वर्गीय आवश्यकताएँ

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GENERIC REQUIREMENT

No. : TEC/GR/SW/PBX-IP/01/MAR 2015

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IP PRIVATE AUTOMATIC BRANCH EXCHANGE (IP PABX)

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FOREWORD

Telecommunication Engineering Centre (TEC) functions under Department of Telecommunications (DOT), Government of India.

Its activities include:

- Issue of Generic Requirements (GR), Interface Requirements (IR), Service Requirements (SR) and Standards for Telecom Products and Services
- Field evaluation of products and Systems
- National Fundamental Plans
- Support to DOT on technology issues
- Testing & Certification of Telecom products

For the purpose of testing, four Regional Telecom Engineering Centers (RTECs) have been established which are located at New Delhi, Bangalore, Mumbai, and Kolkata.

ABSTRACT

This document specifies the Generic Requirements (GR) of an IP PABX connected to the IP interface of Indian Telecom Network. This document covers the Generic Requirements of IP PABX system for supporting speech communication, data communication and multi-media applications. It covers IP PABX facilities, features and its performance requirements.

CONTENTS

HISTORY SHEET

Sl. No.	GR No.	Title	Remarks
1.	TEC/GR/SW/PBX-IP/01/ MAR 2015	Generic Requirement for IP PABX	Issue 01

REFERENCES

S. No.	Document No.	Title/Document Name
(I)	TEC GR/IRs	
1.	TEC/EMI/TEL-001/01/FEB-09	EMI/EMC Standards
(II)	ITU Standard/Recommendations	
1.	ITU-T G.703	Physical/electrical characteristics of hierarchical digital interfaces
2.	ITU-T G.711	Pulse code modulation (PCM) of voice frequencies
3.	ITU-T G.726	Coding of analogue signals
4.	ITU-T G.729	Coding of voice and audio signals
5.	ITU-T T.38	Procedures for real-time Group 3 facsimile communication over IP networks
6.	ITU-T H.264	Advanced video coding for generic audiovisual services
(III)	IETF Recommendations	
1.	RFC 791	IPv4
2.	RFC 2460	IPv6
(IV)	Other Standards	
1.	CISPR 11	Limits and methods of measurement of radio disturbance characteristics of industrial, scientific & medical (ISM) radiofrequency equipment
2.	CISPR 22	Limits and methods of measurement of radio disturbance characteristics of ITE
3.	EN 55011	Industrial, scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement
4.	EN 55022	Information Technology Equipment - Radio disturbance characteristics - Limits and methods of measurement
5.	IEC/EN 61000-4-2	Testing and measurement techniques – Electrostatic discharge immunity test
6.	IEC/EN 61000-4-3	Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test
7.	IEC/EN 61000-4-4	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test

| 8.	IEC/EN 61000-4-5	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
9.	IEC/EN 61000-4-6	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
10.	IEC/EN 61000-4-11	Electromagnetic compatibility (EMC) Part 4-11: Testing and measurement techniques Voltage dips, short interruptions and voltage variations immunity tests
11.	IS 10437 / IEC 60215	Safety requirements for radio transmitting equipment
12.	IS 13252 / IEC 60950	Information Technology Equipment -- Safety, Part 1: General Requirements

CHAPTER-1

1.0   Introduction

1.1   This document specifies the Generic Requirements (GR) of an IP-PABX connected to IP interface of Indian Telecom Network. This document covers the Generic Requirements of IP-PABX for supporting speech communication, data communication and multi-media applications. It covers IP-PABX facilities, features and its performance requirements.

1.2   This GR is intended to facilitate the verification of the capability of the equipment for correct operation and satisfactory inter-working with the IP interface of Indian Telecom Networks.

1.3   Approval of equipment against this GR, shall not be construed as an authorization to evade surreptitiously, regulations including toll-bypass concerning the use of telecom services. Functioning or intended use of the equipment shall conform to the prevailing laws/regulation/instructions of Govt. of India.

1.4   Approval of PABX against this GR, does not entitle the user to connect the equipment to the network of Internet Service Provider's (ISP).

1.5   For all ITU–T/IEEE recommendations, IETF RFC's, TEC standards/specification and other standards referred in this document, the latest release/issue with all associated amendments, addendum and corrigendum shall be applicable. The interpretation of clauses of RFC's shall be as per RFC2119.

1.6   All the requirements described in chapter 2 of this document are suggestive requirements and shall be decided by the purchaser at the time of procurement/ tender as per his requirements. However, the requirements described in Chapter-2 will not be tested/ verified by TEC.

2.0   Description

2.1   IP-PABX can be a single box or multiple box entities. The system (IP PABX) may consist of different types of entities such as SIP server/Call Server/Call manager, Media Manager etc. LAN switch may or may not be part of IP PABX systems. This GR does not specify the LAN switch capabilities. (A typical block diagram of IP PABX system is shown in Figure-A.1)

Figure-A.1
(Simple Block Diagram)
IP-PABX System
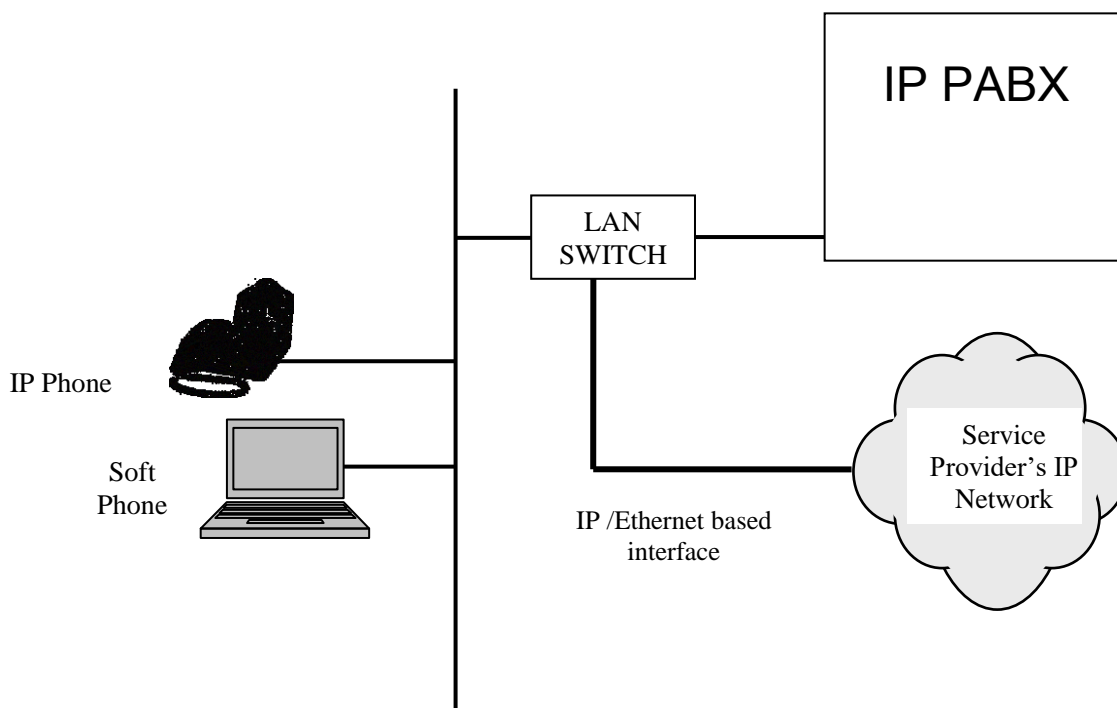
2.2   The system shall be easy to administer from a single administrative point.

3.0   Functional/Operational Requirements

The IP PABX system shall have the following various types of functional/ operational requirements and facilities.

3.1   The system shall support IP entities.

3.2   The system shall allow direct registration/profile creation of IP endpoints onto it and perform all functions of Proxy/ Registrar/Redirect etc.

3.3   The system architecture shall allow for incremental application without modification to existing feature.

3.4   **Addressing:** The PABX shall support IP addressing as per version 4 (IPv4) as well as version 6 (IPv6). It shall have the capability to inter-work with IP networks supporting IPv4 as well IPv6.

3.5   **Management Functionalities:**

3.5.1 The IP PABX system shall be manageable through a management interface. This interface may be built in the system or may be a standalone application. IP PABX shall provide Graphical User Interface (GUI), for system management & maintenance.

3.5.2 The management platform shall support following management functions:

3.5.2.1 **Configuration Management** - The management system must be able to configure various services, users, class of service for all users, all system parameters and features. The management platforms must provide different levels for accessing the system based on the role being played by the user who is accessing the system. The administrator shall have the highest authority.

3.5.2.2 **(a) Call Detail Record** - IP PABX shall provide Call Detail Record (CDR) for all calls i.e. intra-PABX calls as well as calls to/from Public network. Facility shall exist to take a print out for each individual extension.

(b) At least the following information shall be given in a CDR:

    i   Type of call (originating or terminating)

    ii Date and time of answer (in case of successful call)

    iii Calling subscriber identity.

    iv Socket Address i.e. Port no. & IP address of calling subscriber.

    v Incoming/Outgoing junction number

    vi Number dialled by the calling subscriber i.e. called number

vii Duration of conversation in multiple of seconds.

viii Indication of Type of supplementary services used during the call (e.g. normal call, conference call, call forwarding etc.).

ix Redirecting number in case of call forwarding.

(c) Provision shall exist for storing the CDR data on the system and transfer the same on any other external device/system. Applicant shall declare the CDR storing capacity of the system.

(d) Applicant shall supply the required information in the human readable format and the 'data structure' to monitoring agencies. Required software may be part of the PABX system or may be supplied as an external entity. Neither it shall be possible to edit the CDR file nor, it shall be possible to delete the file from the system.

3.5.2.3 **Interface to Directory Services:** It shall be possible to connect PABX system to any LDAP protocol based server to get the directory information. PABX shall use any standard directory protocol (LDAP etc.) or propriety protocol to send the directory to its IP phone users.

3.5.2.4 **Faults and Alarm** - The offered Management platform shall have provision for storing all alarm and event messages date wise in a separate file and shall have the capacity to analyze the same. It shall also be possible to access/route these faults and alarm messages on any of the operator console/ maintenance terminal.

3.5.2.5 **Performance Management –**

(a) Processor Occupancy Report: The system shall offer processor occupancy report indicating the CPU usage, memory usage and uptime.

(b) Performance of Operators: The offered management platform shall indicate the stats regarding the Number of calls assigned to the operator and number of calls cleared and number of calls dropped etc. (Optional)

(c) Performance Reporting: The management platform shall be able to generate reports in terms of error reports and alarm reports. It shall be possible to export information on to an excel format.

(d) The management platform shall be able to interact with the Call control server for all backup related services. It shall be possible to keep back-up or archive of the system on any external device/system.

(e) The management system shall be compliant to SNMP v3 or the latest version.

3.6   It shall be possible to make intra PABX calls as well as calls to/from Public network.

3.7   The calls within PABX system shall be switched without using link with Indian Telecom Network. Intra-PABX calls shall not be affected in case of failure link to Indian Telecom Network.

3.8   It shall be possible to make calls to emergency numbers (e.g. 100, 101, 102 etc.) and IN calls from any type of IP extensions. PABX shall support transmission of DTMF (as per RFC 2833 or SIP INFO) in the post dial scenario.

3.9   **Command log**

Commands which are used for modification of PABX program or data shall be stored in the system. Provision shall exist for storing the command log/history log on the system or any other external device/system. It shall not be possible to modify or delete log file. Applicant shall declare the storing capacity of log file in the system.

3.10   **System back-up-** It shall be possible to save system back-up/history log in the system hard disk. In addition, it shall also be possible to save system back-up/ system log in external device/system. It shall also be possible to load the system from system back-up.

4.0 **Interface Requirements-** IP PABX system shall interface to user terminals on one side and IP network of service provider on the other side (as shown in figure-1)

Section (A): For Extensions Side

4.1 IP-PABX system shall support SIP terminal. Applicant may seek type approval for one or both type(s) of extensions given below:-

  i. SIP Hard Phone

  ii. SIP Soft Phone

4.2 SIP hard phone shall be connected to IP-PABX using RJ45 connector. (Applicable only if applicant has sought approval for SIP hard phone).

4.3 It shall be possible to load SIP phone software client on any PC. (Applicable only if the applicant has sought approval for SIP soft phone).

4.4 **Signaling/Protocols between User terminal (IP Phone) & IP-PABX:**

4.4.1 Signalling between SIP phone and IP-PABX shall comply to the following RFCs.

S.No	Document No.	Title
1	IETF RFC 3261	SIP: Session Initiation Protocol
2	IETF RFC 3262	Reliability of Provisional Responses in the Session Initiation Protocol (SIP)
3	IETF RFC 3263	Session Initiation Protocol (SIP): Locating SIP Servers
4	IETF RFC 3389	Real-Time Transport Protocol (RTP) Payload for Comfort Noise (CN)
5	IETF RFC 2327	SDP: Session Description Protocol
6	IETF RFC 1034	Domain names – Concepts and Facilities
7	IETF RFC 2782	A DNS RR for specifying the location of services (DNS SRV)
8	IETF RFC 2833	RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals
9	IETF RFC 2915	The Naming Authority Pointer (NAPTR) DNS Resource Record
10	IETF RFC 2916	E.164 number and DNS
11	IETF RFC 2326	Real Time Streaming Protocol (RTSP)

12	IETF RFC 768	User Datagram Protocol (UDP)
13	IETF RFC 1889 & 1890	Real Time Protocol (RTP)
14	IETF RFC 3550 & 3551	Real Time Transport Protocol (RTCP)
15	IETF RFC 793	Transmission Control Protocol (TCP)
16	IETF RFC 3761	E.164 Uniform Resource Identifier (URI) Dynamic Delegation Discovery System (DDDS) Application (ENUM)
17	IETF RFC 3311	The Session Initiation Protocol (SIP) UPDATE Method
18	IETF RFC 2806	URL'S (Uniform Resource Locator)for Telephone calls
19	IETF RFC 3265	Session initiation Protocol (SIP) – Specific Event Notification

4.4.2 Signaling between IP PABX system and SIP Phone shall be encrypted using TLS (Transport Layer Security) Protocol.

4.4.3 System shall support SRTP (Secure Real-time Transport Protocol) as per IETF RFC 3711 to provide confidentiality, message authentication, and reply protection to the control traffic for RTP, the Real-time Transport Control Protocol (RTCP).

Section (B): For IP link toward public network

4.5 SIP interface shall be used for connecting IP-PABX system with IP interface of IP interface of Indian Telecom network.

4.6 IP interfaces of the system shall be configured without any external adapter. Ethernet connections used shall be in conformity to the recommendations of IEEE 802.3.

4.7 The physical interfaces (Ethernet connections used) shall consist of 10/100 Mbps Base-T Fast Ethernet or Gigabit Ethernet over twisted pair, coaxial or Fiber (as per IEEE, 802.3u/ IEEE 802.3z). Category 5 cables/ Category 6 cable/8P8C modular connector shall be used.

4.8 It shall be possible to connect IP PABX to IP network of Telecom Service Provider through Session Border Controller (SBC).

4.9 At Layer 2, Ethernet 802.1p/Q standards define the bit markings of Ethernet packet header which are used to prioritize packets at Layer 2.

4.10 At Layer 3, IP standard DiffServ defines bit markings in the Type-of-Service (TOS) fields in the IP header, which will identify a packet to be associated with a specific service. On IP equipment end-to-end, these services can be administered.

4.11 IP PABX shall support T.38 for FAX Connections over IP Networks.

4.12 The system shall support Network Time Protocol as per RFC 1305 to synchronies the system date and time with network devices.

4.13 **Signaling between IP-PABX system & Service provider's Network**

Signalling between PABX and Service provider's network (e.g. Soft-switch) shall be as per clause no. 4.4.1

5.0   Quality Requirements: (For voice calls between IP extension and Public network)

5.1   PABX shall support RTCP-XR protocol for monitoring real time VoIP voice quality.

5.2   **Codec**

i.   The interface shall support the procedures for Codec negotiation, in association with the switching Node of Indian Telecom Network. It shall support G.711, G.726 and G.729 codec as per ITU-T recommendations and shall cater for at least 3.4 KHz bandwidth.

ii.   Video Codec for video calls/ data shall be as per ITU-T standard H.264.

iii. Applicant may apply for additional codec supported and the same may be mentioned in the approval certificate after testing.

iv.   The Codec modification procedures shall also be provided, wherein the Codec selected for a call can be modified in any direction and at any time during the active phase of the call.

v.   Any voice processing functions shall not interfere with transparent interchange of FAX signals.

6.0   EMI/EMC Requirements

Electromagnetic Compatibility (EMC) Requirements:

The equipment shall conform to the following EMC requirements for Class A. 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 an accredited test laboratory.

a) Conducted and radiated emission (applicable to telecom equipment):

Name of EMC Standard: "CISPR 22 {2005} with amendment 1 (2005) & amendment 2 (2006) - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment".

Limits:-

i)   To comply with Class A of CISPR 22 {2006}

ii) The values of limits shall be as per TEC Standard No. TEC/EMI/TEL-001/01/FEB-09.

b) Immunity to Electrostatic discharge:

Name of EMC Standard: IEC 61000-4-2 {2001) "Testing and measurement technique of Electrostatic discharge immunity test".

Limits: -

a. Contact discharge level 2 {± 4 kV} or higher voltage;

b. Air discharge level 3 {± 8 kV} or higher voltage;

c) Immunity to radiated RF:

Name of EMC Standard: IEC 61000-4-3 (2006) "Testing and measurement techniques-Radiated RF Electromagnetic Field Immunity test"

Limits:-

i)   Under Test level 2 {Test field strength of 3 V/m} for general purposes in frequency range 80 MHz to 1000 MHz and

ii) Under test level 3 (10 V/m) for protection against digital radio telephones and other RF devices in frequency ranges 800 MHz to 960 MHz and 1.4 GHz to 6.0 GHz.

d) Immunity to fast transients (burst):

Name of EMC Standard: IEC 61000-4-4 {2004}   "Testing and measurement techniques of electrical fast transients/burst immunity test"

Limits:-

Test Level 2 i.e.   a) 1 kV for AC/DC power lines;

b) 0. 5 kV for signal / control / data / telecom lines;

e) Immunity to surges:

Name of EMC Standard: IEC 61000-4-5 (2005) "Testing & Measurement techniques for Surge immunity test"

Limits:-

i) For mains power input ports : (a)1.0 kV peak open circuit voltage for line to ground coupling (b) 0.5 kV peak open circuit voltage for line to line coupling

ii) For telecom ports : (a) 0.5 kV peak open circuit voltage for line to ground (b) 0.5 KV peak open circuit voltage for line to line coupling.

f) Immunity to conducted disturbance induced by Radio frequency fields:

Name of EMC Standard: IEC 61000-4-6 (2003) with amendment 1 (2004) & amendment. 2 (2006) "Testing & measurement techniques-Immunity to conducted disturbances induced by radio- frequency fields"

Limits:-

Under the test level 2 {3 V r.m.s.} in the frequency range 150 kHz-80 MHz for AC / DC lines and Signal /Control/telecom lines.

g) Immunity to voltage dips & short interruptions

(applicable to only ac mains power input ports, if any):

Name of EMC Standard: IEC 61000-4-11 (2004) "Testing & measurement techniques-voltage dips, short interruptions and voltage variations immunity tests"

Limits:-

a. a voltage dip corresponding to a reduction of the supply voltage of 30% for 500ms (i.e. 70 % supply voltage for 500 ms)

b. a voltage dip corresponding to a reduction of the supply voltage of 60% for 200ms; (i.e. 40% supply voltage for 200ms) and

c. a voltage interruption corresponding to a reduction of supply voltage of > 95% for 5s.

Note: For checking compliance with the above EMC requirements, the method of measurements shall be in accordance with TEC Standard No. TEC/EMI/TEL-001/01/FEB-09 and the references mentioned therein unless otherwise specified specifically. Alternatively, corresponding relevant Euro Norms of the above IEC/CISPR standards are also acceptable subject to the condition that frequency range and test level are met as per above mentioned sub clauses (a) to (g) and TEC Standard No. TEC/EMI/TEL-

001/01/FEB-09.The details of IEC/CISPR and their corresponding Euro Norms are as follows:

IEC/CISPR	Euro Norm
CISPR 11	EN 55011
CISPR 22	EN 55022
IEC 61000-4-2	EN 61000-4-2
IEC 61000-4-3	EN 61000-4-3
IEC 61000-4-4	EN 61000-4-4
IEC 61000-4-5	EN 61000-4-5
IEC 61000-4-6	EN 61000-4-6
IEC 61000-4-11	EN 61000-4-11

The manufacturer / supplier shall submit a test certificate and test report from test agency. The test agency for EMI/EMC compliance shall be an accredited one and details of accreditation shall be submitted.

7.0 Safety Requirements

7.1 The equipment shall conform to IS 13252 part 1:2010- "Information Technology Equipment – Safety- Part 1: General Requirements" [equivalent to IEC 60950-1 {2005} "Information Technology Equipment –Safety- Part 1: General Requirements" and

IS 10437 {1986} "Safety requirements for radio transmitting equipments" [equivalent to IEC 60215].

A test certificate and test report shall be furnished from a test agency.

The test agency for safety requirements tests shall be an ISO 17025 accredited agency and details of accreditation shall be submitted.

8.0   Security Requirements

8.1.   System shall be configured in such a way that it does not support direct, externally initiated, connections via HTTP, telnet, FTP, TFTP or any other protocol as means to prevent distributed Denial of Service attack exploitation.

8.2.   Security measures such as user account, user's password, equipment authentication & registration information shall be transmitted in the secured form.

8.3.   **System Access:**

i   Suitable safeguards shall be provided in the programs to debar unauthorized persons from making any changes in the memory contents or office data. Access to system operations shall be controlled through multi-level password and authentication checks.

ii   The man-machine communication programs shall have the facility of restricting the use of certain domain.

iii   System must support session log out timing with configurable time periods.

iv   The system must support to restrict some commands for particular user.

v   Operator/Maintenance console shall be GUI based. Necessary software package to prevent loading of any unauthorised software or driver on the I/O terminal (without specific authorisation from PC administrator) shall be provided.

vi   The system must support password encryption, usage of AES (Advanced Encryption System)-128 Bit algorithm for password encryption and shall be kept in # form.

8.4   The protection of signaling connections over IP by means of authentication, Integrity and encryption shall be carried out using TLS (Transport Layer Security Protocol)

8.4.1   System shall be able to encrypt the Control signaling also associated with the IP Calls with a minimum of AES 128 bit.

8.4.2   All management traffic between the remote console/session and Call control server shall be encrypted (SSH for Direct Command Line Sessions, Interface, https (SSL) for Web Sessions, SFTP for File Transfer Etc.).

8.4.3   The administrator logging on to the call control server needs to authenticate by suitable mechanism such as User Login Information and Passwords/ Radius Server.

9.0 Various requirements of the category/configuration of the product for testing

Applicant can apply any one or both type(s) of extension(s)

  a. SIP Hard Phone
  b. SIP Soft Phone

CHAPTER-2

10   **Information for the procurer of product:** The various functions/facilities/ features described in this chapter are comprehensive and suggestive which may be useful. These need not be treated as mandatory for the product. However, the purchaser will select the functions/ facilities/features of PABX as per his requiremets at the time of procurement/ tendering.

The functions/ facilities/ features described in this chapter will not be tested/ verified by TEC

10.1   **General**

10.1.1   The system architecture should be so designed that it enables expansion/ upgradation of the system without any compromise with existing features/ functionality.

10.1.2   The system software should be modular so that any functionality can added or removed without disturbing the other functionalities.

10.1.3   System should support MLPP feature.

10.2   **System Redundancy:**

10.2.1   The System redundancy (Optional): The system should support duplicated Control Unit in Hot standby mode.

10.2.2   The standby server should be in automatic synchronization with active server and should take over the database and telephony functions seamlessly in case of failure of main active server without need of manual configuration & administration.

10.2.3   It should be possible to reach the ultimate capacity of the PABX without any degradation of PABX system.

10.2.4   The system should adopt active/standby mode, load sharing and redundancy configuration for the servers and optimizes fault detection and isolation techniques of the faults.

10.2.5   Authorization Code: Every user may have own authorization code to make outgoing calls thereby ensuring no misuse of the system. System shall give the user complete flexibility to dial his Personal Identification number/ authorization code from any location by dialing authorization code and shall be able to use all his facilities. All call made from other location by dialing authorization code may

be billed against authorization code and not against extension number.

10.3   **System Security:-**

a.   The System must support Syslog services for command and configuration control accounting with a minimum of 5 day history.

b.   Internal OS controls for remote point of access restriction and service availability

c.   Account access authentication/restriction at different levels shall be provided so as to prevent unauthorized access or interference to services, calls, protocol and data.

10.4   **Maintenance Console:**

10.4.1 The offered system should be provided with a PC based and software up-gradable maintenance console.

10.4.2 System administration should be password protected with notification of security violations.

10.4.3 System should be capable of maintenance facility from a central location over LAN within the enterprises.

10.4.4 The system management should enable administrator to navigate, display, add modify and/or remove the system and related switch components. The system management should enable administrator to allocating, changing and removing any fuser's facility on any extension number.

10.4.5 The system should support fault diagnosis.

10.4.6 Call statistic reports as required should be available on the monitor as well as printouts. The formats of printouts should be programmable

10.5   **Auto-attendant:** This is the part of the system that initially answers the incoming calls, eliminating the need for a full-time receptionist. Callers hear a custom business greeting, and then are given options for routing their calls.

10.6   **Diagnostic programs to localise faults:** On a faulty condition, the software shall provide for locating the faulty subsystem.

10.7   **Power Supply:** Purchase should specify any one of the following option for power supply

Option 1: The equipment should be capable of working with –40 V to –57 V. D .C. input from power supply. Switching mode Power Supply (SMPS) battery Power supply and battery should be modular and expandable to support the ultimate equipment configuration.

Option 2: AC Mains supply of 220 Volts with a tolerance of -15% to + 10% would be available. The frequency may be 50 Hz $\pm$ 2 Hz.

Purchase may specify the power requirement as per option 1 or 2.

10.8   **Day and night modes-** IP PABX system acts differently after business hours. This feature allows the system to route incoming calls depending on the current time of day. One may have several after-hours options, available at the click of a button:

(a)   Change the greeting callers hear, but leave the system fully active. Callers will know that business hours are over, but may still try to connect to an extension. With follow-me calling, answering options and voicemail each extension can decide if he wants to continue to take calls or simply collect messages.

(b)   Change the greeting and send all calls to voicemail. Called umber shall know that messages have been recorded through notification features.

(c)   Leave the system in full operation, or put it back when the office opens again.

10.9   **User Facilities**

IP PABX shall provide the following facilities/services for all types of extensions:

10.9.1   O/G Call Restriction – Administrative controlled

10.9.2   O/G Call Restriction – Subscriber controlled

10.9.3   Automatic Alarm Call service (Wake-up-call)

10.9.4   Call Waiting

10.9.5   Absent subscriber Service:

10.9.6   Do Not Disturb

10.9.7   Call Forwarding on Busy, No Reply, Immediate

10.9.8   Incoming only line

10.9.9   Outgoing only lines

10.9.10   Audio Conference Call:

10.9.11   Fixed Destination Call - Immediate or Timed out (Hot line)

10.9.12   Call Transfer

10.9.13   Call Forwarding to Fixed Number

10.9.14   Automatic Call Back

10.9.15   Call Completion on Busy Subscriber (CCBS)

10.9.16   Call Monitoring

10.9.17   Call Parking

10.9.18   Call Pick-up

10.9.19   Call Queuing.

10.9.20   Call Recording

10.9.21   Call Blocking

10.9.22   Call ID on Call Waiting

10.9.23   Distinctive Ringing

10.9.24   Music on Hold

10.9.25   Music on Transfer

10.9.26   Custom greeting

10.9.27   Personal greetings

10.9.28   Call Return / Camping

10.9.29   Follow-me / Find-me

10.9.30   Message Waiting Indicator (MWI)

10.9.31   Voice mail or VMS

10.9.32   Closed User Group:

10.9.33   Parallel Ringing

10.9.34   Conference Bridging

10.9.35   Dial by Name

10.9.36   Local and Remote Call Agents

10.9.37   Automated directory

10.9.38   Call screening

10.9.39   Soft Phone Features: Following Soft Phone features should be supported:

    ⅰ   Multi-Location Functionality: User should be allowed full access to all the features of the system from any user terminal.

    ⅱ   Voicemail via Email: PABX sends digital voicemail sound files and Caller ID via email. It shall be possible to scan, forward and organize voicemail messages. This should be in addition to traditional voicemail retrieval (dialing a voicemail box).

    ⅲ   Call Record: It should be possible to make MP3 recordings of phone conversations, simply by pressing the "Record" button on IP phone. Recordings shall be sent automatically o user's email box after the call ends.

10.40   Selective Call Forward

10.41   Selective Call Rejection

10.42   Instant messaging (IM) and presence:

Presence information and notification should be provided as below:

    ⅰ   Information that client is registered

    ⅱ   Information that Client is currently engaged in an Instant Messaging Session.

    ⅲ   SIP clients should communicate with SIP Server using SIMPLE protocol.

    ⅳ   Click-to-Call - Initiate a call from any directory entry

10.43   It should provide the capabilities to:

- Determine the location of the target end point.

- Determine the media capabilities of the target end point via Session Description Protocol (SDP).

- Determine the availability of the target end point.

- Establish a session between the originating and target end point if the call can be completed.

- Handle the transfer and termination of calls. SIP supports the transfer of calls from one end point to another

10.10   Suggestive specifications of IP hard phone:

SIP hard phone should have least he following features:

    ⅰ   Alphanumeric Keypad, programmable function key with LED indicator.

    ⅱ   2-line LCD alphanumeric display with backlight

Purchaser shall specify the additional features, if any, as per his requirements.

10.10.1   Suggested Video Resolution:

System should support minimum video resolution of

    a   Pro-Motion interlaced video (60/50 fields full-screen video for NTSC/PAL)

    b   4SIF (704 x 480)

    c   4CIF (704 x 576)

    d   SIF (352 x 240)

    e   CIF (352 x 288)

10.10.2   PABX should comply to following Protocols/ specifications for IP terminals:

An Offer/Answer Model with the Session Description Protocol (SDP), RFC 3264

10.10.3   Following RFC should be supported: 2246, 2543, 3266, 3312, 3323, 3326, 3420, 3428, 3455, 3515, 3556, 3588, 3665, 3725, 3856, 3863, 3880, 3891, 3911, 3966, 4028

10.10.4   IP Phones should support 802.1x (EAP-MD5/AES or better) for authentication and access control to the network i.e. user shall be connected to network only after he has passed the authentication process

10.10.5   The IP Phone should support built in Ethernet switch to cascade PC with the phone so that single I/O port is used to connect both IP phone and PC

10.11   Ethernet Interface:

10.11.1   QoS management

i.   The interface should support QoS marking and mapping as well as Priority marking and mapping

ii.   The interface should support re-map of ToS bits and DiffServ code points between networks for QoS enforcement.

iii.   The interface should support policy based admission control features on the basis of call details, QoS and bandwidth.

iv.   The interface should support flow reporting which includes functions such as Quality and Service Level Agreement (SLA) monitoring.

10.11.2   Traffic Measurement and Recording

i.   Traffic monitoring and shaping feature should be provided. Traffic report should be generated for I/C and O/G traffic.

ii.   The following measurements should be provided:

a.   Processors occupancy.

b.   Total traffic handled in Mbps.

c.   Total traffic carried by the Ethernet Interface. The total RTP traffic carried by the Ethernet Interface. Rate, ratio and total number of error packets.

d.   Number of Ethernet frames sent out.   .

e.   Number of re-transmitted control/signalling messages during a period.

f.   RTCP traffic handled.

g.   Traffic handled per codec type.

iii.   It should be possible to activate and record/print the measurement of delay, packet loss per session also.

iv.   The above measurements, should not unduly affect the call handling capacity of the processor.

10.11.3   The system shall support Wireless IP hard phones. These phones get

controlled by the PBX for telephony features and gets physical connectivity using 802.11a/b/g interface from underlying Wi-Fi network

10.12 Other requirement of IP Extensions/Multi-Media PC

- PABX shall provide interface for connecting "SIP Telephones or PC based Video Phone with suitable Client software" which shall work as extensions.
- IP Terminal terminals shall be connected to PABX over Ethernet as per IEEE 802.3

10.13 Capacities of the PABX

Following parameters required for dimensioning purpose should be specified by the tendering authority:

i. Maximum Number of client Registration

ii. Registration rate/registration time

iii. Number of calls/sec

iv. Number of concurrent calls

v. Percentage Mix of Intra-PABX calls and calls to/from public network

vi. Other Optional parameters such as Number of trans-coded calls

vii. Optional functions and user applications, if required

10.13.1 Purchaser shall define the following parameters of PABX server, as per his requirements at the time of procurement-

a. Microprocessor

b. Memory

c. Hard disk

d. USB ports

e. Ethernet ports

f. Operating System

10.13.2 Various dimensioning parameters e.g. traffic handling capacity, storage type and volume, synchronous or asynchronous etc. may be indicated.

10.13.3 Type of Ethernet backbone (e.g. 10 Mbps-10Base-T Ethernet, 100 Mbps-Fast Ethernet or 1000 Mbps) may be indicated.

10.13.4 If any additional Codec support is required, same may be specified.

10.13.5 Total CDR & Command log storage capacity required to meet the requirements as per prevailing rules/regulations/law of Govt. of India.

10.13.6 Details of hardware, software and number of operator terminals for operation, administration and maintenance may be specified.

10.13.7 Tools and Testers required, if any

10.13.8 The period for which the maintenance spares are required, may be specified by the tendering authority.

10.13.9 Battery Requirements. Power requirements of AC and DC power supplies. Number of sets to be supplied

10.13.10 Documentation: Number of copies (hard/soft) to be supplied.

10.13.11 Qualitative Requirements (QR): The purchase shall specify quality standards like ISO 9002 or ISO 9001: 2000 certification.

10.13.12 Environment Conditions: The purchaser shall specify the requirements of Environment Conditions that the system shall satisfy as specified in Quality Measure Manual for relevant category of equipment.

11.0 Following shall be indicated in the Type Approval certificate:

REMARKS:

1. (a) Type(s) of Extension(s) used for testing

    (For Example SIP Phone/SIP Hard Phone)

    (b) SIP Terminal (IPv4/IPv6 should be indicated)

    (c) Physical interfaces

      (Ethernet type 10/100/1000 Mbp/twisted pair/coaxial/fiber etc.)

2. Additional codec supported, if any

3. Software required to read CDRs – Inbuilt/supplied separately

4. This TAC does not cover the functions, features, performance, capacity etc. of the equipment.

5. Approval of PABX against this GR, does not entitle the user to connect the equipment to the network of Internet Service Provider's (ISP).

ABBREVIATIONS

For the purpose of this document the following abbreviations apply:

Abbreviation	Expanded Form
AC	Alternate current
AES	Advance Encryption System
CCBS	Call Completion on Busy Subscriber
CDR	Call Detail Record
CPU	Central Processing Unit
CSCF	Call Session Control Function
DC	Direct Current
DoT	Department of Telecommunications
DTMF	Dual Tone Multi-Frequency
EMC	Electro-Magnetic Compatibility
FTP	File Transfer Protocol
GoS	Grade of Service
GR	Generic Requirements
GUI	Graphical User Interface
HTTP	Hyper Text Transfer Protocol
Hz	Hertz
I/C	Incoming
IEC	International Electro-technical Commission
IEEE	Institute of Electrical and Electronics Engineers
IETF	The Internet Engineering Task Force
IM	Instant Messaging
I/O	Input/ Output
IP	Internet Protocol
ISP	Internet Service Provider
ITU	International Telecommunication Union
LAN	Local Area Network

LCD	Liquid Crystal Display
LDAP	Lightweight Directory Access Protocol
LED	Light Emitting Diode
MLPP	Multilevel Precedence and Preemption
MWI	Message Waiting Indication
O/G	Outgoing
OS	Operating System
PABX	Private Automatic Branch Exchange
PC	Personal Computer
PCM	Pulse Code Modulation
QoS	Quality of Service
RFC	Request For Comment
SBC	Session Border Controller
SDP	Session Description Protocol
SFTP	Secured File Transfer Protocol
SIP	Session Initiation Protocol
SLA	Service Level Agreement
SMPS	Switching Mode Power Supply
SNMP	Simple Network Management Protocol
SSH	Secure Shell
SSL	Secure Sockets Layer
TEC	Telecommunication Engineering Centre
TLS	Transport Layer Security protocol
ToS	Type of Service
VMS	Voice Mail Service
VoIP	Voice Over IP

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