2) is more than $10^{-6}$. | Transmission error rate detected by BIP-24 (B2) is less than $10^{-7}$. |
| Multiple section defect of transmitting side | MS-RDI | Receipt of 3 successive b6-b8='110' in K2 after descramble | Receipt of 3 successive b6-b8≠'110' in K2 after descramble |
| Multiple section error of receiving side | MS-ERR | Error detection by BIP-24 (B2) | No error detection by BIP-24 (B2) |
| Multiple section error of transmitting side | MS-REI | Detection of transmission path error transported by M1 | Detection of no transmission path error transported by M1 |
| Loss of pointer | LOP | Receipt of abnormal pointer (except for receipt of AIS pointer) | Receipt of normal pointer |

Table 4-2/JJ-50.30 Conditions of alarm generation and release

| Type | Generation method | Generation condition | Release condition |
|---|---|---|---|
| MS-RDI | b6-b8='110' in K2 before scramble | Detection of LOS, LOF or (MS-SD) | Recovery of LOS, LOF or (MS-SD) |
| MS-REI | Put calculation result of B2 into M1 | Detection of MS-ERR | Recovery of MS-ERR |

### 4.3 Power loss information bit of NT1 (R-INH)

An NT1 shall have the informing function of power loss in order to inhibit unnecessary alarms of the network side in the case of NT1 power loss.

R-INH bits are the 7th and the 8th bits of Z2 byte as shown in Figure 4-2/JJ-50.30.

When the NT1 power is on, the NT1 shall transmit R-INH bits of '00' to the LT. When the NT1 power is turned off from on (the power switch of the NT1 is turned off from on or the power supply is lost even if the power switch of the NT1 is on ), the NT1 shall transmit R-INH bits of '01' to the LT for 12 times and after that shall become signal loss state (except for the case of the

NT1 failures such as fuse burning ).

LT -> NT1

| undefined | undefined | undefined | undefined | undefined | LOOP2 | LOOP2 | ‘0’ |
|---|---|---|---|---|---|---|---|
| b1 | b2 | b3 | b4 | b5 | b6 | b7 | b8 |

NT1 -> LT

| undefined | undefined | undefined | undefined | undefined | LOOP2-ACK | LOOP2-ACK / R-INH | R-INH |
|---|---|---|---|---|---|---|---|
| b1 | b2 | b3 | b4 | b5 | b6 | b7 | b8 |

LT -> NT1

| b6 b7 | LOOP2 |
|---|---|
| ‘00’ | Set |
| ‘01’ | Release |

NT1 -> LT

| b7 b8 | R-INH |
|---|---|
| ‘00’ | Set |
| ‘01’ | Release |

NT1 -> LT

| b6 b7 | LOOP2-ACK |
|---|---|
| ‘00’ | Set |
| ‘10’ | Release |

(Note) The previous state shall be maintained in the case of receiving b6 and b7 bits of other than ‘00’ or ‘01’.

Figure 4-2/JJ-50.30 Mappings of R-INH and LOOP2 into Z2 byte

### 4.4 Loop information bit (LOOP2)

An NT1 shall have the loop back function (LOOP2) in order to perform effective identification of failure.

LOOP2 bits are the 6th and the 7th bits of Z2 byte as shown in Figure 4-2/JJ-50.30.

Table 4-3/ JJ-50.30 shows the loop back conditions and states of LOOP2.

Table 4-3/JJ-50.30 Loop back conditions and states

| Loop back condition | | Loop back state |
|---|---|---|
| Set | Receipt of more than 6 successive LOOP2 bits of ‘01’ | The NT1 transmits the signal (VC-4) received from the LT to the LT. |
| Release | Receipt of more than 6 successive LOOP2 bits of ‘00’ | Loop back state is released and the NT1 returns to normal state. |