

TEST PROCEDURE
FOR
ISDN NETWORK TERMINATION (NT1)

No. TSTP/IR/NT1-02/03. MAY2005
(Against No. IR/NT1-02/03. MAY 2005)

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TELECOMMUNICATION ENGINEERING CENTRE
KHURSHID LAL BHAWAN, JANPATH
NEW DELHI-110001
INDIA

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CHAPTER-1

1.1 General

This document gives the test procedure for ISDN Network Termination 1 (NT1) for ISDN Basic Rate Access which supports the Interface Requirement (IR No. IR/NT1-02/03MAY 2005. The tests will be done on three samples of NT1 and one sample shall be retained in the TEC after testing is over as given in para 1.5.1 of the IR.

Tests mentioned in paras 1.3, 2.3.3, 2.3.4, Annex-A-2.1.1 (b) & Annex-B may be tested in any one of the technology exchanges mentioned in para 1.2.

Tests mentioned in paras 2.4, Annex-A-2.1.5, 2.1.12, 2.1.26, 2.1.18 & 2.1.21 may be tested in any two of the technology exchanges mentioned in para 1.2.

Tests mentioned in paras 2.2.2, 2.3.2, 2.5 & 2.6 are independent of exchange.

Tests mentioned in para 1.2, 1.4, 1.5, 1.6 & Annex-A-2.1.1(a) require only certification from suppliers.

1.2 The NT shall have to be compatible with the following types of exchanges

- (a) AXE-10 of M/S Ericsson
- (b) EWSD of M/S Siemens
- (c) FETEX-150 of M/S Fujitsu
- (d) NEAX-61E of M/S NEC
- (e) OCB 283 of M/S Alcatel
- (f) 5 ESS of M/S Lucent Technologies Ltd
- (g) C-DOT

1.3 Power Supply

Connect NT1 to the exchange and check the functioning by making call by ISDN phone when AC mains supply of NT1 is $230 \pm 10\%$ between 207 V (230-23) and 253 V (230 + 23) at 50 ± 2 HZ. The NT1 should function satisfactorily in this voltage range.

1.4 The manufacturer shall provide a certificate that the features as given below in para Nos. 1.4.1 to 1.4.3 and para 1.6 conform to the provisions of these paras.

- 1.4.1 The operating personnel shall be protected against shock hazards as per IS 8347 (1993) – Guide on the effects of current passing through the human body equivalent to IEC publications 60479-1 (1984). The manufacturer/supplier shall submit a certificate in respect of compliance to these requirements.
- 1.4.2 The equipment shall conform to IS 13252 (2003)-“Safety of information technology equipment including electrical business equipment”(equivalent to TEC publication 60950 (2001)). The manufacturer/supplier shall submit a certificate in respect of compliance to these requirements.
- 1.4.3 The isolation between mains and the line shall be met as per EN 41003 of ETSI.

1.5 Additional information for testing

As mentioned in para 1.5.1 & 1.5.2, the required samples and documents shall be provided by the supplier.

1.6 EMC Requirements

The equipment shall conform to the EMC requirements as per the following standards and limits indicated therein. A test certificate and test report shall be furnished from test agency. The test agency for EMI/EMC compliance shall be an accredited one and details of accreditation shall be submitted.

- (a) Conducted and radiated emissions: To comply with Class-B of CISPR 22 (2003) “Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipments”;
- (b) Electrostatic discharge: To comply with IEC 61000-4-2 (2001) “Testing and measurement techniques of Electrostatic discharge immunity test” under following test levels:
Contact discharge level-2 (± 4 KV)
Air discharge level-3 (± 8 KV)
- (c) Fast transients common mode (burst): To comply with IEC 61000-4-4(1995 with Amendment -1 (2000) and Amendment -2 (2001)) Testing and measurement techniques of electrical fast transients/burst immunity test under Level-2 {1KV for DC power lines; 1 KV for signal control lines}
- (d) Immunity:IEC 61000-4-3 (2002) Radiated RF Electromagnetic Field Immunity test under test level-2 (test field strength 3 V/ m) for general purposes in frequency range 80 Hz to 1000 MHz and under test level-3 (10 V/m) for protection against digital radio telephones in frequency ranges 800 MHz to 960 MHz and 1.4 GHz to 2.0 GHz.

- (e) Surges line to earth coupling and line to line coupling: To comply with IEC 61000-4-5 (2001) "Test & Measurement techniques for Surge immunity tests" under test levels of 0.5 KV for line to line coupling and 1KV for line to earth coupling.
- (f) Radio frequency common mode: To comply with IEC 61000-4-6(2001) "Immunity to conducted disturbances, induced by radio frequency fields" under the test level-2 (3 V r.m.s) clamp injection method for DC lines and Signal Control lines.

Note: For checking compliance to above EMC requirements, the methods of measurements shall be in accordance with TEC standard No. SD/EMI-02/02 Sep 2001 and references mentioned therein. Alternately, corresponding relevant Euro Norms of the above IEC/CISPR standards are also acceptable subject to the condition that frequency range and test levels are met as per above mentioned sub clauses (a) to (f) along with TEC standard No. SD/EMI-02/02 Sep 2001. The details of IEC CISPR and corresponding Euro Norms are mentioned in the References.

End of Chapter 1

Chapter -2

OPERATIONAL TESTS OF NETWORK TERMINATION 1

2.1 Connect NT1 to U-interface on one side to connect to the ISDN line and to the S-interface to the other side to connect to the ISDN Terminal Equipment.

2.2 U – interface specification

2.2.1 Tests given in Annex-A as per TEC document SD/ISN-02 National Standards for ISDN Basic Rate Access U-Interface.

2.2.2 Check that suitable termination or connector is provided to connect the two wires of U-interface to the rosette.

2.3 S/T-interface specification

2.3.1 Tests given in Annex-B as per TEC document SD/ISN-01 ISDN User Network Interface (S/T) National Standards

2.3.2 Check connections for S interface on 8 position jack ISO8877/RJ-45 where

pin 3 Rx+

pin 4 Tx+

pin 5 Tx-

pin 6 Rx-

2.3.3 The Network Termination (NT) shall be tested in following configurations. A suitable ISDN Feature telephone shall be used for speech and PC add-on card will be used for data calls.

(a) Point to point : upto 1000 metres

(b) Short Passive Bus : upto 150 metres

Upto 8 TEs

(c) Extended Passive Bus : upto 500 metres

Upto 4 TEs

Separation between

TEs – 25 to 50 metres

2.3.4 Power feeding:

- (a) Make connections as given in figure-1. Connect NT1 local power supply. Measure the voltage of power source 1 (PS 1). The voltage should be 40 volts when 3 W of power is drawn. Calculate the power as follows:

$$\text{Power} = VX(A1+A2)$$

The value of resistors is around 1000 ohms 5 watts each.

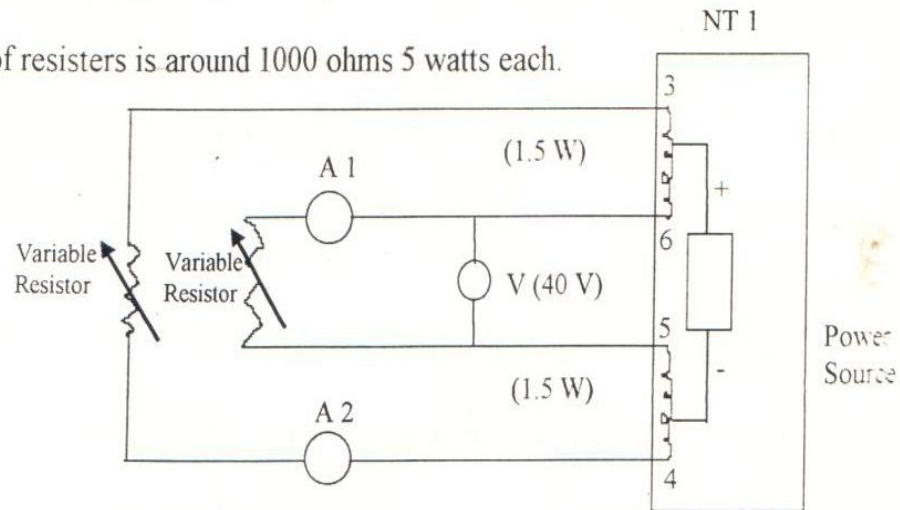


Figure-1: Power available from NT1

Refer figure – 2 for tests (b), (c) and (d)

- (b) Measure the power drawn by TE from the exchange battery in case of local power failure (restricted power supply) NT should be capable of providing upto 420 mW.
- (c) Measure the voltage at S-Bus between pin 3 and 5 or 6 and 4. It should be between 34 and 42 volts (40 V- 15% and 40 V+ 5%) Check this voltage when NT1 main supply is nominal, minimum and maximum.
- (d) Check of polarity of DC voltage.
- (i) Under normal power condition pin 3 and 6 will be +ve and pin 5 and 6 will be –ve.
- (ii) Under restricted power condition pin 3 and 6 will be –ve and pin 5 and 4 will be +ve.

2.4 Test Function

Connect NT1 to the exchange line and ISDN phone on S bus. Make a call to test the connection. Test the line from the exchange by entering suitable man machine command. The result should indicate normal condition of the line. Test all the three samples.

By a man-machine command from the exchange the NT1 shall give loop back test towards exchange. The NT1 shall provide loop back at S/T interface. Verify the same.

2.5 Check the following features of Network Termination:

2.5.1 8 pin S interface socket (ISO 8877/RJ-45).

2.6 Check that the terminating resistor of 100 ohms are provided for S/T interface.

End of Chapter - 2

Annex-A

TESTS WITH RESPECT TO U-INTERFACE STANDARDS

No.SD/ISN-02/02 SEP 2003

(Clause Nos given below correspond to SD/ISN-02/02 SEP 2003 document)

2.1.1 2B1Q line coding implementation :

- (a) This should be checked with the documents provided by the supplier for the chip used. In the chip details, it should be clearly mentioned that line coding used is 2B1Q. Data sheet should be provided as document support.
- (b) The NT should be tested with one of the new technology exchange mentioned in para 1.2 of the IR.

2.1.5 Use 36 db attenuation (at 40 KHz) between exchange and NT. Make speech and data call and verify proper working of NT. A 4 kilometer line simulator will give the above required attenuation approximately.

2.1.11 Duplex transmission using ECH :

Same as test given in 2.1.1 above.

2.1.12 & 2.1.26 Following level-1 tests can be checked by making outgoing and incoming calls in power on condition and for restricted power condition.

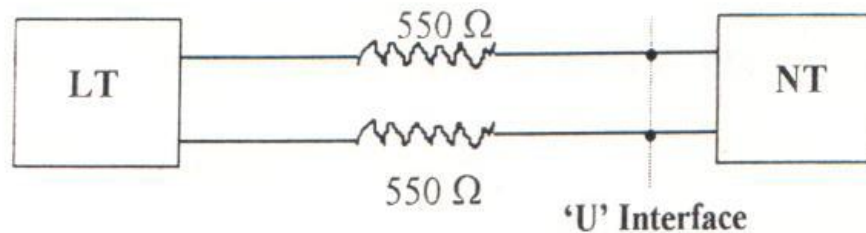
- (a) Activation from ET (make an incoming call to ISDN phone)
- (b) Request activation from TE (Make an O/G call from ISDN phone)

NT should be checked for outgoing and incoming calls by removing S and U interface in the following sequence. The tests are to be repeated with other samples. The test is to be carried out in restricted power condition also.

Condition	O/G call	I/C call
1. Both U and S bus removed, first put U bus and then S bus.		
2. Only U bus removed and put back		
3. Only S bus removed and put back		
4. Both U and S bus removed, first put S bus and then U bus		

2.1.18 DLL resistance: Functionality of NT should be checked by connecting a resistor of 550 ohms each in both the limbs in series as per the diagram below. The test should be done in both normal and emergency mode. For functional tests, following should be checked:

- Activation / Deactivation for LT
- Activation / Deactivation for NT
- Successful out going call
- Successful terminating call
- Simulations two calls on both B channels
- Speech call
- Data call



2.1.21 Power requirement of NT1 from network:

Measure the power (Voltage and current drawn by NT1 at 'U' interface with digital voltmeter and ammeter. Connect any approved ISDN phone or Terminal Adapter at 'S' interface. Connect the exchange line at 'U' interface. The power consumption from line should as follows:

(a) Active state without powering of user network interface less than or equal to 500 mW. Connect any approved PC add on card/TA on the S-Bus. Make data call. Measure the power at U-interface in both normal and restricted power condition.

(b) Active state including restricted mode powering of the user network interface less than or equal to 1100 mW. Connect two ISDN telephones and make calls using both 'B' channels. Measure the power supplied by the NT. Measure the power at U-interface in both normal and restricted power. In restricted mode call shall be possible from only one designated phone.

(c) Deactivated state without powering of user network interface less than or equal to 120 mW. Connect one ISDN telephone on the S-Bus. Make on hook. Allow few seconds for the instrument to go to deactivated state. Measure the power.

Measure the power at U-interface in both normal and restricted power condition.

NT POWER FEEDING

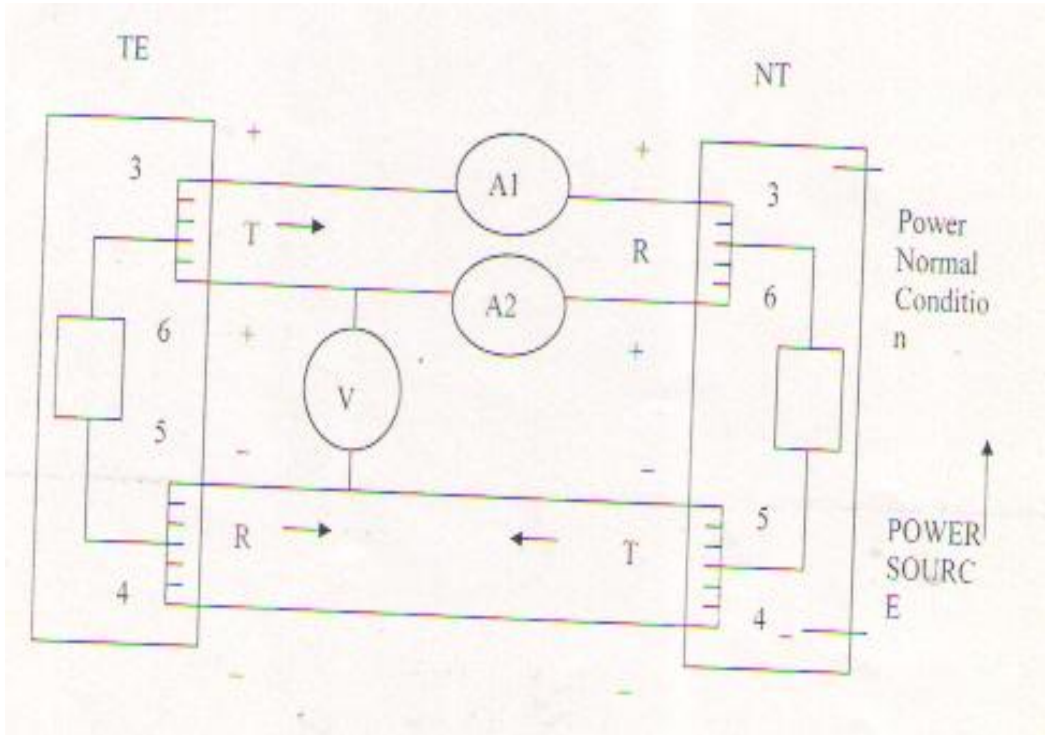


Figure -2. PHANTOM POWER FEEDING

Other clauses no tests envisaged.

End of Annex-A

ANNEX-B

Tests given as per TEC document SD/ISN-01 ISDN User Network Interface

(S/T) National Standards

(Clause Nos correspond to ETS 300 012)

7.1.3.3 Switch over from normal to restricted mode:

Procedure: Connect TEC approved phone to NT. In the ISDN phone set the switch to restricted mode. Make a call when the NT is in the normal mode. During conversation switch off power supply to NT. Verify that the conversation is not disconnected.

7.1.4.2 Overload and short circuit protection of NT:

Procedure: Connect the NT to the line and also to its power supply. Short circuit pin number 3 & 5 momentarily and remove. Make telephone call and check normal function of NT. Repeat the procedure by short circuiting pin number 4 & 6.

End of Annex-B

End of Test Procedure