

**MEMORANDUM CIRCULAR
NO. 02-01-2001**

**SUBJECT: REVISED CUSTOMER PREMISES EQUIPMENT INTERFACE
STANDARDS AND PROCEDURES FOR TYPE APPROVAL AND TYPE
ACCEPTANCE**

PREAMBLE

Pursuant to the powers vested upon this Commission and in line with Memorandum Circular No. 1-04-88, otherwise known as the Rules and Regulations Governing Equipment Provided by Customer/Subscribers of Public Networks, the following revised Customer Premises Equipment (CPE) interface standards and type approval/acceptance procedures are hereby approved for implementation:

Section I GENERAL PROVISIONS

- a. Type approval is a process by which a CPE is evaluated for conformance to national CPE interface standards, as recommended by ITU-T and/or ITU-R. A CPE is tested and evaluated by undergoing laboratory tests to determine its operational compatibility with the public telecommunications network and to guarantee that when connected will not cause harm and will assure adequate safety for:
1. the end-users, regarding their lives, health and properties;
 2. the public telecommunication networks and employees, from malfunction and damage; and
 3. the users of the frequency spectrum, from interference and spurious emissions.

In cases where a CPE has already been certified by a foreign approval authority, the NTC and/or its accredited test laboratory may, at its discretion, accept manufacturer's self-declaration, foreign test reports and approval certificates in lieu of local type approval tests, provided, they must show compliance or conformity with the CPE interface standards herein prescribed.

- b. Type acceptance is a process by which a CPE may be accepted for use in the country in the absence of established interface standards that correspond to the specifications of such CPE. The CPE is evaluated on the basis of submitted foreign test reports and type approval certifications.

Generally, equipment meeting the CPE interface standards will be granted a certificate of type approval. Equipment with interface specifications that are not included in the

established CPE standards may be granted a certificate of type acceptance, on a case-by-case basis.

- c. A CPE without having been issued a Certificate of Type Approval or Certificate of Type Acceptance shall not be connected to the public telecommunications network except those CPEs brought in from overseas by individual subscribers as provided in Section IIc of this Circular.
- d. Type approval shall be required in the following cases;
 - new types/classes, models of CPE intended for connection to a public telecommunications network;
 - modification or alteration of a previously type approved CPE or grandfathered CPE circuitry and/or its associated network interface; and

When there will be a change in trade name and/or model number of a previously type approved CPE, type approval testing may no longer be necessary but issuance of another type approval certificate shall be required under the new trade name or model number.

- e. Type approval shall not be required for a terminal equipment intended for connection to leased line circuits.
- f. Customer Premises Equipment that may be allowed for connection to a public telecommunications network, subject to type approval and the application of authorized rates and tariff charges, are as follows;
 - 1. Private Branch Exchange (PBXs)
 - 2. Key Telephone Systems (KTS)
 - 3. Corded Telephone Sets
 - 4. Cordless Telephone Sets
 - 5. Special purpose terminal equipments designed to operate in conjunction with central office facilities to receive and transmit data from a subscriber's location or to operate in a manner that serves public interest. They include but are not limited to;
 - Alarm dialing and signaling equipment for industrial, security, fire, instruction and equipment failure applications.
 - Traffic Recorder or device for measuring the amount of traffic carried by a group or several groups of switches, lines or trunks and may have the

capability of periodically printing a record of that traffic.

- Variation Monitors or devices for sensing deviations in electrical characteristics of a line and capable of providing an alarm or initiating other actions when program of the electrical characteristics are exceeded.
 - Multiplexer or device that allows transmission of a number of different signals simultaneously over a single telecommunications channel. Concentrators are included in this heading.
6. Automatic dialer or a separate device that dials a call automatically over the public network. The device may include the capability to include dial attempts after encountering a busy signal.
 7. Automatic Answering Machine or device connected to a telephone line which operates in such a manner that when the user is absent, the device answers calls and gives a recorded message and may or may not provide for recording of a short message for the caller.
 8. Call distributor or a device that distributes incoming calls to different operating positions to spread traffic load and increase efficiency.
 9. Data communications equipment (DCE) provides the functions required to establish, maintain and terminate a connection, the signal conversion, and coding required for communication between data terminal equipment and the public telecommunications network. DCE may or may not be an integral part of a computer (e.g. dial-up modem).
 10. Data terminal equipment (DTE) consists of digital end instruments that convert user information into data signals for transmission, or reconvert the received signals into user information. The DTE may consist of a single piece of equipment that provides all required function necessary or it may be an interconnected subsystem of multiple pieces of equipment which together perform all the required functions.
 11. Facsimile machine or device employed at the transmit end to convert a hard copy to electrical signals suitable for delivery to the public telecommunications network and at the receive end to convert picture signals to a hard copy.
 12. Teleprinter or device having a signal actuated mechanism for automatically printing received message. The device may also include a keyboard for manually sending line signals, a paper tape transmitter and paper tape punch/reader or the electronic equivalent of these. (Intended for connection to a telex network).

13. Wireless Paging Receiver using selective radio signal to summon a person, exact whereabouts unknown, to the nearest telephone or to deliver a message to the person carrying the paging unit.
 14. Cellular Mobile Telephone Subscriber Terminal is a terminal unit connected to the cellular mobile telephone system which is a wide area mobile radio telephone system composed of clusters of cells capable of providing high-capacity mobile as well as fixed telecommunication services by utilizing frequency re-use techniques.
 15. Global Mobile Personal Communications by Satellite (GMPCS) terminal equipment connected to a satellite system providing telecommunications services directly to end-users anywhere in the globe from a constellation of satellite.
 16. Fixed Wireless Access Subscriber Unit is a fixed terminal equipment located at the end-user or subscriber's premises wherein it is connected to the public telecommunications network via the fixed wireless access system. Fixed wireless access is an access application using radio technology rather than copper wire or optical fibers to reach subscriber's premises in which the locations of the subscriber and the network access point are fixed.
 17. Very Small Aperture Terminal (VSAT) equipment is a technological innovation in the field of satellite communications that allows reliable transmission of information (voice, data and facsimile) via satellite using small satellite antennas.
 18. Credit Card Verification, Debit Payment and other similar Point of Sale (POS) transaction devices that utilize the public telecommunications network.
 19. Caller Line Identification Device (CLID) is a device connected or built-in to the telephone set that shows the identity i.e. the telephone number and/or registered name of the calling party.
 20. Advanced CPEs
- g. Type approval of CPEs for connection to the public telecommunication network shall be universal in nature and applicable to all concerned network operators.

Section II. SCOPE/LIMITATION

- a. The type-approval of CPEs shall be confined to the interface parameters (physical and electrical characteristics) defined in Section III.

- b. Type-approval of CPEs, however, does not guarantee full operational compatibility when connected with a particular public telecommunications network in terms of signaling, transmission quality, and activation of various system features.

Public Telecommunications Operators may conduct further evaluation of type-approved CPEs based on their own specific requirements to ensure full operational compatibility of the CPE when connected to their network and may issue, for internal control purposes, an interface approval certificate. CPE terminals must have a demarcation point, and the means of connection at that point must be specified for each telecommunications networks.

Interface approval is a process by which CPEs are evaluated, at the option of a public telecommunications operator, not only to guarantee safety, as required by this Circular, but also to ensure operational compatibility when connected to the network of said public telecommunications operator.

- c. A non- type approved CPE brought from overseas by an individual subscriber for personal use and intended for connection to a public telecommunications network may not be required to undergo type approval process, provided that the same CPE is subjected to interface approval testing by the intended serving network operator. The subscriber may apply for connection directly to the concerned network operator subject to the safety requirements of this Circular and the operator's authorized rates, charges and technical requirements. The importation of CPE by an individual subscriber is subject, however, to the rules and regulations of the Bureau of Customs and permits/clearances from this Commission.

Section III. INTERFACE PARAMETERS FOR CPEs

Customer premises equipment intended for connection to a public telecommunications network shall, in general, conform to Section A, B and C as defined in Annex "1" of this Circular.

Section IV. TEST PROCEDURES FOR CPEs

Type-approval testing for CPEs shall be done in accordance with the test procedures specified in Annex "II".

Section V. MEANS OF CONNECTION OF CPE TERMINALS TO PUBLIC NETWORKS

All single connection to the public switched telephone network (PSTN) shall be made through the standard USOC RJ11C jacks and plugs, described under Annex 3. Standard jacks

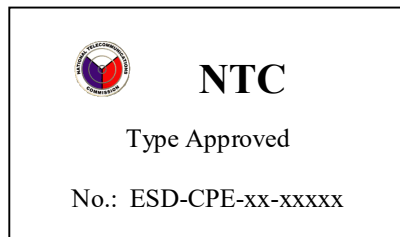
shall be so arranged that, if the plug connected thereto is withdrawn, no interference caused to the operation of any equipment at the customer's premises which remains connected to the public telecommunications network, shall occur by reason of such withdrawal.

Section VI. ADMINISTRATIVE PROCEDURES FOR TYPE APPROVAL OR TYPE ACCEPTANCE

1. Applicant shall file a type approval request (NTC prescribed application form) with the NTC or its accredited test laboratory and submit the following:
 - a. Certified copy of re-export bond if equipment is brought in on "no dollar import", CB clearances
 - b. Evidence of payment of import tax and other duties
 - c. Equipment manual, brochure, technical specifications and circuit diagram
 - d. Foreign test reports and type approval certifications
 - e. Manufacture's declaration of conformity with the CPE interface standards
 - f. Appropriate permits/clearances from NTC
2. Applicant shall pay the necessary type approval/acceptance fees to NTC or its accredited test laboratory. Applicant shall install the demo unit at the agency's laboratory. Should it be impractical to install a demo unit at the agency's laboratory, as in the case of large-sized equipment (such as PABX), the test may be done at the location of the equipment. Any test for PABXs and other large-sized equipment shall not be for a longer period to exceed thirty (30) working days, while for other equipment, the test shall have a maximum of fifteen (15) working days.
3. Applicant who intends to apply for type approval of another model in the same series of a previously type-approved equipment need not present the equipment for testing but should submit a complete technical manual of such equipment to determine whether the interface circuits are actually the same as the previously type-approved model of the same series. The type approval fee for such an equipment shall be one-half of the fee charged for the previously type approved equipment in the same series. However, if it is verified at the course of the evaluation of submitted technical manuals that it is still necessary to conduct tests on the equipment, the original type-approval fee shall be charged and type-approval tests shall be conducted accordingly.
4. The NTC or its accredited test laboratory shall then proceed to undertake the actual tests as per attached type approval test procedures mandated under Memo Circular 01-04-86 Section 2.d. Test results and all other submitted documents together with the filing fee

shall be forwarded by the testing laboratory to the NTC within five working days upon completion of tests for the issuance of the Type Approval Certificate. The agency shall also advise the applicant, within 5 working days after completion of tests, to retrieve that demo unit.

5. Equipment that has been type approved/accepted must be marked by a tamper proof label as describe below. Suppliers/Distributors are responsible for the production of their own labels subject for clearance from this Commission.



6. The Commission shall prepare a cumulative masterlist of all type approved/accepted CPEs including grandfathered equipment on a quarterly basis to include information such as the equipment type approval/acceptance number corresponding to the type approved/accepted equipment, date of approval and other information such as name of the grantee.

Section VII. PROVISIONS ON GRANDFATHERED CPEs

1. All CPEs and accessories type approved by a network operator prior to the effectivity of this memorandum order shall be considered type-approved unless equipment interface parameters are subsequently modified. These CPEs shall be considered as “grandfathered” and may be allowed continued connection to the same public network.
2. Any CPE legally connected to a public telecommunications network prior to this Circular may remain connected to the public telecommunications network without further type approval unless equipment interface parameters are subsequently modified.
3. A previously type approved CPE, brought into the country by a subscriber, shall need no further type approval and shall be deemed type approved and may be authorized for connection into the public telecommunications network provided that all required import duties and/or taxes due the government shall have been paid by the subscriber at the point of entry.

Section VIII. REPEALING CLAUSE

Any circular or memorandum, rules and regulations which am in conflict with this Circular shall be deemed superseded, amended or repealed.

Section IX. AMENDATORY CLAUSE

These type approval procedures and interface standards may be revised, amended or revoked, as may be necessary, taking into account advancements in telecommunications technology or when public safety and interest so requires

Section X. EFFECTIVITY CLAUSE

This memorandum circular shall be published once newspaper of general circulation in the Philippines, shall take effect fifteen (15) days after its publication, three certified copies furnished to the UP Law Center and shall remain valid unless otherwise amended, revised or revoked.

Quezon City, Philippines, 31 January 2001.

(SGD.) AURELIO M. UMALI
Deputy Commissioner

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Deputy Commissioner

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Commissioner

CPE INTERFACE STANDARDS

Section A. ELECTRICAL SAFETY REQUIREMENTS

Customer premises equipment operating with mains power supply shall comply with the following international safety standards:

- 1.1 **ITU/IEC 950: 1996** — Safety of Information Technology Equipment
- 1.2 **BS EN 41003: 1993** — Specification for Electrical Safety Requirement for Apparatus for Connection to Telecommunications Network.
- 1.3 **BS EN 60950: 1992** — Specification for Safety of Information Technology Equipment including Electrical Business Equipment
- 1.4 **BS EN 60065** — Specification for Safety Requirement for Main-operated Electronic and Related Apparatus for Household and Similar General Use.
- 1.5 **IJL 1950:1994** — Information Technology Equipment including Electrical Business Equipment
- 1.6 **PNS 256: 1999*** - Audio, Video and Similar Electronic Apparatus — Safety Requirement)

** This standard is identical to IEC 60065: 1998*

No repeated measurement for safety is to be done as long as manufacturer/distributor of the equipment certifies compliance to the above standards. However, in cases where PNS 256 is applied, visible inspection and insulation tests are to be performed between all power supply output wires to all tip and ring wires to public network.

Section B. ELECTROMAGNETIC COMPATIBILITY REQUIREMENTS (EMC)/RADIATION SAFETY STANDARDS

Customer premises equipment must show compliance with the internationally accepted standards for EMC and radiation safety such as follows:

1. CISPR22
2. EN55022
3. EN50082
4. EN6100-3-2/3
5. IEC 801-2/3/4

6. FCC CFR Title 47, Part 15
7. AS/NZS 3548
8. International Commission on Non-Ionizing Radiation Protection (ICNIRP): Guidelines for limiting exposure to time varying electric, magnetic and electromagnetic fields (up to 300 GHz)
9. EMC Directive 89/336/EEC
10. 1999/519/EC: Council Recommendation on the limitation of exposure of the general public to electromagnetic fields (0 to 300 GHz)
11. ETS 300 342-1: Electro Magnetic Compatibility
12. EN 301 419-1: Mobile Stations in the GSM 900 and DCS 1800 Bands: Access
13. ES 59005: Evaluation of Human Exposure, Specific Absorption Rate

Section C. NETWORK GENERAL REQUIREMENTS

1. Network Address Signaling

- 1.1 To assure accurate transfer of dial information to serving exchange, CPE's with dial-up capabilities shall comply with Network Address Signaling requirements.
- 1.2 CPE's shall be able to transmit Dial Pulse signals and/or Dual Tone Multi-Frequency signals.
 - 1.2.1 Dial Pulse Signaling is characterized by the interruption of the subscriber loop, thus, producing a train of pulses. The count of pulses in a pulse train represent a digit (0-9) of the dialed number.
 - 1.2.2 DTMF signaling is characterized by two (2) distinct frequencies, one each from a high group and a low group with maximum of four (4) frequencies for each group.
- 1.3 Dial Pulse signaling is currently being employed for electro-mechanical exchanges and Dial Pulse or DTMF for SPC - electronic and digital exchanges.
- 1.4 Dial Pulse Requirements
 - 1.4.1 Pulsing speed 10 ± 2 pps
 - 1.4.2 Percent break 50% - 70%
 - 1.4.3 Interdigit interval ≥ 500 rsec.
 - 1.4.4 Speech network shall be shunted or totally disconnected during dialing.
 - 1.4.5 Speech network shall be re-established immediately after completion of dialing.
 - 1.4.6 Spurious makes shall not occur during break intervals.

1.5 DTMF Requirements

- 1.5.1 Low Group Frequencies : 697; 770; 852; and 941 Hz.
 High Group Frequencies : 1209; 1336; 1477; and 1633 Hz.

- 1.5.2 Frequency Deviation : $\pm 1.8\%$

- 1.5.3 Distortion : 20dB below fundamental freq.

1.5.4 Signal Level at CPE

- a. Low Frequencies : 0.241 - 1005 V
 b. High Frequencies : 0.303 - 1.194 V
 c. Twist : 4dB (max.)

1.5.5 Signal timing for other than manually-keyed digits:

- a. Two-frequency signal duration : 50 msec., min.
 b. Interdigit interval : 45 msec., min./3 sec, max.
 c. Cycle Time : 100 msec., min.

2. Line Supervision

Exchange lines provided by the Network for CPEs are Loop Start lines.

Line seizure is characterized by an off-hook condition as defined by the DC-off-hook requirements specified in Section B4 of this standard.

Line disconnect is characterized by the transition from off-hook to on-hook condition. The on-hook condition is defined by the DC-on-hook requirements specified in Section B4 of this standard. During this idle condition, no power shall be drawn from the network operator.

Talk condition is characterized by an off-hook condition as defined by the DC-off-hook requirements in Section B4 of this standard. When answering an incoming call, the CPE shall not generate an on-hook signal for a period longer than 10 seconds except to generate a disconnect signal. A CPE, which has originated a call, shall not generate an on-hook signal for a period longer than 100 msec.

3. Exchange Lines

The following characteristics of the exchange lines are to be expected;

- 3.1 Feeding Voltage : 48-60 Vdc, 2x200 ohms
 or 60 Vdc, 2x400 – 500 ohms
 3.2 Line Resistance : 1900 ohms, max.

- 3.3 Line Impedance : 600 ohms; (900 ohms for PLDT)
- 3.4 Trunk Leakage Res. : 33 k-ohms, min.

4. DC Characteristics

- 4.1 On-hook DC resistance between tip and ring conductors and between each of the tip and ring conductors and earth ground shall be greater than 10 Meg-ohm for all DC voltages up to and including 100 Vdc.
- 4.2 The CPE should be able to operate with the minimum off-hook loop current of 17 mA, and a maximum loop current of 100 mA.
- 4.3 Off-hook dc resistance shall be within 90 ohms to 400 ohms.

5. AC Characteristics

- 5.1 On-hook tip-and-ring-to-ground impedance during ringing shall be greater than 1400 ohms at ring voltages and frequencies specified in Section B6 of this standard.
- 5.2 To prevent excessive ground current flow at commercial power frequencies, on-hook impedance shall exceed 20 k-ohms measured at tip-to-ground and ring-to-ground terminals at voltages up to 50 Vrms and frequencies from 60 to 600 Hz.

6. Ring Alerting Requirements

- 6.1 Ring alerting device must respond to incoming ring signals of 19 - 25 Hz and 35 - 110 Vac rms. From the exchange the ringing signal is superimposed upon the dc voltage of nominal 48 V or 60 volts.
- 6.2 Straight-line electro-mechanical or electronic ringers maybe employed.
- 6.3 Ring signal voltage at main-distribution-frame of the PSTN is rated to be 90 +/-20 Vac (rms) for a frequency of 19 - 25 Hz. Because of the loss caused by maximum loop attenuation and the distribution of loop current among extensions and annexed equipment, it is required that ring alerting devices must respond to incoming signals in the range of 35 to 110 Vac (rms.), measured at tip and ring wire of the CPE.
- 6.4 Ringer impedance at 20 Hz shall be at least 1400 ohms.

7. Ringer Equivalence Number (REN)

The sum of the ringer equivalence numbers of all equipment connected the same telephone line or loop shall not exceed 5. For the equipment under test the following measurements and computations are to be made:

- 7.1 Divide 50 MOhms by the smallest measured on-hook DC resistance at 100 Vdc.
- 7.2 Divide 7000 ohms by the actual measured ringer impedance at 70 Vrms, 20 Hz.

The highest value computed in 8.1 and 8.2 is the Ringer Equivalence Number (REN) of the instrument, which shall be visualized to customer in a numerical of two digits max. on type approval label of CPE

8. Transmit Signal Power Limitations

- 8.1 Signals transmitted by CPE into the telephone network shall not induce interference and cause crosstalk between adjacent transmission paths.

8.2 Secondary Pulse

During transition from off-hook to on-hook condition, the CPE shall not introduce unnecessary signal, which can be interpreted by the exchange as a pulse signal.

8.3 Voice Band Signals

Voice band signals other than voice and those intended for network address signaling, shall not exceed -9 dBm when measured across the terminals. In cases however when output level is variable, in no way shall signals when measured at the exchange exceed -12 dBm.

8.4 Out-of-Band Signals

The signal power output of CPE for frequencies above voice shall not exceed the following limitations.

4005 Hz to 10 kHz	-	-16 dBm,
10 kHz to 25 kHz	-	-24 dBm
25 kHz to 40 kHz	-	-36 dBm
40 kHz to 1 MHz	-	-50 dBm

8.5 Voice Band Impedance Match; Return Loss

To ensure stability of voice frequency transmission channels in the network, the return loss for all CPEs, measured against 600 ohm resistance, must exceed -4 dB for all frequencies from 200 Hz to 3200 Hz (Singing Return Loss or Stability Return Loss).

9. Hazardous Voltage Limitations

9.1 Connection of CPE shall not cause transmission of hazardous voltage into the network in order to ensure the safety of network personnel and subscribers, and to prevent damage and malfunction of network equipment.

9.2 The open circuit voltage when measured between equipment leads to telephone line shall not exceed 70 volts peak for more than 1 second.

10. Noise Limits

CPE-generated noise when measured across tip and ring terminals shall be 15 dB_{rnc} or less.

11. Means of Connection

All connections to the public telephone network shall be made through the standard USOC RJ11C jacks and plugs, as described in Annex 3. Standard jacks shall be so arranged that, if the plug connected thereto is withdrawn, there shall be no interference caused to the operation to any equipment at the customer's premises which remains connected to the telephone network, shall occur by reason of such withdrawal,

Section D. CORDED TELEPHONE SETS

Corded telephone sets are subject Sections A, B and C of Annex '1' of this Circular

1. Transmission Characteristics

1.1 Transmission Test Environment

Test Loop	:	4.57 Km
Wire Size	:	#26 awg
Loop Current	:	27 mA , $\pm 1\%$
Test Frequencies	:	833 to 1078 Hz

Source Signal Levels -

- a. Artificial Mouth: 94 ± 0.8 dBspl (relative to 20) micro Pascal at tip & ring
- b. Line (tip and ring) 0.251 volt (-12dBV)
- c. Handset Fixture: as defined in IEEE Standard 269: Method for Measuring Transmission Performance of Telephone Sets.

1.2 Transmit Response

With the 94 dBspl source signal fed to the transmitter via artificial mouth, the signal measured at the tip and ring conductors of test telephone shall fall within -33.5 dBV and -10.5 dBV.

1.3 Receive Response

With 0.251 Volt (-12dBV) source signal fed across tip and ring conductors, signal measured via artificial ear shall be between 79 dBspl to 95.5 dBspl.

1.4 Sidetone Response

With 94 dBspl source signal fed to transmitter through artificial mouth, signal measured via artificial ear shall fall within 68 dBspl to 94 dBspl.

- 1.5 High-amplitude electrical pulses (or voltage transients) present at the tip and ring terminals of test telephone shall not create excessive acoustic pressure at the telephone receiver. Compliance with this requirement prevents annoyance and possible auditory injuries in the part of telephone users. The peak pressure, however, shall not be so low as to interfere with the peaks of normal speech signals.

2. Dial Requirements

- 2.1 CPEs may have conventional rotary dials or keypads with associated dialers for the generation of dial pulse or DTMF signals.
- 2.2 Push button sets whether for dial pulse or DTMF signaling shall have a keypad layout preferably as shown below. Frequencies shown are for DTMF applications as standardized by ITU-T.

High Group Frequencies

	1209	1336	1477	1633
697	1	ABC 2	DEF 3	(a)
770	GHI 4	JKL 5	MNO 6	(b)
852	PQRS 7	TUV 8	WXYZ 9	(c)
	*	OPER 0	#	(d)

Low Group Frequencies

- 2.3 Keys in parenthesis are optional and are for DTMF sets only. These are reserved for special service features.
- 2.4 A telephone user should perceive a positive indication to determine that actuation of a keypad button has actually occurred.
- 2.5 Alphanumeric marking is preferred for pushbutton keypad and for rotary dial sets.

3. Ringer Characteristics

- 3.1 The telephone set shall be able to comply with the ring alerting requirements specified in Section B6 of this standard.
- 3.2 Straight-line electro-mechanical or electronic ringers may be employed.
- 3.3 Ringer impedance at 20Hz shall be at least 1400 Ohms

4. Electrical Stress and Overload Requirements

4.1 Dielectric Strength

Dielectric strength shall be measured between telephone terminals and item exposed to user (e.g., handset). The instrument shall be able to withstand a 5000Vdc voltage applied between line cord terminals and metal foil wrapped around handset without evidence of breakdown or leakage.

4.2 Insulation Resistance

The insulation resistance when measured with an Insulation Tester between line cord terminals and external metal surfaces exposed to user shall not be lower than 500 Meg-ohms.

Section E. CORDLESS TELEPHONE SETS

1. Cordless Telephone Sets shall meet the requirements for conventional telephone sets.
2. Transmit Frequency Ranges: 1.725 to 1.79 MHz or
27.515 to 27.715 MHz or
46.600 to 50.000 MHz
3. Base stations of cordless telephones are subject to Sections A, B and C of Annex "I" of this Circular.
4. Radiated power shall not exceed 5 mW.

Section F. PABX and KTS EQUIPMENT

1. Private Automatic Branch Exchange (PABX)

- 1.1 PABX is subject to Sections A, B and C of Annex "I" of this Circular
- 1.2 PABX with direct inward dialing (DID) feature shall receive either dial pulse (decadic) or DTMF dial signals specified as follows:
 - 1.2.1 Decadic

Dial Pulse Rate	-	8 to 12 pps
% Break	-	57 to 63%
Interdigit Time	-	≥300 msec
 - 1.2.2 DTMF shall comply with the network general requirements for DTMF dialing.
- 1.3 With the condition specified below and using 1000 Hz, 0 dB test tone, insertion loss measurements shall be 1.0 dB (maximum).
- 1.4 Applying 1000 Hz, 0dB test tone to one of the two adjacent PABX local to trunk connections, crosstalk attenuation measured from the other connection shall be maximum of 70 dB.

1.5 A measure of the impedance mismatch, Return Loss, between the PABX and the serving telephone exchange shall have the following value relative to the frequency range covered:

- | | | | |
|-------|--------------------------|---|--|
| 1.5.1 | Echo Return Loss, ERL | - | 14 dB (minimum)
(500 to 2500Hz) |
| 1.5.2 | Singing Return Loss, SRL | - | 6 dB (minimum)
(200 to 500 and 2500 to 3200 Hz) |

2. Key Telephone Systems (KTS)

2.1 KTS is subject to Sections A, B and C of Annex "I" of this Circular.

2.2 Crosstalk attenuation shall be the same as in PABX,

2.3 A measure of the impedance mismatch (Return Loss) between the KTS and the serving telephone exchange shall have the following values relative to the frequency range covered:

- | | | | |
|-------|--------------------------|---|--|
| 2.3.1 | Echo Return Loss. ERL | - | 7dB (minimum)
(500 to 2500 Hz) |
| | Singing Return Loss, SRL | - | 3.5 dB (minimum)
(200 to 500 and 2500 to 3200 Hz) |

Section G. Cellular Mobile Telephone System (CMTS) and/or Public Mobile Telephone Systems (PMTS) Subscriber Units

1. General Characteristics

1.1 Accepted Common Air Interface (CAI) Standards:

AMFS/NAMPS, TAGS, TDMA, GSM, GDMA, and Other standards based on ITU Recommendations which may be developed and accepted in the future as a result of new technologies and services.

1.2 Frequency Range: Subject to the frequency allocation by this Commission

2. Receiver Characteristics

2.1 Sensitivity shall be -116 dBm (12dB SINAD) or better

2.2 Adjacent Channel Selectivity shall be greater than or equal to 65Db.

- 2.3 Spurious Rejection shall be greater than or equal to 65 dB
- 2.4 Intermodulation Rejection shall be greater than or equal to 60 dB.
- 2.5 Audio Distortion shall be less than -26 dB.
- 2.6 Hum and Noise shall be greater than or equal to 45dB.

3. Transmitter Characteristics

- 3.1 The R.F. power output shall not exceed 3 watts (34.77 dBm).
- 3.2 The Spurious Emission shall be greater than or equal to 45 dB below the carrier.
- 3.3 Hum and Noise shall be greater than or equal to 32 dB.
- 3.4 Audio Distortion shall be less than -26 dB.
- 3.5 Frequency Stability shall be 2.5 kHz, ± 2.5 ppm.

Section H. Fixed Wireless Access Subscriber Terminal

1. General Characteristics

- 1.1 Accepted Common Air Interface (CAI) Standards

: PHS, DECT, TDMA, GSM, COMA, and
 : Other standards based on ITU Recommendations which may be developed and accepted in the future as a result of new technologies and services.

- 1.2 Frequency Range : subject to frequency allocation by this Commission.
- 1.3 Radiated power shall not exceed ± 28 dBm per channel.
- 1.4 Receiver Sensitivity : -86 dBm at BER 10^{-3} or better
 : -73 dBm at BER 10^{-5} or better

Section I. Wireless Paging Equipment

1. General Characteristics

- 1.1 Accepted Common Air Interface (CAI) Standards:

: POCSAG, FLEX, and
 : Other standards based on ITU Recommendations which may be developed and accepted in the future as a result of new technologies services.

- 1.2 Frequency ranges: 149 .000 to 157.000 MHz
 279.000 to 281.000 MHz
 445.500 to 446.000 MHz
 929.000 to 932.000 MHz

2. Alphanumeric Paging Receiver Characteristics

2.1	Paging Sensitivity	:	5 μ V/m (Front) at 512 BPS
		:	7 μ V/m (Front) at 1200 BPS
		:	11 μ V/m (Front) at 1200 BPS
2.2	Frequency Stability	:	± 5 ppm (-10°C to +50°C)
2.3	Selectivity	:	More than 60 dB at ± 25 KHz
2.4	Spurious Rejection	:	50 dB
2.5	Image Rejection	:	40 dB

3. Numeric Paging Receiver Characteristics

3.1	Paging Sensitivity	:	25 KHz
3.2	Frequency Stability	:	0.001% (-10°C to 50°C)
3.3	Selectivity	:	More than 70 dB at ± 25 KHz
3.4	Spurious Rejection	:	More than 55dB
3.5	Image Rejection	:	More than 55dB
3.6	Signal Format	:	NEC D3 Standard

Section J. Data Communications Equipment (DCE)/Data Terminal Equipment (DTE)

1. General Characteristics

- 1.1 Accepted standards: ITU-T/ANSI standards, and Other standards based on ITU Recommendations which may be developed and accepted in the future as a result of new technologies and services.
- 1.2 DCE/DTE is subject to Sections A, B and C of Annex "I" of this Circular.

2. Transmission Speed

Due to the diversity of types of the network's switching equipment, the recommended data transmission speeds vary in relation to the type of equipment involved in the connection process.

3. Equipment Impedance

3.1 Terminating Impedance

To minimize interference and optimize power transfer, the equipment shall present terminating line impedance, which is identical to the serving exchange.

3.2 Ringing Impedance

During the application of simulated ringing signal, the impedance shall not be less than 1000 ohms. Impedance to ground shall not be less than 100 kilo ohms.

3.3 Impedance Balance

The minimum acceptable impedance balance ratio shall be 46dB.

4. Equipment Design Requirements

4.1 Safety Requirements

4.1.1 Hazardous voltages internal to the equipment must be isolated from the point of attachment by at least one of the following barriers, which may be located within the equipment or interfaced between the attachment and the line:

- a. Isolating Transformers
- b. Isolating Capacitors
- c. Isolating Relays or Switches

4.1.2 The equipment shall have an earth connection. Main supply plugs shall have protection earth lead and shall be plugged into appropriate convenience outlets. All metal works of the equipment not required to carry current must be connected to protection earth.

4.2 Protection of Equipment

Users, suppliers, and manufacturers are advised to consider the need to protect their equipment from transient and prolonged voltages, which are normal functional characteristics of the telephone network.

4.3 Fail-Safe Operation

In the event of power failure, or incorrect manual operation, the equipment shall immediately release the engaged telephone line and shall revert to the normal free condition (on-hook) upon the restoration of power.

4.4 Self-Test Feature

Users, vendors, and manufacturers are advised to consider the need for self-test capabilities in their equipment to facilitate isolation of trouble to either equipment side or network side.

4.5 Equalization

To compensate for cable attenuation and envelope delay distortion, compromise equalization for medium-speed data transmission (2400 bits per second and below) or automatic equalization for high-speed transmission should be considered.

Section K. ANSWERING MACHINES

1. Answering machines/devices are subject to Section A, B and C Annex "I" of this Circular except for Section C1 (Network Address Signaling).
2. At least one (1) but not more than four (4) ringing cycles shall be completed before the answering machine goes off hook to answer an incoming call.
3. The answering machine shall wait for at least two (2) seconds after going off hook before starting the transmission of recorded message.

Section L. Global Mobile Terminal Equipment

1. Accepted standards : ETSI TBR 41
 : Technical Basis for Regulation on Satellite Personal Communications Networks (S-PCN) Mobile Earth Stations (MESs), including handheld ear for S-PCN in the 1, 6/2, 4 GHz bands under the Mobile Satellite Service (MSS); Terminal Essential Requirements.
 : Other standards based on ITU Recommendations, which may be developed and accepted in the future as a result of new technologies and services.
2. Frequency ranges: Subject to the frequency allocation by this Commission.
3. Applicants shall provide the manufacturer's declaration of compliance to relevant global standards based on ITU Recommendations.

Section M. Very Small Aperture Terminal (VSAT) Equipment**1. ANTENNA****1.1 Cross-Polarization**

- 1.1.1 The transmit antenna polarization must be adjusted with the angle which maintains a cross polarization of at least 30 dB low the co-polarized component with the -1 dB contour of the main beam on any assigned channel.
- 1.1.2 Sidelobe performance for the transmit antennas: the sidelobe performance of the antenna must conform to ITU-RS.580-5 and 465-5.

2. CARRIER SPECTRAL SIDELOBE

- 2.1 The spectral sidelobes of each transmitted digital carrier shall be more than 25 dB from the spectral mainlobe when it falls outside the user's bandwidth.
- 2.2 Off-beam emissions shall not exceed the limits set by ITU-RS.524-5

3. CARRIER POWER STABILITY

- 3.1 EIRP value shall not exceed 0.5dB compared to the nominal value in clear weather condition
- 3.2 VSATs operating in Ku band, Ka bands must have uplink power control.

4. OFF-BAND SPURIOUS EMISSION

The EIRP outside of the user's bandwidth which result from spurious tones, bands of noise or undesirable signals, except intermodulation products, shall not exceed 4 dBW in any 4 KHz band within the operating frequency range.

Section N. ADVANCED CPEs

Advanced CPEs are those that make use of wireless and wired digital interfaces different from the interface parameters described in Section C.

Applicants shall provide the manufacturer's declaration of compliance or conformity to relevant internationally accepted standards based on ITU Recommendations. Advanced CPEs may include, but not limited to, the following:

- a. Integrated Services Digital Network (ISDN) terminal equipment
- b. Multimedia terminal equipment
- c. Call distribution terminal equipment
- d. Videophone terminal equipment
- e. Interactive voice response terminal equipment
- f. Third Generation (3G) mobile terminal equipments

Section 0. DEFINITION OF TERMS AND ACRONYMS

AMPS	-	Advanced Mobile Phone System
ANSI	-	American National Standards Institute. A US national standard body that coordinates the setting and approval of some US standards.
CDMA	-	Code Division Multiple Access
DECT	-	Digital European Cordless Telecommunications
DTMF	-	Dual Tone Modulated Frequency. A way of representing information as pairs of tones.
EIRP	-	Effective Isotropic Radiated Power
FLEX	-	Flexible High Speed Paging
GMPCS	-	Global Mobile Personal Communications by Satellite
GSM	-	Global System for Mobile Communications
ISDN	-	Integrated Services Digital Network
ITU	-	International Telecommunications Union. The United Nations agency responsible for international telecommunication regulation. Formerly CCITT
ITU-R	-	ITU Radio Communications Sector
ITU-T	-	ITU Telecommunications Sector
NAMPS	-	Narrow-Band Analogue Mobile Phone System
OFF-HOOK	-is the	signal that the telephone receiver has been lifted. Originating off-hook activates a dial tone on switched networks.
PHS	-	Personal Handy Phone System
POCSAG	-	Post Office Code Standardization Advisory Group
PSTN	-	Public Switched Telephone Network
TACS	-	Total Access Communications System
TDMA	-	Time Division Multiple Access
SPC	-	Signaling Point Code
VSAT	-	Very Small Aperture Terminal