

## **Technical specifications**

### **1.0 System hardware and software architecture requirements**

The offered system shall have at least following hardware and software features as per the requirement :

- 1.1 The hardware architecture of the system shall be based on the latest technology with PCM/TDM or modern LAN/level switching/ATM architecture.
- 1.2 The offered system shall support at least 8 numbers of Gigabit Ethernet ports and one numbers of the serial port and USB Ports. Distributed switching or advanced should be possible on IP access points.
- 1.3 The offered system shall be based on universal slots and distributed hardware for signal processing, switching, power supply and auxiliary units.
- 1.4 The universal slots shall support the digital ports with simultaneous voice and data, analogue ports with DTMF signalling, standalone DTMF receiver ports, ready to use IP ports, E1 ports, CO ports, ISDN PRI/BRI ports, E/M ports loop disconnect ports, fire alarm ports, paging ports and power failure circuit ports.
- 1.5 The offered EPABX should be modular in design. The number of the cabinets and the size of each cabinet shall be given based on the physical slots, logical time slot / channels for the equipped and the wired ports to achieve the above specified non-blocking communication criteria and also to accommodate all the peripheral interface cards. This should be designed for the 100 % non-blocking switching system for equipped and wired ports
- 1.6 All the hardware shall be installed and commissioned for equipped ports and free physical slots shall be available for the wired ports. The vendor shall carry out the wiring between the main distribution frame (MDF) and all the specified ports (equipped and wired ports).
- 1.7 The system shall use latest processors of at least 64-bit processor. Vendor to indicate type of processor used. The system should support both single bit and double bit error correction capable of switching voice, data and images without any degradation of performance. Processor should be Quad Core 2.0 GHz. RAM to be 4GB. Hard Disk Capacity 250 GB and Hard Disk should support RAID-1 concept. System should have 3 HDD. (2 configured in RAID-1 and 3<sup>rd</sup> HDD for BackUp) System form factor should not be greater than 19” and it should be rack-mountable.
- 1.8 The system shall use advanced multi user / multi tasking operating system. The system should provide non blocking Digital path for the Voice and data Communication (IP Protocol). The system should also offer an in built Ethernet port management ( LAN)

- 1.9 All the software packages shall be loaded and the software licence & locks shall be opened in both the systems for all the system parameters and applications for “fully equipped and wired capacity. The list of all the software licence, key & locks etc shall be submitted. The Licensing concept should be simple. There should be only one type of License in system irrespective of whether the license is applied for any type of Trunk or any type of Extension. The License should remain same if it is applied for IP Subscriber, TDM Subscriber, IP Trunk, Digital Trunk, Analog Trunk and DECT solution.
- 1.10 Alternate routing or least cost routing shall be available through PSTN over ISDN-PRI link during interface link failure and link congestion. If there is a delay due to BSNL in implementing this feature, the vendor will not be held responsible. But, whenever the BSNL part is ready the vendor shall test and commission this feature in the EPABX free of cost.
- 1.11 The system shall have an integrated VoIP for enabling the IP telephony over IP trunks and IP extensions. end-to-end DTMF signalling and the FAX/MODEM transmission. IP Gateway Card should support both IP user Registration as well as IP trunking. Each card to support 200+ IP users and 50+ Trunks. IP gateway Card to support feature of LoadBalancing and StandBy functionality.
- 1.12 The software architecture of the offered system shall be run under an open, real time operating system and provide a native Ethernet communication link, in direct connection with the real time telephone call handling. The systems shall have the latest version of software packages for the basic operating system, programming language and all the applications to meet all system features and functional requirements for the proposed configurations.
- 1.13 The software shall include the full trunk routing software for daytime routing, distributed trunk routing, alternative routing, route optimisations and digit manipulations also.
- 1.14 The offered system shall have voice guided auto attendant features on all caller lines and accordingly the vendor shall provide the required number of interconnecting ports for voice-guided auto attendant. The offered system shall have capability to incorporate the Interactive Voice Response (IVR) facilities in latter date.
- 1.15 Any analog or digital telephone should be empowered to alter the auto attendant message as per programmed in telephone exchange.
- 1.16 Analogue extension ports shall have built in or distributed DTMF receiver circuits. Minimum one number of DTMF circuit shall be available for ten analogue ports. All the DTMF cards shall be equipped in universal slots and accordingly the physical slot and time slot calculation is to be taken care for specified non-blocking communication.
- 1.17 Ringer circuit per line card should be provided. The design of ringer circuit for the analogue ports shall be such that it shall provide the ringer current to all the ports simultaneously and it shall be equipped with over voltage and over current protection.

### 1.18 System Redundancy:-

The system should be provided with 100% Duplicated control unit in Hot stand By mode. The basic system should be capable of achieving its ultimate capacity (10000 Lines) without the need of adding / Upgrading CP. There should not be any call Drop or Voice delay during switchover from 1<sup>st</sup> Processor to 2<sup>nd</sup> Processor.

1.19 The system shall have the required management facilities for system feature programming, fault location and diagnosis, main and remote unit monitoring and fault annunciation using external audible devices.

1.20 The system should support a minimum of 225,000 BHCC (Busy Hour Call Completion)

1.21 The system architecture should be such that it is inherently able to handle high traffics and it does not require any traffic engineering to take care of high loads. Enough time slots should be available within the system, which ensures that not extra time slot cards needs to be added to do load balancing-vendor to confirm this. Vendors to design the system to meet BHCC requirement as per clause.

1.22 The system should be open architecture, which is designed to add new features, applications, hardware, etc. by more addition of cards or suitable software changing the entire system.

1.23 The system should be able to provide a single unified platform connecting various signal units for catering to current requirement of 1500 ports equipped, 1500 ports wired and future expansion up to 2000 ports( for future requirement site expansion). This should be possible with a single system using same processing unit and NOT through networking of multiple EPABX systems.

1.24 The system should work on the latest FLASH ROMs; both the primary and secondary storage devices should be of RAMs, ROMs and flash ROMs. The system data should be automatically updated and also backup data should be available on CD media/Magneto Optical Device/Hard disk.

1.25 The system shall support the architecture to provide simultaneous voice, data and video transmission without any degradation of services.

1.26 The system shall be of universal port architecture. This should ensure that any card could be inserted in any slot including high-density cards like E1 cards, etc. without wastage of slots vendor to confirm this.

1.27 The system shall have the necessary interface to support voice mail applications.

1.28 The system shall support voice mail, email integration and fax messaging in an integrated multimedia messaging system.integration with SKYPE, Ms Lync, CTI, Presence, Instant Messaging, Peer to Peer Video Calling. All these features should be available from same EPABX OEM.

- 1.29 The systems should support multi media conferencing solutions including audio, video and data collaborations.
- 1.30 The system shall be capable of working as transit switch, local switch and data circuit switch.
- 1.31 The system should be capable to support networking through IP Trunk without any E1/T1 links. The IP Trunk should support the following CODEC: a) G.711 b) G.723 c) G.729a and G.729b.
- 1.32 The system should support IP extensions (IP hard phones and IP soft phones).
- 1.33 The system should support the following type of trunks-Ring down, Both way Loop Dial, E&M (2 wire / 4 wire Type V ), DTMF, MFR2 DID lines (Indian), CEPT connectivity, ISDN BRI and PRI.
- 1.34 The system should support ISDN BRI, ISDN PRI, ATM and IP TRUNK with interface cards in the universal slots of the system.
- 1.35 All telephone sets (digital and analogue) shall be line powered from the system and connected on two wires (single pair) only.
- 1.36 The main system shall be equipped with external music system for music on hold facilities.
- 1.37 All the software authorisation levels (passwords) shall be supplied along with the system and it shall be available with the system user.
- 1.38 All analogue trunks shall be supplied with pulse metering and busy tone detection's features.
- 1.39 The Caller Line Identifications (CLI) shall be available on all digital/analogue ports with incoming caller number and name for the same EPABX extensions and incoming caller number.
- 1.40The Caller Line Identifications (CLI) shall be available on all trunk ports like E1 / E&M / CO trunk with incoming & outgoing caller number and name for the same EPABX extensions and incoming caller number
- 1.41 The vendor shall furnish the complete technical details of the system including the critical system parameters like number of class of services, number of the DID transaction table for level DID, number of the hunt groups and number of the digits.
- 1.42 The equipment shall be constructed on a modular basis, using plug in type components to the maximum practical extent. The equipment panels shall be enclosed, self-supporting type forming complete factory assembled enclosures. The field cabling entry shall be from top of the panels. The input/output termination cables shall be labelled front and back to permit ready identifications.

- 1.43 System shall support four to six digit extension numbers.
- 1.44 The system platform shall be based on open system architecture and universal multitasking real time operating system.
- 1.45 The operating system shall enable easy development of applications by providing window based API Library.
- 1.46 The software version offered shall be of the latest release and the updated software versions should be given free of cost for further 10 years from the date of completion of warranty period.
- 1.47 AUTHORISATION CODES: Every user shall have his own authorisation code to make outgoing calls thereby ensuring no misuse of the system. At large no. of unique authorisation codes shall be possible in the system.
- OR
- Password facility should be similar to BSNL for opening and closing of STD/ ISD facility and pass word should be user changeable
- 1.48 System should have time synchronisation facility with external clock/ GPS system through IP connection or maintenance terminal.
- 1.49 System to support 80+ Distributed Gateway units for remote location connectivity of all IP, TDM Subscribers and Trunks.
- 1.50 Remote Gateway Unit to support Survivability feature in case main system Processor board fails.

## **2.0 System main features/facilities**

The proposed system should be capable to provide the following features /facilities to the subscribers through user-friendly system programming.

- 2.1. Abbreviated dialling
- 2.2. Account code charging
- 2.3. Appointment reminder
- 2.4. Assigned night answer for Trunks.
- 2.5. Automatic call back on Busy trunk/bundle/network link
- 2.6. Automatic call back on free/busy extension
- 2.7. Automatic lockout of faulty lines
- 2.8. Boss-Secretary feature digital subscribers.
- 2.9. Call by name and number from the digital station
- 2.10. Call forwarding to extension or hunting group, voice mail, operator, paging, etc.
- 2.11. Call Forwarding (Internal and External) – no answer / busy/immediate/follow-me/fixed/variable
- 2.12. Call Park
- 2.13. Call Pickup from any extension (individual and in a group)
- 2.14. Call transfer
- 2.15. Camp on busy extension/line
- 2.16. CLI on the selected terminal.

- 2.17.Choice of supervisory tones or voice announcements.
- 2.18.Class of service changeover by station/operator/administration.
- 2.19.Controlled private call by pin code.
- 2.20.Digit suffixing / prefixing – For the incoming calls, either from other exchanges or trunk, it shall be possible to insert/suppress at least 6 number or more of digits.
- 2.21.Direct Inward Dialling supporting DP/DTMF/MIXED
  - a. Direct inward dialling (DID) on CO line
  - b. Direct inward dialling (DID) on 2Mbps ISDN / R2MFC link
  - c. Direct outward dialling (DOD) on 2Mbps ISDN / R2MFC link.
- 2.22.Directory Services (System should support minimum 5000 entries – name and numbers).
- 2.23.Do not disturb
- 2.24.Executive Override.
- 2.25.Feature Portability.
- 2.26.Forced Release under the following conditions:
  - a. User exceeds a present inter digit time interval
  - b. Calling user exceeds a preset time while listening to the ringing or busy tone
  - c. When any of the two users of a normal call terminates.
  
- 2.27.Group Hunting
- 2.28.Hold facility
- 2.29.Hot-line services on extensions and trunks
- 2.30.Individual directory internal/external
- 2.31.It shall be possible to suppress or add digits for outgoing calls.
- 2.32.Last number redial
- 2.33.Local and external call
- 2.34.Malicious Call Identification – Manual & Automatic
- 2.35.Multiparty Conference. System to support 8 party Conference and it should be possible to have 20+ such conferences running simultaneously.
- 2.36.Priority call
- 2.37.Private incoming / outgoing trunk (Dedicated Trunks for Priority Users)
- 2.38.Recorded announcement / music on hold (internal & external) for waiting party
- 2.39.Saved number redial – After dialling an internal or external number it can be saved by dialling a code, then number can dialled by using the same code.
- 2.40.Selection of night service – at least 3 options should be selectable from console that is a line transfer to predefined extension, to voice mail, to a hunting group. It should also be possible to allocate each trunk line a different Night Destination.
- 2.41.Special night answer points.
- 2.42.Support of DP/ DTMF/mixed/digital/IP/DECT signalling.
- 2.43.Support the flexible numbering plan for dialling up to ten digits.
- 2.44.Time of day barring of Local/STD/ISD calls from specified extensions.
- 2.45.Timed reminder – wake up call
- 2.46.Toll / code restriction for trunk/tie or station-to-station calls.
- 2.47.Voice guided auto attendant facilities at least for 12 numbers of the Internal/External callers and capability of the interactive voice response for Internal/External callers for the system.
- 2.48.Time and date announcement facility through auto attendant system or voicemail system on dialling of code.

2.49. Auto attendant messages should be user programmable from any analog and digital telephone.

### **3.0: System networking and interface capability requirements**

The offered system shall provide the connectivity with all types of EPABXs approved by TEC / DOT and it shall support at least standard QSIG-BC-GF, Extended QSIG and DPNSS standard protocols for inter connectivity. Vendor shall supply licence software package/locks along with the hardware for enabling the QSIG, Extended QSIG and DPNSS link protocol.

The proposed system shall be compatible to handle the following links/connectivity for the system networking to achieve above requirements.

#### **3.1 Terminal connectivity:**

- a. Analogue/digital/IP/DECT interfaces
- b. ISDN (2B + D)/(3B+D) interface bus for S0 terminals 3B+D not required
- c. ISDN BRI (2B+D) & PRI (30B+D) for BSNL connectivity
- d. Ring down line connectivity
- e. E & M trunks connectivity
- f. Link for fully integrated Voice Mail/Fax Mail link
- g. Link for Interactive Voice Response System (IVRS).
- h. DID, Level DID/Indian R2MFC.
- i. CLI link on all Analog and Digital ports.
- j. Loop disconnect type.

#### **3.2 Public switched networks connectivity:**

- a. Analogue CO trunks
- b. Analogue DID R2MFC
- c. Digital DID R2MFC/ISDN
- d. ISDN Basic rate interface access
- e. ISDN Primary rate interface access

#### **3.4 Private networks connectivity:**

- a. Analogue Tie lines through long distance modem (if required) at both end 2,4,6 wires & E&M
- b. Digital Tie lines, E&M
- c. Digital DID R2MFC/ISDN
- d. ISDN Basic rate interface access, ISDN Primary rate interface access, Proprietary private network, QSIG, DPNSS protocols, proprietary private network protocol.
- e. ATM 155 M/bit SDH, QSIG, Extended QSIG, DPNSS protocols
- f. X24/V11/V35 or V36 Frame relay, Private network, QSIG, Extended QSIG, DPNSS protocols
- g. Ethernet TCP-IP, Private network, QSIG, DPNSS protocols
- h. E1 connectivity

### **4.0 Characteristics of telephone sets (subscriber terminals)**

The proposed system should provide the connectivity for all types of the telephone sets (subscriber terminals) like basic analogue telephone set, premium analogue telephone set, digital telephone sets, IP based soft and hard telephone sets, and DECT based telephone sets. Vendor should offer various range of analogue/digital/IP/DECT telephone equipment, each capable of meeting one or more of a variety of needs for the corporate offices

#### 4.1 *Analogue telephone sets*

The analogue push button telephone sets to meet the following requirements.

- a. It shall be copper track PCB.
- b. It shall be desktop type.
- c. It shall have both DTMF/DP facilities.
- d. It shall have anti skid foot
- e. Redial facility
- f. It shall have at least two colour options
- g. It shall have at least two lines alphanumeric display window
- h. It shall have at least 8 memory keys.
- i. It shall have caller line identification facilities.
- j. Redial Switch on panel.
- k. It shall be with built-in speaker and microphone for hand free operation.
- l. It should be battery free.

#### 4.2 *Digital telephone sets*

The professional digital telephone sets to meet the following minimum requirements:

- a. Line power feeding using two wire (single pair)
- b. Alphanumeric display windows for at least two lines
- c. Capability for simultaneous voice and data transmission.
- d. Capability for converting the digital set as an ISDN, CTI or analogue terminal using additional interface adapters.
- e. Selectable ringing patterns at least two types of the patterns.
- f. Programmable/fixed feature buttons for conference, mute, transfer, drop and hold, redial, do not disturb.
- g. Built in message waiting lamp
- h. Call logging services
- i. Integrated personal directory services and name dialling facilities.
- j. Built in microphone and speaker for hands free operation.
- k. Caller Line Identification (CLI) feature by caller number and name.
- l. Phone should have 3 Fixed Keys, 8 Programmable Keys, 3 Navigation Key.

### **5.0 Operator console system**

The vendor shall offer the PC based console with a detailed description of features. The console shall be equipped with the headset with volume control Plantronics make for hand

free operations along with the required furniture. The minimum specifications of the attendant console are as follows:

- 5.1 The PC based attendant console should be with 17-inches LCD-TFT colour monitor and Antiglare screen and keyboard. This console shall provide the following minimum facilities:
- a. PC based terminal along with head set with volume control
  - b. Telephony application running under Windows NT client
  - c. Full windows resizing and layout personalisation
  - d. Multi-applications compliant
  - e. Hands-free operation
  - f. Supports all telephony applications.
  - g. Subscriber and trunk Supervision facilities
  - h. Manual or automatic answering facilities
  - i. Call internal or external correspondent by name
  - j. Software shall support the set of soft keys on the monitor as per the normal telephone layout.
  - k. Software shall support the set of function and program keys designed to handle special operators features like hold, night answer mode, call splitting, call pickup.
  - l. Software shall support the set of programmable keys for direct dialling (One touch dialling) of internal or external numbers.
  - m. Text messaging facilities
  - n. Multiple Ringing levels
  - o. DTMF transmission
  - p. Automatic call transfer
  - q. Locking the terminal
  - r. Withdrawal of consoles
  - s. System management
  - t. System and port wise diagnosis and built in audio visual alarms on screen
  - u. Corporate directory services using LDAP server/ Directory server

## **6.0 System Administration**

The system administration shall have the Exchange (Switch) Management system in one PC.

- 7.1 The Exchange ( Switch) management system software shall be based on latest open platforms running under Windows NT/Unix/Linux, providing multiple graphical applications offering a consistent and friendly graphical user interface (GUI). This system shall integrate all applications needed for complete telephone system administration such as:

- a. System configuration and subscriber management application.
- b. Performance application in text as well as graphical format.
- c. Built in fault diagnosis and audio-visual alarm system.
- d. Offer user–friendly access to the various proposed services.
- e. Be protected by an overall access code and offer several secondary access codes.
- f. Provide the overall management of the system.
- g. Provide all menus in English language.
- h. Enable printout of information via printing software.

- i. Provide the TCP/IP based LAN connectivity
- j. Traffic measurement facilities such as
  - i. Overall internal traffic of the installation
  - ii. Traffic of one attendant position
  - iii. Traffic of attendants groups
  - iv. Trunk group traffic
  - v. Traffic per external trunk
  - vi. Traffic per normal user
  - vii. Traffic per user group
  - viii. Traffic per mobile DECT user
  - ix. Traffic per private link, proprietary protocol
  - x. Traffic per private link, QSIG protocol
  - xi. Traffic per private link, DPNSS protocol
  - xii. Virtual private network traffic per direction
  - xiii. User traffic observation facilities
  - xiv. Presented calls
    - xv. Number of calls answered
    - xvi. Number of calls abandoned

### **Call Billing Software**

(a) Have separate charging tables for guests & staff, and for specific extensions & junctions.

(b) Have support for multiple Service Providers

(c) Implement on-line Budget Control & Toll-Fraud Control

(d) Get the following pre-defined Summaries, Reports & Analysis

(i) **MIS Reports.** Your wide range of reports should include Peak Hour/Day Analysis, Expensive Call Analysis, Incoming Call Analysis, Frequently Called Numbers and Beyond Office Hours.

(ii) **Graphs.** All reports could be viewed in a graphical format. We should be able to Just choose our choice - 2D or 3D, Bar or Pie - they should be available. Prints should come out full-page wide.

(ii) **Report Wizard.** The tool for customization should enable the user to just define to the system the requirements like the parameters, the sorting method and the display type and that should be sufficient to generate such user defined reports.

(iii) **Scheduler.** The user should be able to schedule the reports whenever required on a weekly, or fortnightly or monthly basis and the reports be generated and ready for user even in the form of an email.

(iv) **Reprocess Data.** The system should allow the user to reprocess call data to recalculate costs in case of any changes in tariff or pulse rates. The backup of unprocessed data will be used to re-calculate all costs.

(v) **On-Screen Critical Analyzer.** Viewing the reports in grid to perform a critical analysis of reports should be possible. Sorting & merging fields (columns) in a user defined manner should be provided for easy viewing and quick analysis.

(vi) **Exporting Reports.** All reports should have options of redirection to either a Window, Grid, Printer, or a large number of file formats, including word-processors and spread sheets.

## **Telephone Equipment**

(a) **Digital Phone.** Digital Phone should have the following of specifications atleast :-

- Backlit LED display a minimum of 6 lines.
- Min 6 Function keys with LED
- At least 6 programmable soft labelled keys with LED.
- Full-duplex speaker phone.
- Message Waiting Indicator.
- Cell Phone Like Four-way navigation cluster button.
- Volume button – (separate volume levels in the handset, headset, speaker, and ringer)
- Various hard keys like Contacts, Call log, Redial, Speaker, Mute Headset , Hold , Conference ,Transfer, Drop, Conference,
- Interface of Headset jack, USB & key module
- Missed call alert ( button or programmable in function key )

(B) **Digital Phone.** Digital phone for boss/secretary environments

- Tiltable graphical color display
- Backlit LED display a minimum of 6 lines.
- Min 6 Function keys with LED
- At least 6 programmable soft labelled keys with LED.
- Full-duplex speaker phone.
- Volume adjustment Touch Slider with LEDs
- Message Waiting Indicator.
- Cell Phone Like Four-way navigation cluster button.
- Volume button – (separate volume levels in the handset, headset, speaker, and ringer)
- Various hard keys like Contacts, Call log, Redial, Speaker, Mute Headset , Hold , Conference ,Transfer, Drop, Conference,
- Interface of Headset jack, USB & key module
- Missed call alert ( button or programmable in function key )