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NETWORK CONNECTION SPECIFICATION FOR CONNECTION OF CUSTOMER PREMISES EQUIPMENT (CPE) TO THE PUBLIC TELECOMMUNICATIONS NETWORKS (PTNs) IN HONG KONG USING DIGITAL LEASED CIRCUITS AT DATA RATE OF 1544 kbit/s BASED ON ITU-T RECOMMENDATION G.703

TELECOMMUNICATIONS AUTHORITY

HONG KONG

FOREWORD

1. This specification is issued pursuant to Section 32D of the Telecommunications Ordinance (Cap. 106). This specification sets out the technical requirements for connection of customer premises equipment (CPE) to the public telecommunications networks (PTNs) in Hong Kong using digital leased circuits at data rate of 1544 kbit/s (T1 circuits) based on ITU-T Recommendation G.703.

2. Digital leased circuits may be provided by any one of the Fixed Telecommunications Network Services (FTNS) operators in Hong Kong. CPE should comply with this specification for connection to the T1 circuits provided by the FTNS operators. The general technical characteristics of the FTNS networks are given in HKTA 2201. Supplementary information on network characteristics and services of the FTNS networks may be obtained direct from the operators. Contact information of the FTNS operators can be found in the information note OFTA I 412.

3. At present, the Office of the Telecommunications Authority (OFTA) operates a **H**ong **K**ong **T**elecommunications Equipment **E**valuation and **C**ertification ("HKTEC") scheme. Details of the scheme can be found in the information note OFTA I 421. Under the scheme, suppliers or manufacturers may apply for certification of their customer premises equipment against this specification. The application procedures for certification of customer premises equipment can be found in the information note OFTA I 412. A label prescribed by the Telecommunications Authority (TA) may be affixed to the certified equipment. Details of the labelling arrangement can be found in the Standardisation Guide HKTA 3211.

4. The TA may amend any part of this specification as and when he deems necessary.

5. In case of doubt about the interpretation of this specification, the methods of carrying out the test and the validity of statements made by the manufacturers of the equipment, the decision of the TA shall be final.

6. The TA accepts no responsibility for the satisfactory performance of the CPE connected to the public telecommunications networks. The CPE is not normally evaluated against performance, reliability or quality-of-service parameters.

7. The HKTA specifications and information notes issued by the TA can be downloaded from OFTA's website at http://www.ofta.gov.hk. Enquiries about this specification may be directed to:

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AMENDMENT TABLE

Item	Issue No.	Paragraph	Descriptions
1.	Issue 2	Foreword	Certification and labelling requirements are updated.
2.	Issue 3	Title	Revise the title to cover only connection interface based on ITU-T Recommendation G.703.
3.	Issue 3	Foreword	Update information on certification and labelling as a result of the accreditation of Certification Bodies (CBs).
4.	Issue 3	Foreword Para. 1	Revise the information to reflect the coverage of only connection interface based on ITU-T Rec. G.703.
5.	Issue 3	Para. 2.2, 5	Update the title of HKTA 2001.
6.	Issue 3	Para. 4	Update the technical requirements based on the current version of ITU-T Rec. G.703.
7.	Issue 3	Para. 4.1	Delete the note about the use of other types of interfaces (other than G.703, such as V.35 or V.11) which are to be covered in another HKTA specification.

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1. SCOPE

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5. REFERENCE

1. SCOPE

This network connection specification covers the minimum technical requirements for connection of customer premises equipment (CPE) to the public telecommunications networks (PTNs) in Hong Kong using digital leased circuits at data rate of 1544 kbit/s based on ITU-T Recommendation G.703.

2. ELECTRICAL SAFETY

2.1 PRINCIPLE OF PROTECTION

In order to safeguard operating personnel, users, and plant, it is essential to prevent the transmission of excessive voltages from the CPE into the public telecommunications networks (PTNs) in Hong Kong.

2.2 SAFETY REQUIREMENTS

The CPE shall comply with the HKTA 2001 specification entitled "Compliance Test Specification - Safety and Electrical Protection Requirements for Subscriber Telecommunications Equipment" issued by the Telecommunications Authority (TA).

3. INTERCONNECT POINT

3.1 Digital leased circuits may be provided by any one of the Fixed Telecommunications Network Services (FTNS) operators (hereafter referred to as the "network operators") in Hong Kong. Interconnection with the digital leased circuits at 1544 kbit/s (T1 circuits) will require the installation of the network operators' equipment and internal cabling in customer premises. A normal office air-conditional environment is required together with a maintained power supply. Either a mains power supply of 220 Vrms ± 10% taken from the same point in the building distribution as the CPE or a suitable power supply of -48 Vdc ± 10% should be provided by the customer.

3.2 The interconnect point (IP) marks the division of responsibility between the network operator and the customer (see Figure 1).

3.3 The network operator will provide sockets for connection, disconnection or re-connection of the equipment to the IP. The customer will be responsible for connection and disconnection of the CPE at the IP.

3.4 The IP configuration will depend on the number of circuits provided to the customer. For a large number of T1 circuits, terminating strip / frame will be used for physical interconnection at the IP. For a few number of T1 circuits, symmetrical cable with one of the following types of connector will be used:

- ISO 4903 (DB15); or
- ISO 2110 (DB25); or
- RJ-45 type connector.

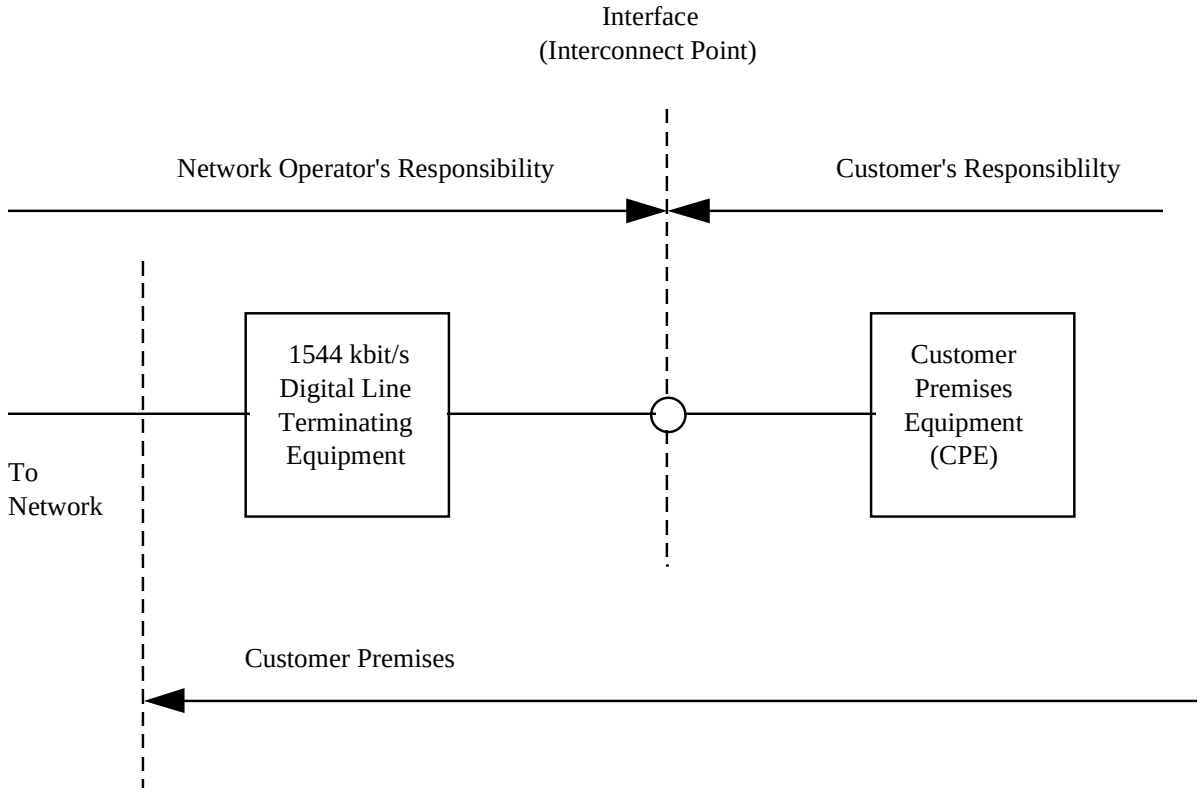


Figure 1 - Interconnection of CPE with 1544 kbit/s digital interface to the PTN at the Interconnect Point

3.5 The cable pairs connecting the CPE to the IP should have the following characteristics:

(a) One screened, twisted symmetrical pair shall be used for each direction of transmission.

(b) Cable gauge : 0.5 mm in diameter (i.e. AWG 24/SWG 25)

(c) Attenuation : Not greater than 0.02 dB/m at 772 kHz

(d) Characteristic impedance : 100 ohms nominal at 772 kHz

(e) The screen of the symmetrical pair shall be connected to earth at the output port and left open-circuit at the input port, on the CPE side of the IP (see Figure 2).

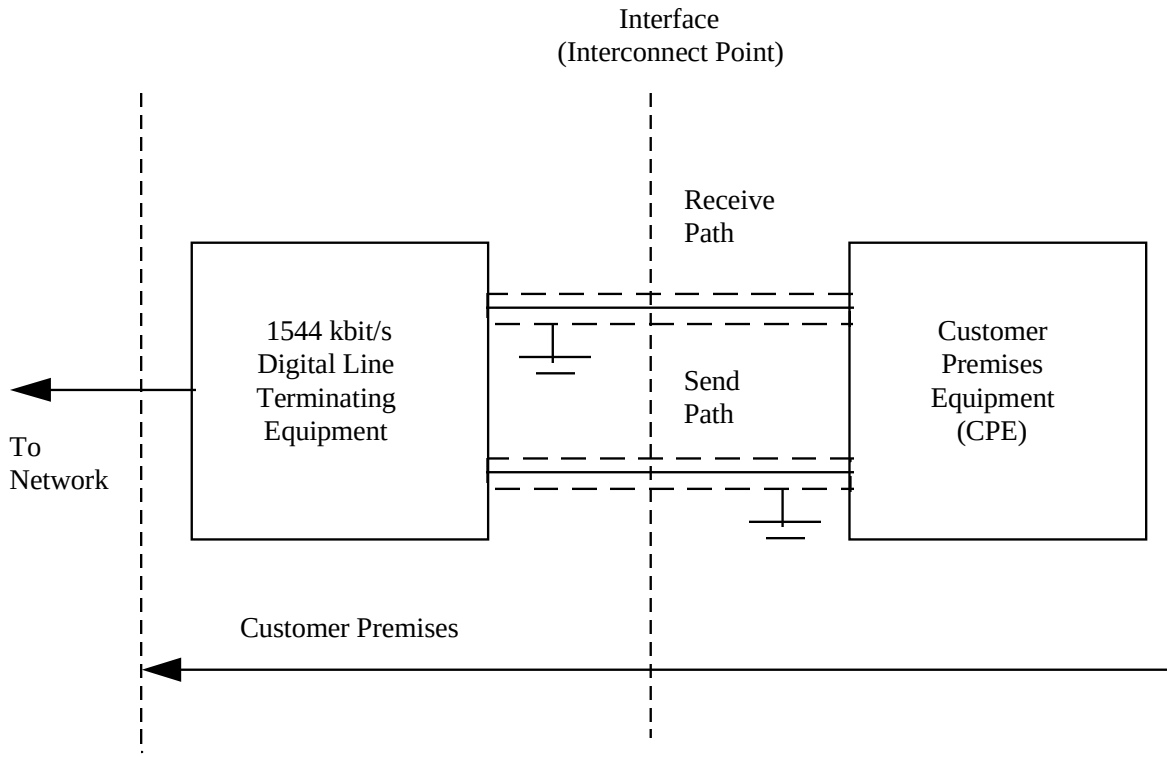


Figure 2 - Earthing of Screened Pair at Output Port

4. INTERFACE ELECTRICAL REQUIREMENTS

4.1 GENERAL

The digital interface of the CPE shall conform to ITU-T Recommendations G.703 and G.824 referring to a digital interface operating at a nominal bit rate of 1544 kbit/s, as specified below.

Note 1: The voltage specifications below are given for isolated pulses, while power levels below are specified for all-ones signal.

4.2 BIT RATE ACCURACY

The CPE shall have a bit rate accuracy of ±32 parts per million (ppm) or better.

Note 2: The bit-error-ratio of the 1544 kbit/s digital links provided by the network at the interface is less than 1 in 10^6.

4.3 LINE CODE

The CPE shall support either B8ZS or AMI (bipolar) code.

Note 3: B8ZS code is the default option used by the network. AMI code can be supported by the network if it is specified by the equipment manufacturer/ supplier.

4.4 TEST LOAD IMPEDANCE

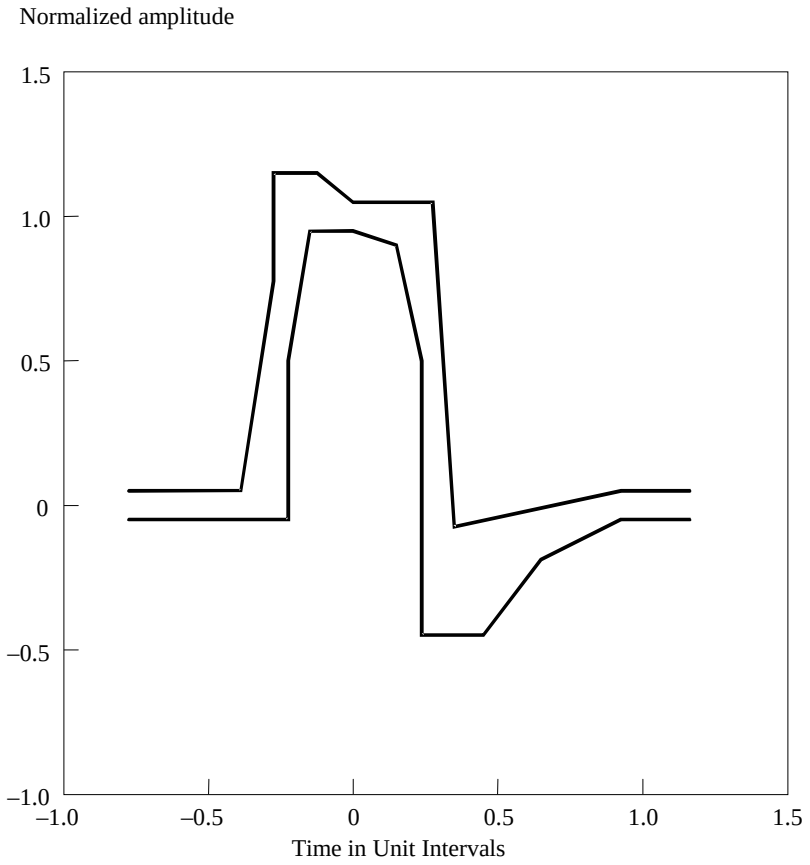
The test load impedance shall be 100 ohms ± 5% resistive.

4.5 PULSE AMPLITUDE

The amplitude of an isolated pulse shall be between 2.4 V and 3.6 V.

4.6 PULSE SHAPE

The shape of every pulse that approximates an isolated pulse (is preceded by four zeros and followed by one or more zeros) shall conform to the mask below:



Minimum curve		Maximum curve	
Time	**Normalized amplitude**	**Time**	**Normalized amplitude**
– 0.77	– 0.05	– 0.77	0.05
– 0.23	– 0.05	– 0.39	0.05
– 0.23	0.5	– 0.27	0.8
– 0.15	0.95	– 0.27	1.15
0.0	0.95	– 0.12	1.15
0.15	0.9	0.0	1.05
0.23	0.5	0.27	1.05
0.23	– 0.45	0.35	– 0.07
0.46	– 0.45	0.93	0.05
0.66	– 0.2	1.16	0.05
0.93	– 0.05		
1.16	– 0.05		

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4.7 POWER LEVEL

For an all-one signal, the power in a 3 kHz ± 1 kHz band centred at 772 kHz shall be between 12.6 dBm and 17.9 dBm. The power in a 3 kHz ± 1 kHz band centred at 1544 kHz shall be at least 29 dB below that at 772 kHz.

4.8 PULSE IMBALANCE

In any window of 17 consecutive bits, the maximum variation in pulse amplitudes shall be less than 200 mV, and the maximum variation in pulse widths (half amplitude) shall be less than 20 ns.

4.9 DC POWER

There shall be no DC power applied at the interface.

4.10 VERIFICATION ACCESS

Access to the signal at the interface shall be provided for verification of the signal specifications as stipulated above.

4.11 JITTER AND WANDER

The control of jitter and wander at the CPE interface shall conform to ITU-T Recommendation G.824.

Suitable test apparatus is described in ITU-T Recommendation O.171. Testing will be conducted if loop-back facility is provided by the CPE.

4.12 FRAME STRUCTURE

There is no requirement on the frame structure for the signal being transmitted over the 1544 kbit/s circuit.

5. REFERENCE

5.1 HKTA 2001 - "Compliance Test Specification - Safety and Electrical Protection Requirements for Subscriber Telecommunications Equipment" issued by the Telecommunications Authority

5.2 ITU-T Recommendation G.703 - Physical/electrical characteristics of hierarchical digital interfaces

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

5.4 ITU-T Recommendation O.171 - Timing jitter and wander measuring equipment for digital systems which are based on the plesiochronous digital hierarchy (PDH)

5.5 ISO 4903:1989 Information technology -- Data communication -- 15-pole DTE/DCE interface connector and contact number assignments

5.6 ISO/IEC DIS 2110 Information technology -- Data communication -- 25-pole DTE/DCE interface connector and contact number assignments (Revision of ISO 2110:1989)

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