

Volume II

Minimum Technical Requirements

for

Chhattisgarh State Wide Area Network

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1) CGSWAN architecture

CGSWAN is required to be open standards based, scalable, high capacity Network to carry Voice, Data and Video traffic between designated Government of Chhattisgarh(GOC) offices at State, District and Sub Division /Block levels. The connectivity to the end-user is based on either one or more of the standard technologies like leased circuits, VSAT, Radio Frequency dial-up circuits or using Ethernet ports as appropriate for the individual offices. The Network should have single point Gateways of adequate capacity to Internet. CGSWAN shall be built vertically on three tiers of Network connectivity comprising:

- **Primary Tier consisting of SHQ**
- **Secondary Tier consisting of DHQs**
- **Tertiary Tier consisting of BHQs**

The Bidder shall be solely and exclusively responsible to design, implement and maintain on a BOOT (Build, Own, Operate, and Transfer) model the network as mentioned in this tender and to provide the services as specified.

2) Network Design Principles

The key design considerations for building this network is as follows:

- a) **Protocol:** All the protocols used should be industry standard protocols. The network protocol to be used would be the industry standard Internet Protocol (IP). The design should also support IPV6 in future without financial implication to the State..
- b) **Redundancy:** The network should be designed to minimize the single point of failure. The network shall have capability for defining and enabling alternate routes to avoid disruption in service. Bidder shall provide the details of redundancy and the level of redundancy provided in the network. The network shall have redundancy of relevant elements at appropriate levels so that any one failure does not cause a total disruption of services. The design at DHQs shall cater for providing redundancy, to the extent that each DHQ may be connected to the adjacent DHQs to form a ring and each DHQ is connected to SHQ.

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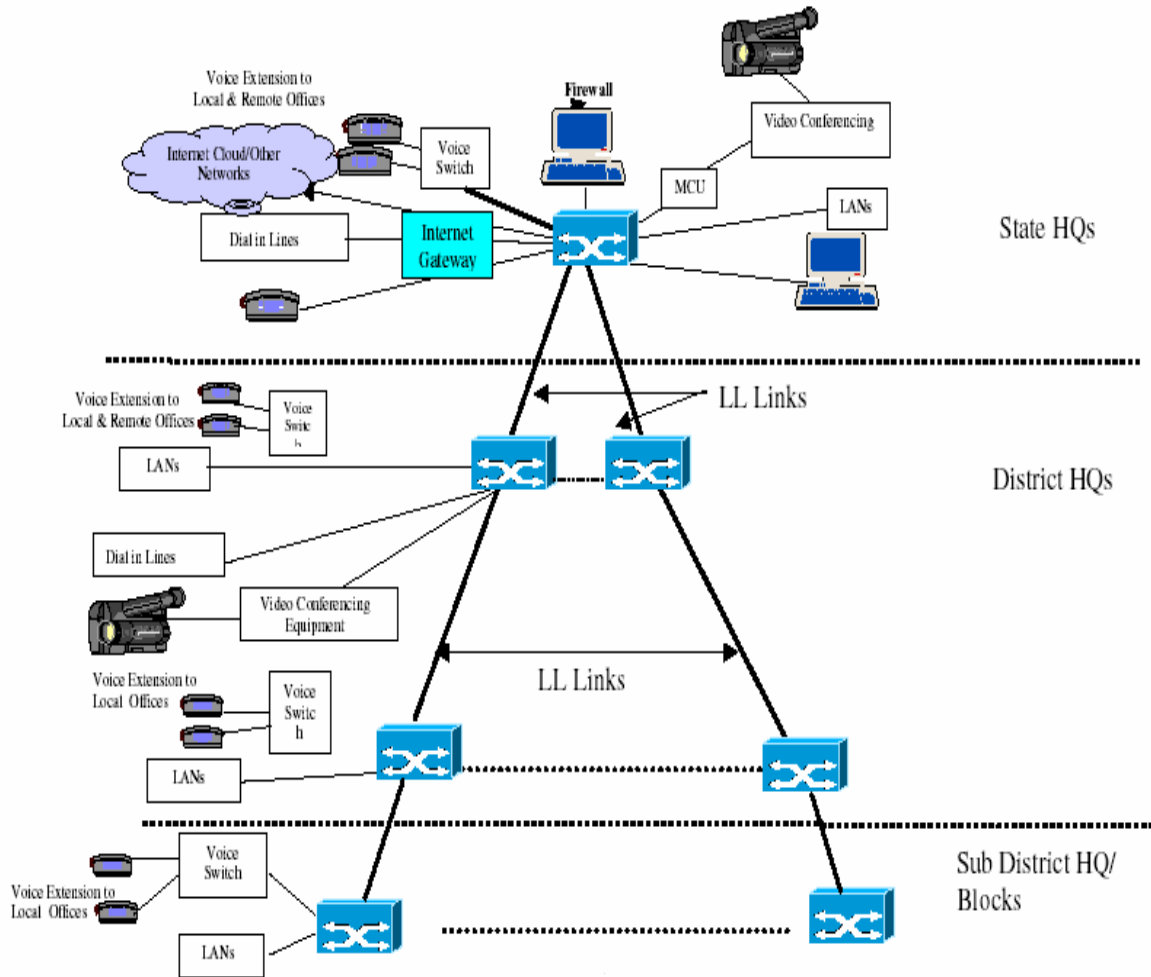
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- c) **Scalability:** The network design shall accommodate future scalability. Chassis based switches and access equipment shall be used to ensure future scalability at the equipment level as well. The design shall be scalable with respect to number of centres; number of interfaces per centre and bandwidth at all the levels..
- d) **Optimization** The Network shall have industry efficient compression engine to optimize bandwidth utilization
- e) **Performance Considerations:** The equipment selected to ensure adequate back plane capacity to route under peak load to prevent any performance issues. Performance of the network will be periodically monitored using Network Management tools and capacity will be upgraded proactively. Necessary memory slots to be provided on all routers to accommodate future performance scalability.
- f) **Manageability:** A centralized Network Management System (NMS) should be deployed to manage entire Chhattisgarh State Wide Area Network (CGSWAN). NMS should also support SNMP. The Network Management System used shall be capable of doing fault management (at the network and server level) performance management, configuration management, security management and also accounting management (if inter-departmental accounting is needed). The Network Management System should be scalable as well and would be able to provide a hierarchical, topological view of the entire network and provide trouble ticketing. The design shall have sufficient diagnostic facilities to identify & locate the faults and easy rectification of faults. The bidder shall specify the details & level of diagnostics provided.
- g) **Standards** The equipments/ interfaces shall comply with relevant ITU-T/ IEEE/ IETF/ EIA/ TIA/ ANSI/ NEBS/ TEC etc. standards as applicable. The design shall comply to interconnect and security guidelines issued by Government of Chhattisgarh and Department of Information Technology (DIT), GoI from time to time.
- h) **Configurable** The network shall route the data traffic as per the requirement from any location to any other location. The network shall allow Internet connectivity to all/ selective users at all/ selective centres / locations as per requirement using the same network infrastructure.
- i) **Interconnect with Existing network** The proposed network design shall allow the connectivity of existing networks with proposed CGSWAN using standard protocol.
- j) **Security:** The proposed design should adhere to security guidelines issued by DIT, GoI and Government of Chhattisgarh. The design shall also take care of all the security requirements mentioned in this Tender.

The architecture design of the CGSWAN is as follows

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3) Requirements

The scope of work for bidder shall include the following: -

1. Design/Review the CGSWAN architecture and provide recommendations on gaps / issues

a. Wide Area Network Connectivity

- i. The Bidder shall design/review the architecture of the CGSWAN to provide Data, Voice and Video services that will integrate the PoPs identified across the state and provides recommendations on areas of improvement or the gaps in the CGSWAN architecture.

b. Local Area Network Connectivity at PoPs

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- i. The Bidder shall design the LAN architecture at all the PoPs identified for CGSWAN.
 - ii. The bidder shall plan and design the structured cabling and power cabling and all related works for the successful installation and commissioning of the CGSWAN.
- 2. Design of other CGSWAN elements including IP Addressing, Voice Dial Planning, Wireless, Security etc for CGSWAN**

a. IP addressing & Voice Dial Plan design

- i. The Bidder shall design the IP-addressing schema and Voice Dial Plan schemes for the CGSWAN. Wherever applicable and feasible within the guidelines specified by DIT, GoI It is desired that the current IP addressing scheme at the state level network should be retained, however if the Bidder feels that it needs to be modified to be inline with the proposed IP addressing scheme, he should plan for any migration with minimal disruption in service.
- ii. The Bidder has to prepare an integration plan for the voice and video communication systems required for the state.

b. Network Security

Security: Since the network is to be used by various government departments and agencies of the GOC and CHIPS, therefore, the successful bidder is required to prepare detailed IT Security Policy, Security architecture and deployment document for securing the IT infrastructure in the CGSWAN and the same shall be submitted to the CHIPS for approval along with the other documents/designs as mentioned. The guideline and framework to be used for the IT security policy is published at www.cert.org – IT security policy guideline. The bidder shall also ensure CGSWAN security to be in line with DIT-GoI guidelines.

3. Supply of Products / equipment including active and passive components for CGSWAN and Factory Acceptance Testing

- a. The Bidder is responsible for the supply of all the Products / equipment specified in the Bill of Materials included in the tender and their appropriate quantity & capacity, which will meet the Technical Specifications as per the CGSWAN design approved by the State.
- b. The bidder is responsible for supply of passive components specified in the Bill of Materials section of the tender viz. Cables, Racks etc.
- c. The Bidder shall also quote as optional items for all such items and their appropriate quantities that are not listed in the Bill of Material Section of the

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tender but are considered necessary for the successful implementation of the project. The bidder selected for implementation should not submit any further bill of material during the implementation stage.

- d. The Bidder shall undertake minimum **‘five years comprehensive on-site Warranty’** for all the supplied products / equipment.
- e. **Factory Acceptance Testing:** The Bidder will get the Factory Acceptance Tests done for the products listed in BoM or agreement. (The team designated by the CHiPS shall perform checking of the part or whole of the products to be supplied by the Bidder against the Bill of Materials and the respective Technical Specifications).

4. Installation and Commissioning of CGSWAN connecting all the PoPs listed in the tender document in line with the requirements outlined.

- a. The Bidder shall install, integrate and commission the CGSWAN connecting all the PoPs identified for the state inline with the requirements specified in the Tender.
- b. The Bidder shall interact / coordinate with the Bandwidth Service Provider for successful commissioning of Leased Line, VSAT/Wire less connectivity as appropriate.
- c. The Bidder shall also install and commission backup link for providing redundancy to the primary Leased Lines.
- d. The Bidder shall be responsible for configuring and implementing the security components of the CGSWAN such as firewalls and IDS as approved by the CHiPS.

e. Structured Cabling

- a. The Bidder is required to install and commission on a turnkey basis, the structured cabling with in the POP’s involving CAT5E / CAT6 cables, Surface Mount I/Os, 3’ CAT 5E / CAT6 patch cord, 7’ CAT 5E / CAT6 patch cords, Jack Panel, Racks, PVC conduit / casing / capping with accessories, any other required components such as labels, ferrules etc., and all associated civil works at all the PoPs in accordance with the following guidelines.
 - (i) Carrying out of the required surveys prior to installation work is the responsibility of the Successful Bidder, if deemed necessary.
 - (ii) The cabling job should be carried out under the supervision of certified engineers.

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- (iii) All the wiring should be fully concealed inside the conduit and no cable (except patch cords) should be visible to the naked eye.
 - (iv) The actual ratio of trenching and casing work will depend upon the site layout. The Bidder is advised to familiarize itself with the site layout of POP locations through representative surveys / site visits and ascertain the actual ratio.
 - (v) The cabling shall be properly labeled and ferruled so as to facilitate easy identification and maintenance. The labeling and ferruling shall be documented.
 - (vi) All civil work like cutting, chiseling, drilling, etc. shall be finished to ensure smooth leveled surfaces matching the existing surface finish without disturbing the existing aesthetics of the office to the extent possible.
 - (vii) All waste material shall be properly disposed off from POP premises in an environment friendly manner and compliant to applicable civil / municipal guidelines.
- b. Testing, in conformance to measurement procedures and test parameters for V.35, CAT 5E / CAT 6 and other communication cables installation as defined in TIA/EIA-568-B standards, of each node at each site. The certified test results are to be submitted to State in hard copy.
 - c. Certification of each site for minimum 15 years performance warranty based on the above test results from the manufacturer of the structured cabling components.
 - d. Fixing & installation of existing hubs/switches, if any, inside the supplied rack(s)

f. Power Cabling

- a. The Bidder is required to install & commission the Power Cabling from the power source to the UPS & from the UPS to the network equipments that involves design, laying, fixing, installation, & commissioning of the power cabling system including electrical box / boards, cables, UPS, MDB, MCB, and associated civil works at each of the PoPs on a turnkey basis in accordance with the following guidelines.
 - (i) The power-cabling job should be carried out under the supervision of licensed electrical technicians.
 - (ii) All the wiring should be fully concealed inside the conduit / G.I. pipe / Aluminum Channel and no cable should be visible to the naked eye.

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(iii) The cabling shall be properly labeled and ferruled so as to facilitate easy identification and maintenance. The labeling and ferruling shall be as documented.

(iv) All civil work like cutting, chiseling, drilling, etc. shall be finished to ensure smooth leveled surfaces matching the existing surface finish without disturbing the existing aesthetics of the office.

(v) All waste material shall be properly disposed off from the PoP premises in an environment friendly manner and compliant to applicable civil / municipal guidelines.

b. **Earthing** - The Bidder is required ensure a proper electrical earth for Power Cabling is available in the PoPs. The bidder is also required to properly earth the UPS. The Bidder also shall repair the existing power earth(s), if any, and make sure that the existing earth is working properly.

c. **Testing** - Each electrical point should be tested with line tester / multi-meter. Test results are to be submitted to state in hard copy.

g. IP Telephony and Video Conferencing Services

(i) The Bidder has to install and commission one IP Telephone connection at each of the PoPs.

(ii) The Bidder has to integrate these IP Phones with the dial plan designed for the state.

h. Network Security

The Successful bidder shall ensure by necessary configuration & security policies for the CGSWAN that the whole network is totally secure and is not prone to any type of hacks/attacks from intruders.

i. **Final Acceptance Testing:** The Bidder should get the Final Acceptance Tests and shall cover the Functional Tests of WAN components, Structured Cabling and Power Cabling. The Final Acceptance Test Procedure shall also include tests to verify the data, voice and video traffic handling capability of the CGSWAN.

5. CGSWAN Maintenance Services

The Successful Bidder shall provide the following services for Management of the CGSWAN. The Successful Bidder shall ensure that appropriate System and Processes are in place for delivering them.

- Configuration Management

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- Problem Management
- Performance Management
- Change Management
- Help Desk Management
- Service Level Management
- Quarterly Performance Audits
- Quarterly Capacity Audits

6. Network Management Services

- a) Network management services are to be provided which includes managing ALL the CGSWAN elements like routers and switches for required uptime, security, configuration of the network and performing suitable test to ensure high availability of the network elements & connectivity. This service is to be provided for a period of five years.
- b) The Successful Bidder is responsible for maintenance of all the supplied hardware & software supplied for CGSWAN. This maintenance is comprehensive onsite maintenance as part of the Warranty service.

7. Remote Management of Network Equipment and Monitoring of CGSWAN Connectivity

- a. The Successful Bidder will implement a centralized helpdesk available on a toll free number for problem management, which will act as the 1st level helpdesk for all users of the CGSWAN. The scope of this helpdesk will be to Accept all user calls, Respond to all calls related to the management and maintenance of CGSWAN and its related assets, Issue a trouble ticket number to each call, resolve the issue or escalate calls to OEM's or Bandwidth Service Providers as per requirement. It is bidder's responsibility to ensure issue resolution within the timelines specified in the agreement.
- b. The Successful Bidder shall undertake the various responsibilities of the problem management functions of the helpdesk viz. to propose and adhere to an appropriate escalation matrix, to assign severity level to each call, to track each call to resolution, and make sure that the resolution time requirements, as per the definitions, is met with, to escalate calls as required, if necessary and to analyze the call statistics.

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- c. The Successful Bidder should generate call reports using an automated tool. The reports should be generated and submitted at a monthly and quarterly basis.
- d. The successful bidder shall establish a portal solution for publishing the CGSWAN performance and availability metrics. Such solution shall be made accessible to the select state representatives based on a user id and password.
- e. The Successful Bidder will implement a mechanism to ensure that all issues noted, complaints made and problems faced are identified by a unique Trouble ticket number within the timeline stipulated in the tender. All trouble tickets will be centrally noted, monitored and logged in the Successful Bidders NOC/Helpdesk facility. The Successful Bidder will mark all trouble tickets as “closed” upon resolution of the issue noted.
- f. The Successful Bidder has to manage the whole network system and provide Help Desk to remotely monitor the network availability, reliability, maintenance and quality of service for a period of three years.
- g. The Successful Bidder has to have skilled and certified manpower as L1/L2/L3 engineers for Management of the network round-the-clock, in NOC.
- h. Bidder has to coordinate with the Bandwidth provider for day-to-day maintenance and upkeep of the CGSWAN Links.
- i. The Successful Bidder has to provide the following reports on a monthly basis to State as part of their scope:
 - i. WAN Links Uptime Report (including backup links)
 - ii. WAN Links Utilization Report (including backup links)
 - iii. Scheduled Down Time Activities Report
 - iv. Problem Management Reports
 - v. Performance Management Reports
 - vi. Bi-annual Performance Audit Reports and Recommendations Report (bi-annual)
 - vii. Bi-annual Capacity Audit Reports and Recommendations Report (bi-annual)

8. Training

8.1 Upon completion of the implementation, successful Bidder shall provide training free of cost to the personnel identified for the state. (The numbers of personnel required to be trained are to be specified by the state). The training

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should cover system design, installation, configuration, set-up, upgrade, administration, testing, management, and maintenance of all the equipment (hardware and software) supplied. This Training shall be held at the location (s) identified by the state. Separate training modules for the following components must be provided:

- i. Routers, WAN setup, configuration & documentation
- ii. Switch, other LAN components in PoP, configuration & documentation
- iii. Firewall, IDS, their configuration & documentation
- iv. Interconnection details of attached hardware
- v. Capabilities and technologies involved and configuration and troubleshooting of the equipment.
- vi. UPS, Structured Cabling, Power Cabling & documentation
- vii. Servers and system software configuration & documentation
- viii. Other supplied equipment.

8.2 This training should cover the day-to-day maintenance, management, and operations related aspects of the Routers, Switches, Servers, related system software, and UPS etc.

8.3 The training modules and their duration shall be finalized in consultation with the state.

8.4 The Successful Bidder shall also supply detailed training material to state, to enable them to train more number of officers independently.

9. Handover

After the training is over, the Bidder must properly handover the network to the Network Operations (Remote Management) team with all required documentation at the end of five years. If state wishes to continue the services of the successful bidder, further negotiations shall be held and a contract shall be signed for further support period identified at the end of five years.

10. General Scope of Work Clauses

- a. **Implementation Methodology** – The Bidder shall adopt industry best practices to ensure smooth implementation of the project including but not limited to: -
 - (i) Preparation of **Project Schedule & Charter** - a detailed location wise project schedule conforming to the overall Time frame of the project

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- (ii) Understanding the requirements for the project with specific details to kick-off the project as per schedule
- (iii) Formulation of the Project Team with dedicated Project Manager for the project based on the Project Plan. The Successful Bidder shall deploy extra resources to complete the project as per the timelines, if required.

The Bidder shall submit the Project Schedule & charter and the Project Team Structure for approval to state within 2 week from issue of Letter of Award.

- b. It shall be the responsibility of the Successful Bidder to bring all the installation equipment and tools required for the installation of the CGSWAN.
- c. The Successful Bidder has to provide all necessary assistance to the state in resolving regulatory issues like obtaining Clearances / License from any government agency / regulatory authority, as required for setting up of the communication network.
- d. The Successful Bidder has to be responsible for co-ordinating with the Bandwidth provider for provisioning of the connectivity and related services for successful implementation.
- e. The Successful Bidder shall provide all the test equipments / software required for the Factory Acceptance Tests. The Successful Bidder shall also get the Factory Acceptance Tests done as per Schedule.
- f. The Successful Bidder shall prepare the Final Acceptance Test procedures and submit to the state for approval at least two weeks prior to the schedule of respective activity. The Successful Bidder shall provide all the test equipments / software required for the Final Acceptance Tests. The Successful Bidder shall also get the Final Acceptance Tests done as per Schedule.
- g. **Documentation:** The Successful Bidder has to submit all relevant documentation pertaining to the entire network, for Remote Management of the Network. This should minimally cover the User Manuals, Operation Manuals, Manufacturer Supplied Technical Documentation, Configuration of all the Network Devices, all relevant diagrams/documentation required in hard copy as well as soft-copy. The documentation for Structured Cabling shall minimally cover detailed schematic layout of the structured cabling system with respect to the floor plan with details of cable numbering (labels and ferrules), wiring diagram for each node, test report for each node and pin-out diagram for each jack panel. The documentation for Power Cabling shall minimally cover the detailed schematic layout of the power cabling system with respect to the floor plan with details of cable numbering (labels and ferrules).

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Above requirements shall be provided for the following locations

Data Requirements (Bandwidth Requirements)

Place	Mbps
SHQ TO DHQ	6/4
DHQ TO BLOCK	2
Horizontal connections at Block	0.512
Horizontal connections at SHQ	2
Horizontal connections at DHQ	0.512
SHQ to ISP (internet)	8

Note: The number and user details, which are indicative and not exhaustive, of co-located and remote offices in the DHQ, BHQ & Blocks are given in Annexure respectively.

CGSWAN overview

Government of Chhattisgarh (GOC) intends to set up a Chhattisgarh State Wide Area Network (CGSWAN) through Chhattisgarh infotech and biotech Promotion Society (CHiPS), DKS Bhavan, Mantralaya Raipur providing network connectivity to Government Offices and Departments at State Capital, District, Sub-Divisional, and Block headquarters across the State. CGSWAN is aimed to improve the G-2-C, G-2-G, G2-E and G-2-B services across the State. There will also be adequate bandwidth provision to meet the increasing demands of data, voice and video transmission. CGSWAN will link GOC offices at the State Data Centre, called as the State Head Quarter (SHQ), District Head Quarter (DHQ), and all the Block Head Quarters (BHQ).

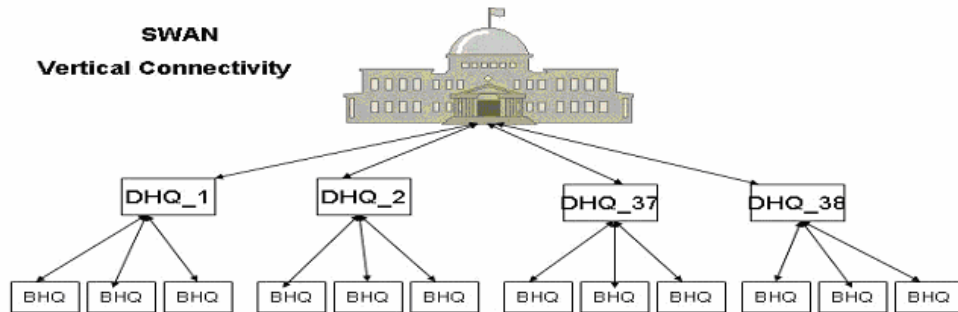
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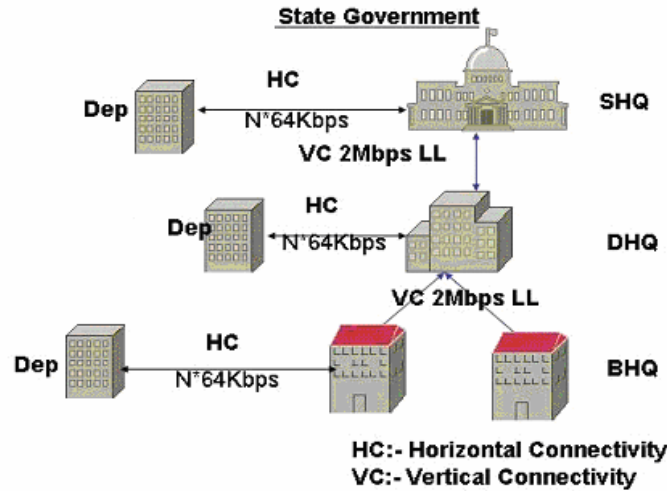
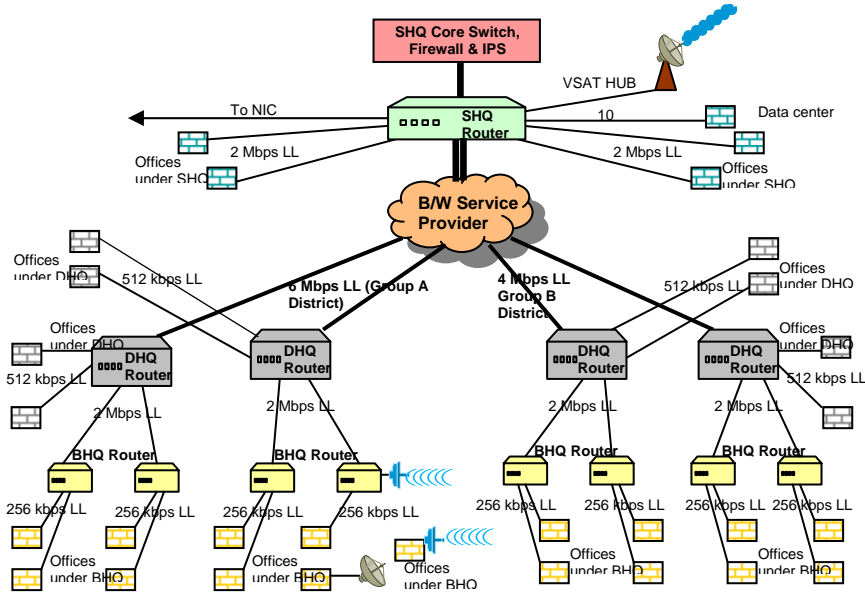
Connectivity at Various Levels

In the first instance, using 6/4 Mbps leased lines, SHQ would be connected to all the District Headquarters (DHQs); Similarly, DHQs would also be connected to their respective Block Headquarters (BHQs) using the 2Mbps links. All these links at various State levels are Point of Presence (PoP) of CGSWAN. This connectivity between POP's are referred as *Vertical connectivity* (VC). The vertical connectivity for CGSWAN is depicted in schematic below:



The CGSWAN connectivity will be availed by all the GOC offices across the State from the nearest POP. This connectivity between PoP to GOC offices is referred to as Horizontal Connectivity. The GOC offices which are co-located with PoP can be extended CGSWAN connectivity using LAN technologies, else there needs to be some connectivity mode for these non localized departments from the respective HQ's. The Horizontal Connectivity (HC) and Vertical Connectivity (VC) are depicted using a logical schematic below. The bandwidths shown in the following diagram indicate immediate requirements.

Chhattisgarh State Wide Area Network - Overview



Next schematic provides components level overview of both Vertical and horizontal connectivity, using 2Mbps lease lines, nX64Kbps lease lines, VSAT and LAN technologies.

The network architecture of CGSWAN shall be designed on proven standards and technologies and shall be a secure, reliable, accessible, configurable and scalable, high performance, high-bandwidth network.

Interconnectivity between various tiers

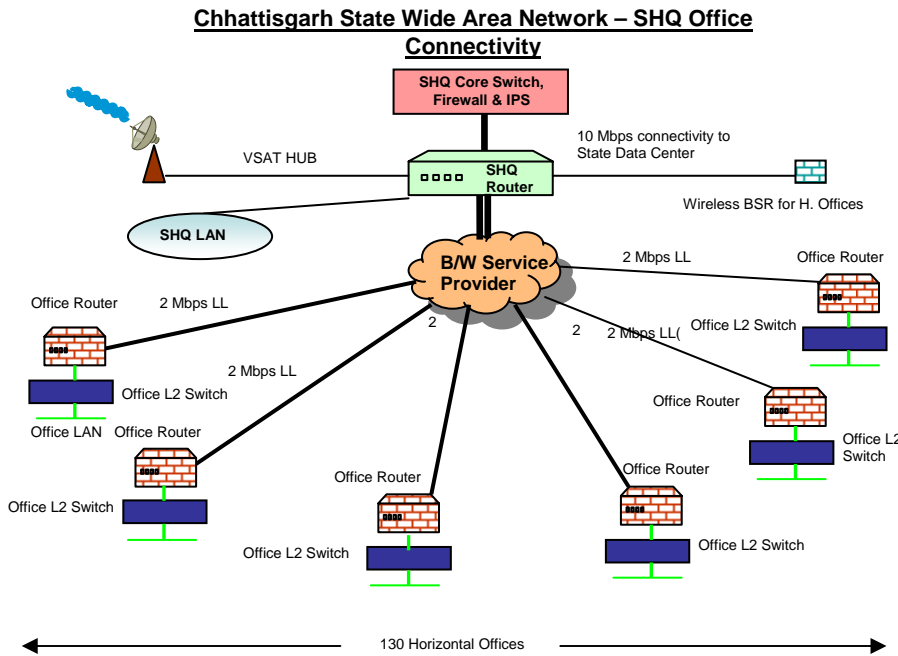
CGSWAN will be a three tier IP based Network, to provide connectivity among CGSWAN PoPs at State HQ, District HQ and Block HQs. CGSWAN will be based on star topology, using leased line network of Bandwidth Provider. The logical understanding of these tiers is briefed in the table below:

POP	LOGICAL LAYER	TIER
SHQ	State Head Quarters	Tier-1
DHQ	District Head Quarters	Tier 2
BHQ	Block Head Quarters	Tier 3

Highlights of these Logical Layers are as follows:

State Head Quarters (SHQ)

Tier-I will be the core of the CGSWAN at State Headquarter, which will be connected (vertically) to all the District Head Quarters (DHQs) PoPs (including state DHQ at Raipur), and other GOC Offices & Departments in a city/town using horizontal connectivity mode. At SHQ the entire Sate Wide Area Network bandwidth is aggregated from all the connected GOC offices. For CGSWAN SHQ will be facilitating e-Governance applications and services to GOC Departments, Offices and Citizens. SHQ as first level tier of CGSWAN and will be located at Raipur. The GOC Offices/ Departments in Raipur will be either connected to SHQ or DHQ at DC Office Raipur (horizontally) using n x 64 kbps leased lines. However, co-located offices will be connected to SHQ/ DHQ using LAN technologies. There are 40 GOC Offices/ Departments at the State level spread over.

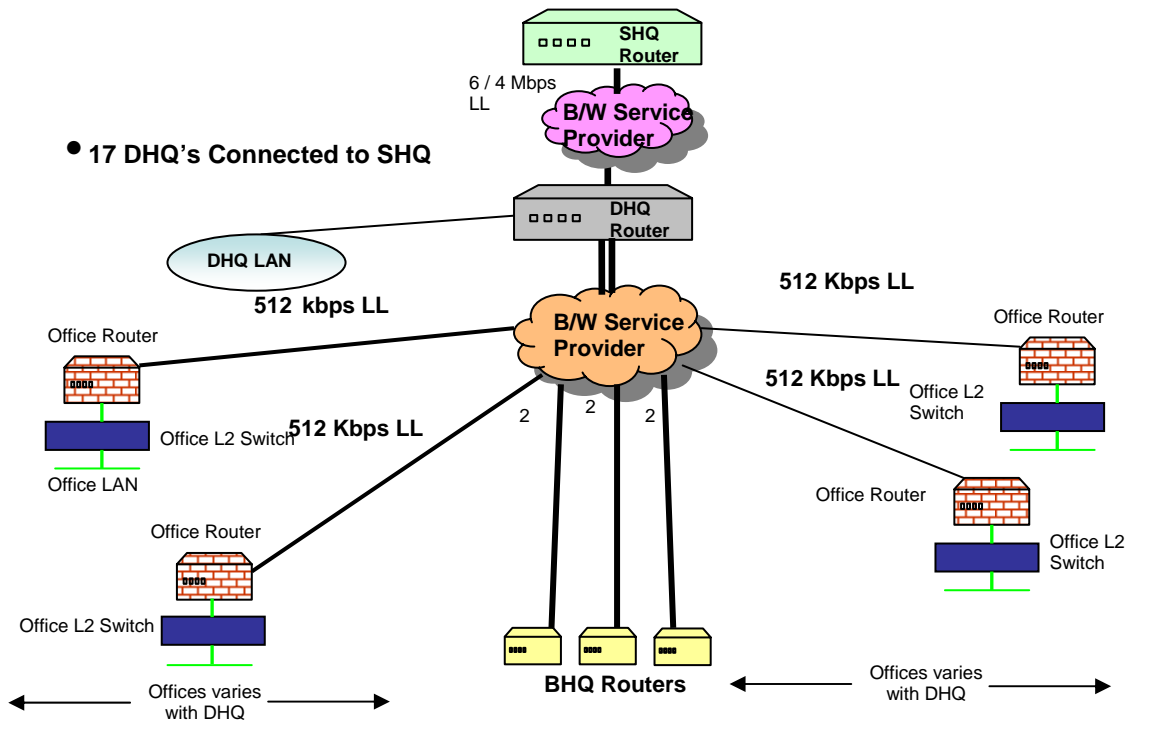


District Head Quarters (DHQs)

This Tier-II of CGSWAN initially will be using 2 Mbps leased lines to connect the SHQ with District Head Quarters (DHQ) as vertical connectivity. These DHQs will be located at the respective DHQ PoP. There are Government Departments/ Organizations at the

District level, which are spread over locations and will be connected to DHQ using n x 64 Kbps leased lines (horizontal). The co-located departments within the DHQ PoPs building will be accessing CGSWAN using LAN technologies directly on the LAN switch at DHQ; while 20% of the rest of GOC offices in District level will be connected using n x 64Kbps link, as Horizontal connectivity and remaining 80% using wireless / VSAT as per details given herein after., It is also proposed that offices located close to each other at one location will be covered with only one horizontal connection.

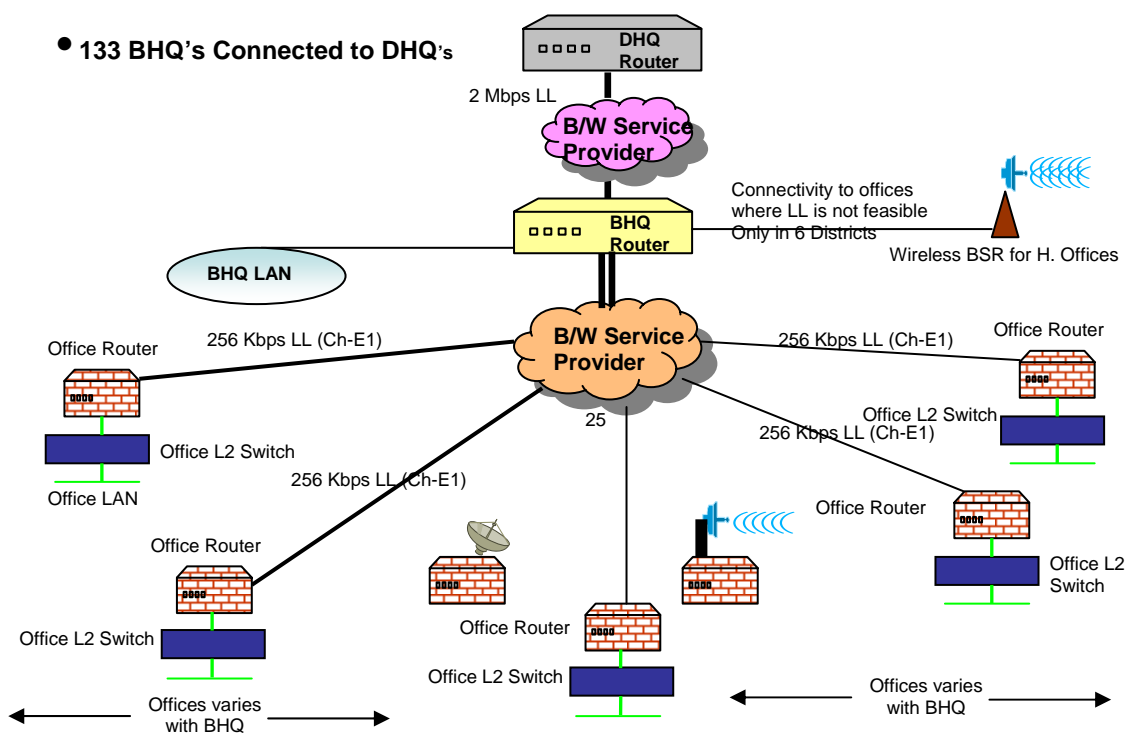
Chhattisgarh State Wide Area Network – DHQ Connectivity



Block Head Quarters (BHQs)

This Tier 3 will link DHQ with Blocks / Division/ Block Head Quarters to be located at the respective Sub-Division; Block head quarters using 2 Mbps leased lines. Each BLC will also be connected with other Government Offices at Sub Division/ Block level using n x 64 Kbps leased circuits. The co-located departments within the Block PoPs building will be accessing CGSWAN using LAN technologies directly on the LAN switch at BHQ; while 20% of the rest of GOC offices in Block level will be connected using n x 64Kbps link, as Horizontal connectivity and remaining 80% using wireless / VSAT as per details given herein after.

Chhattisgarh State Wide Area Network – BHQ Connectivity



Connectivity between PoPs

CGSWAN to be established shall be capable of reaching all parts of the State and shall be able to deliver the following bandwidths between PoPs: Video applications like conferencing should support from SHQ level to DHQ/BHQ level.

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Initially	Upgrades in multiple(s) of	Connectivity between
2Mbps	2Mbps	SHQ – DHQ
2Mbps	2Mbps	DHQ – BHQ

Understanding the CGSWAN Network layers

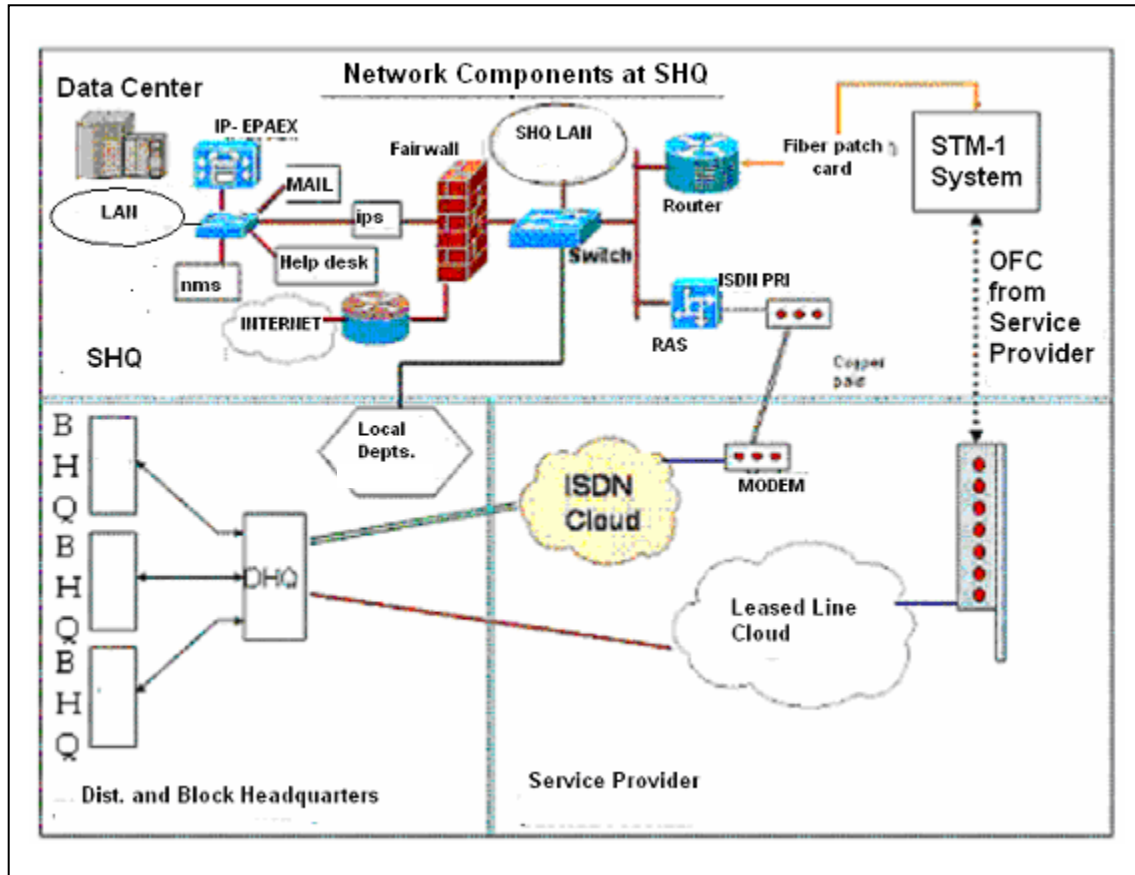
Layer	Coverage	Description
Core Layer	SHQ	The primary responsibilities of this layer shall be to forward the traffic at very high speed, apply QoS parameters to meet desired service levels for various applications, integrate network security, ensure high-availability and the resilient network etc.
Distribution Layer	DHQ	Backbone router will be heart of the CGSWAN network, and will facilitate in routing the data between the centralized Datacentre and GOC offices connected on CGSWAN.
Access Layer	BHQ	The primary responsibilities of this layer shall be aggregating traffic coming from multiple access location to the core, summarizing the routes, applying QoS policies & integrated network security, acting as a topology change isolation point.

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Technical Requirements at SHQ



Considerations at SHQ

- (a) A core router with necessary modules would be installed at SHQ where all the leased lines from Districts on verticals get terminated. These connections at router would be provisioned through STM-1 module directly. STM-1 will be directly interfaced / integrated to STM-1 interface of Core Router at SHQ using the fibre patch cords.
- (b) At core router ISDN PRI line(s) with required quantity will be availed for providing the backup ISDN connectivity for GOC DHQs and BHQs, in case vertical E1 link failure. These ISDN PRI lines will be provisioned on last mile as copper from the Bandwidth Provider. These lines will be terminated directly on the Remote Access Server (RAS).
- (c) Centralized internet bandwidth will be provisioned from the Internet

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Service provider (BSNL or other) for CGSWAN. This bandwidth will be terminated on a separate router and then connected to core router, firewall and to server farm.

- (d) Protecting integrity and confidentiality of information data of GOC's, and securing the same from internal as well as external threats, suitable security arrangements will be done using firewall and Intrusion prevention systems (IPS).
- (e) Network monitoring for network devices and links will be done using centralized Network Management System (NMS).
- (f) Helpdesk System will be used for tracking the support and incident calls and inventory management purpose.
- (g) For voice communication on CGSWAN network, IP based PABX Server will be in place at SHQ. This EPABX will connect the location with based on IP addressing configured by Service Provider.
- (h) Multipoint control unit (MCU) will be deployed for Video-conferencing purpose. The MCU should also support desktop based VC option for desktop users, besides default VC end-points. MCU should support 118 endpoints in multiple concurrent sessions of varying sizes. The end-points can be hardware based and/or desktop based video conferencing mode.
- (i) Suitable solution for infrastructure services will be used for mailing, proxy, directory, anti-virus (with anti-spamming), database, web server, etc. As the traffic grows scalability in the form of clustering etc would be provisioned at the time of design itself. Necessary access rules on Proxy server will be provided on mutual discussion at the time of preparation of Security policy. Mails would be routed through Gateway Antivirus for spam and any other mail virus from time to time. Web and Database servers would be configured with necessary security on DMZ. The logs will be analysed at Syslog Server. Intrusion prevention Server would be placed to prevent and detect unauthorized access. Provision would be planned for horizontal increase of servers in clusters in the event of increase in traffic. Database server would be configured with hot-standby and data replication to DR setup. Backup would be planned as per enterprise backup policy adopted by CGSWAN with the System Integrator.
- (j) Core switch with sufficient ports distributed on minimum 4 modules Gigabit ports and provision for further expansion is placed for providing vertical and horizontal connections.
- (k) All the components will be routed through STM-1 module of the router.

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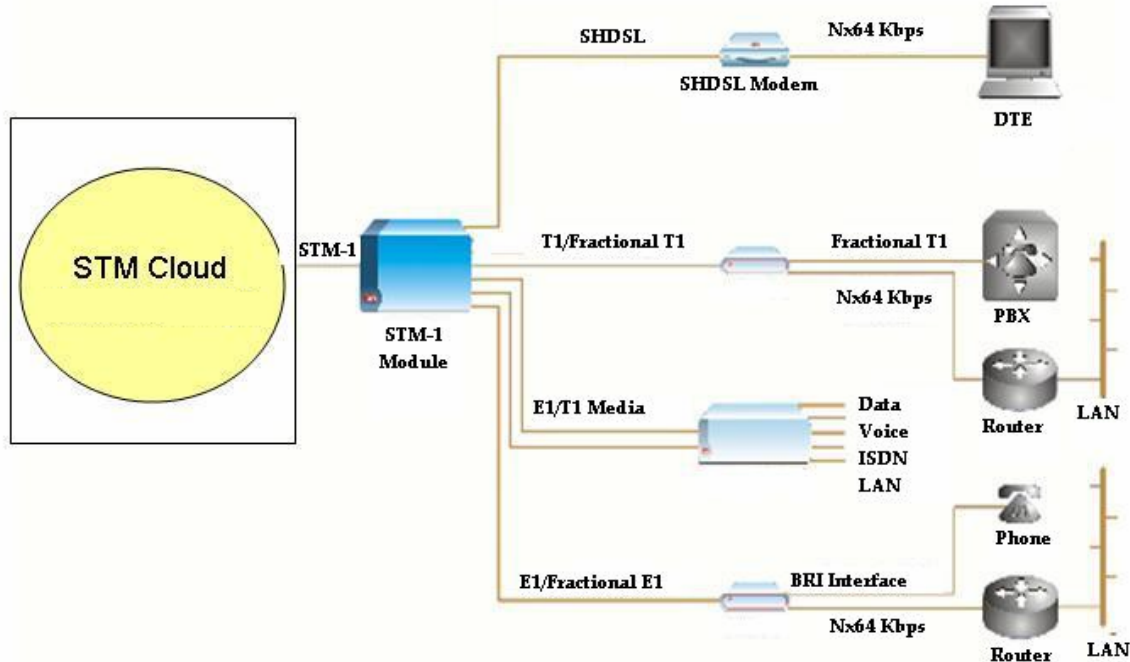
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About STM-1 Protocol

Both SONET (Synchronous Optical Network) and SDH (Synchronous Digital Hierarchy) are based on transmission at speeds of multiples of 51.840 Mbps, or STS-1. The STS-1 frame is composed of octets which are nine rows high and 90 columns wide. The first three columns are used by the Transport Overhead (TOH) and contain framing, error monitoring, management and payload pointer information. The data (Payload) uses the remaining 87 columns, of which the first column is used for Path Overhead (POH). A pointer in the TOH identifies the start of the payload which is referred to as the Synchronous Payload Envelope or SPE.

OC-3c and STM-1 rates are an extension of the basic STS-1 speed and operate at 155.520 Mbps, carrying three interleaving STS-1 frames. Thus, the OC-3c frame has nine rows and 270 columns.



Schematic Diagram showing the Logical connections and Core Router

Understanding State Head Quarters Network Components

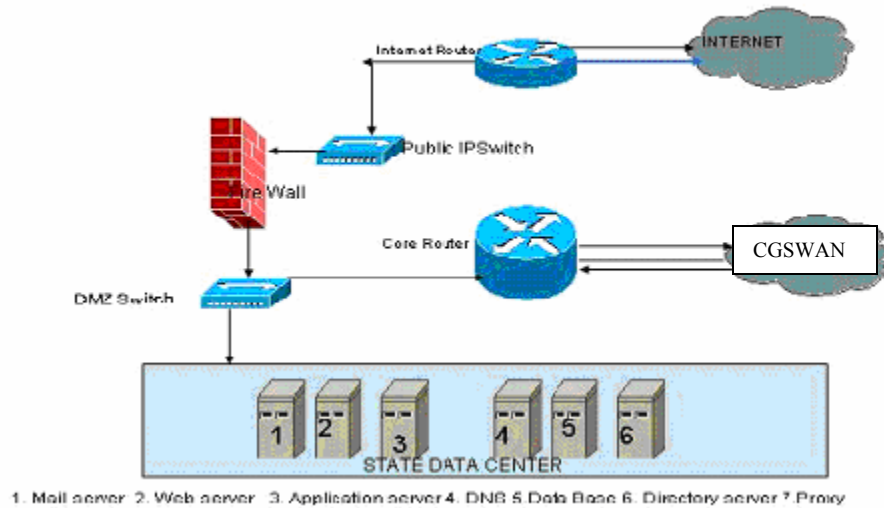
S.NO	Particulars	Description
1	Internet Router	Connects the CGSWAN Server farm to Internet.
2.	Firewall	Provide Security to CGSWAN Network from internet
3.	IPS	Detects and Prevention of Intrusion.
4.	Core Switch	Provide Vertical & Horizontal connections.
5.	Core Router	Provide Network access across CGSWAN.
6.	RAS Server	Provide fallback connections to CGSWAN locations.
7.	DMZ/Internet Switch	To connect Internet and Firewall.
8.	IP Phones	Provide VoIP to CGSWAN locations.
9.	Server farm	Servers to provide CGSWAN services.

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Infrastructure Service requirements



The overall infrastructure services include following components:

- 1 Directory Services
- 2 Mailing services
- 3 Proxy Services
- 4 Anti-virus patches and Updates

Directory Services

Using Directory, SWAN administrator shall be able to define centralized authentication & authorization mechanisms for all network users. It would also be able to associate policies such as security, management etc on all workstations and servers from a central console. Many setups have multiple directory services that they must manage, such as one for sending e-mail, one for managing user accounts etc. The complexity of administering and using multiple accounts has a negative affect on the productivity of everyone involved. CGSWAN will be having LDAP v3 compliant directory services that are the focal point of interoperability, security & manageability in a network. Centralized architecture at SHQ should support cluster for future up gradation. The cluster solution required will be active-active configuration. Whenever cluster solution will be used, bidder will not charge any cost during cluster implementation.

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Mail Services

Using CGSWAN, centralized mailing facilities will be available for entire department/offices. This will increase communication, collaboration and enhanced productivity for the employee and officers of GOC, within and outside departments and citizens of the state, as they will be able to communicate / share information with other email users.

Proxy Services

The Proxy services may provide the CGSWAN users the access mechanism to the Internet. The Proxy server web access shall provide web-caching services for better performance and efficient utilization of Internet bandwidth. With proxy services the Internet access can be controlled and monitored in an efficient manner.

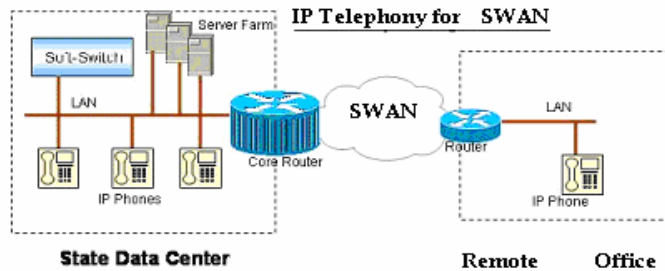
Voice over IP setup

For CGSWAN, centralized architecture based solution is envisaged. This is a Server-Client model, where call processing and controlling is carried out by Voice Switch (VS) at the state data centre, and IP phone (as end-points) spread across the CGSWAN network. These IP based phones sets will integrate to VS, using Ethernet media LAN. These sets will be located at various remote GOC offices spread across WAN. IP Telephony for the government will be one of the core services to be provided using CGSWAN. The IP Telephony system should be set up so that any user can make a telephone call to any other user in the CGSWAN through his/ her IP Phone.

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- Any IP Phone user, whether in the LAN or the WAN should be able to make a call to any other user in the network.
- The IP Telephony system should provide a unified numbering scheme for all the users in CGSWAN.
- The IP Telephony switch/ soft-switch should be scalable to accommodate new users and services are rolled out the government departments and offices.
- The IP Telephony system shall support the following features – conference call, call forwarding, and call transfer.
- The IP Telephony system will have a unified directory service.
- The IP Telephony system would ensure good voice quality.
- Additionally, with use of state of art network infrastructure, overall VoIP system will provide redundancy for voice communication within a district (and its respective BHQ or BHQ), whenever there are any failure of connectivity between SHQ and DHQ. This will ensure that VoIP communication is unaffected, within departments and offices within a district. CDRs, performance and VOIP QOS events should be stored locally and NMS should provide comprehensive report.
- The IP Telephony system will have a unified directory service and shall imply for all the numbers of the IP Closed User Group system.

Video Conferencing Setup

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The following are the requirements for Video Conferencing System (VCS) for GOC: The video conferencing system (VCS) shall provide point-to-point and multipoint video conferencing. The VCS shall support, at the minimum, H.323 / SIP protocol for voice, video, data and control. The VCS shall be used with a Gatekeeper or LDAP directory for IP address translation. The VCS shall be able carry-out Multi-point Conference. The VCS shall provide full motion video, with minimal latency and jitter. The VCS shall also have capability to provide Desktop based conferencing. VCS should integrate with IP telephony system and should be possible to initiate VC from an IP telephone.

Security Infrastructure Consideration

Security Infrastructure should provide comprehensive identification, authentication, authorization/access control, administration, and audit mechanism in the Hardware or Software with relevant technologies, best practices, guidelines, and standards. The security services used to protect the information infrastructure shall include:

- (i) Identification – Process of distinguishing individual users
- (ii) Authentication – Process of verifying the identity of a user
- (iii) Authorization and Access Control – Process of establishing and enforcing user rights and privileges
- (iv) Administration – Process of managing, and maintaining infrastructure
- (v) Audit – Process of monitoring above mentioned processes, to make sure that suitable security has been established and maintained.

The security services shall be delivered, and that the technologies implemented, in conjunction with a set of best practices guidelines, and industry standards. The technology solution should comply with BS7799 standard or any other standard adopted as a policy by the GoI.

Security attributes should dynamically adapt to threats, attacks and the recommendations, as per CERT-In guidelines and alerts.

Firewall Architecture Requirements

- It should be able to support multiple interfaces

- It should be based on the Next Generation Networking technologies giving complete Scalability / Reliability / Availability from Hardware / Software standpoint.
- It should be capable of supporting Routing, Firewall, DDoS, VPN
- It should natively support Gigabit Ethernet and fibre ports.
- It should provide for interface based Stateful Filtering
- It should provide dynamic/static NAT & PAT capabilities.
- It should be based on real time, secure, operating system
- It should give complete Manageability In band as well as Out of band

Routers should support

- Routers should be capable of accepting VPN configurations.
- Security Filters imposed on Configuration ports and Access lines.
- Unused interfaces and Access lines shut down or disabled.
- Risky interface services disabled.
- SNMP disabled or enabled with good community strings and Security Filters.

Network Security considerations

- Overall CGSWAN environment has to follow a well-defined security policy. The framework needs to ensure the information availability, integrity, and confidentiality of GOC infrastructure and data. The security policy should be comprehensive and shall address the security needs of the CGSWAN and the NOC/ DC and the end-users
- A security audit of the CGSWAN shall be done after the completion of implementation phase and regularly during the Operations and Maintenance phases on annual basis, to assess whether appropriate security procedures are being followed.
- CGSWAN will be an IP based intranet, therefore strong security infrastructure be put in place from securing the network from the external network/ internet.
- Methods of mitigating a security breach from within the intranet or extranet should be address by the security policy. The bidder should design appropriate

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solution so that a security breach/ virus do not spread throughout the network if originating at the end-user level.

- CGSWAN shall have IPS, Firewall, and Anti-virus server to secure the network in conjunction with ACL, port monitoring and management from any attacker. It should provide interface based user configurable DoS attacks policies.
- It should give CLI / Web GUI Single look & feel Architecture for managing and configuration.
- It should support standard DDoS signature support from external as well as internal attacks.
- It should Includes numerous application aware inspection engines that secure advanced networking protocols which are TCP/IP, RIP-V2.0, OSPF, RTP, L2TP, PPTP, IPSec, GRE, PPPoE, EAP-TLS, SIP, RTSP, DNS, H.323, FTP, HTTP, HTTPS,SNMP, SMTP, TFTP, support for IPv6, DHCP.
- It should support Advanced Encryption Standard (AES) - 128, 192 and 256 bit key sizes for VPN Solution

Other considerations at SHQ

- DHQ Raipur will not be separate PoP for Raipur BHQs. It will be directly terminated along with Raipur BHQs at SHQ backbone Router.
- Offices in Raipur requires **n x 64 Kbps** leased line connectivity, will be terminated to nearest office either at DHQ (DC Office Raipur) using Channelised E1 links.
- Departments and offices of GOC which are co-located in DHQ (DC office Raipur) will be connected to SHQ directly using UTP or OFC.
- SHQ will also be connected to Chhattisgarh State Secretariat using OFC link.
- This type of collocations at all the districts will be calculated and all the district blocks of each district are co located with in the respective DHQ.

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Technical Specification at SHQ:

All bidders are required to fill in the compliance / deviation table given below subsequently.

Sr. No.	Hardware	Specifications	Compliance / Deviations
1.1.	Core Router	<ul style="list-style-type: none"> - Redundant Supervisor / Switching / Routing Engine. Routing performance claimed on the chassis should not degrade with failure of any one of the switching/routing engine modules. - The Bidder should provide adequate memory to accommodate all OS features required - The resources in the switch such as CPU, Memory etc., shall be capable of handling the ultimate capacity with all features enabled. - Redundant Power Supply (230V AC, 50Hz) - Multiple services (Data, voice, video) - Shall support IP, MPLS etc - All the modules, power supply and fan should be hot swappable. - Dual CPU (1+redundant) - Forwarding performance (with state-full switch-over) of the router shall not be impacted due to one CPU failure - Should support minimum 11 service slots - Should provide scalable port capability - Shall support variety of interfaces like Ch-STM1/STM1 Interfaces as per ITU-T Standard. - Router should support interfacing with Ch-STM, STM1, ChE3, E3, ChE1, E1, 10/100 Mbps and 	

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Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>1000 base TX, Gigabit Fibre and 10 Gigabit.</p> <ul style="list-style-type: none"> - Ethernet Ports – 2 nos. of GE LX, 2 nos. of GE SX and 10 x 10/100 / 1000 Mbps - Channelized STM-1 - 2 Ports - STM-1 Transceiver Type Single-mode up to 5 KM - Console port 1 number - Should have at least two free slots for future expansion. - Built-in 1 GB RAM / 512 MB Flash Memory - Single channel wire-speed 15Mpps or more - Throughput should be 40 Gbps or more - All interfaces shall support wire rate throughput for L2, L3, VPN, MPLS, traffic with QoS and Security features enabled. - Encryption . Hardware based encryption for IPSec 3DES/AES – min of 640Mbps performance (This feature can also be supported externally). - Routing Protocols RIPv1, RIPv2, OSPFv2 and v3, BGP4, IS-IS, Route redistribution between any of the above Protocols. - Protocols PPP, Multi-link PPP, IPv4, IPv6, MPLSL2 & L3, ISIS protocol available as standard - Should support - IP Multicasting (IGMPv1&v2, PIM-SM,) - IP Accounting (Using in-built /or external hardware/software infrastructure, Packet & Byte Counts, Start & End Time Stamp, Input & Output 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>interface ports, Source & Destination IP addresses, Source & Destination TCP/UDP ports)</p> <ul style="list-style-type: none"> - Physical: Router should be provided with 19” Rack mounting kit. All necessary power cords, adapters, data cables, connectors, CDs, manuals, brackets accessories, wire managers, etc. should be provided Monitoring Event and system history logging functions shall be available. - Management Accessibility using Telnet, SSH, Console access, Easier Software upgrades through network, using FTP/TFTP, etc. Configuration management through CLI, GUI based software utility and using Web interfaces. GUI tools shall be provided. Support for Syslog Server required Support pre-planned timed reboot to upgrade hardware to a new software feature and plan the rebooting as an off-peak time. Shall support boot options booting from remote Network node. - QoS: ToS, CoS, Queuing, Prioritising. Committed Access Rate/ Rate limiting. IP Precedence, Policy based routing. Congestion avoidance algorithm, such as WRED, Priority queuing, Class based weighted fair queuing, RSVP. - Debug & Diagnostics Display of input and output error status on all interfaces, Display of Dynamic ARP table, Display of Routing table, Trace-route, Ping, extended PING 	
1.2	Core Switch	<ul style="list-style-type: none"> - Hardware Architecture Redundant Supervisor / Switching / Routing engine. The Switch should have hot standby configuration switch fabric to ensure higher level of resiliency in the network. It should have non-blocking wire-speed architecture. Multiple services (Data, voice, 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>video) Redundant Power Supply, Power supply 230 Volt 50Hz input, Modular Chassis.</p> <ul style="list-style-type: none"> - Dual CPU (1+redundant) - Interfaces / Slots Minimum 8 Slots, All service Cards should be hot swappable, 192 Ports should be accommodated, 10/100/1000Base-TX. - Minimum 1 Free Slots should be available for future expansion - Performance <p>High back plane speed 400Gbps or more, Forwarding rate should be 325 Mpps or more. 10 Gigabit Ethernet support from day 1.</p> <ul style="list-style-type: none"> - L2 Features <ul style="list-style-type: none"> - Layer 2 switch ports and VLAN trunks, IEEE 802.1Q VLAN encapsulation, Support for at least 1800 VLANs., 802.1w, IGMP snooping v1 and v2, Port trunking technology across line cards. - IP Routing Protocols. - Static IP Routing, OSPF, RIP, BGPv4, VRRP or equivalent . - L3 features. PIM Sparse Mode / Dense Mode, IGMP v1, v2, / v3, ICMP support, IPv6 support in hardware with delivered configuration. <ul style="list-style-type: none"> - Security. <ul style="list-style-type: none"> - Standard and extended ACLs on all ports, Dynamic Host Configuration Protocol (DHCP) snooping, AAA and RADIUS authentication enable centralized control of the switch and restrict unauthorized users from altering the 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>configuration. Secure Shell (SSH) Protocol and Simple Network Management Protocol to provide network security by encrypting administrator traffic during Telnet and SNMP sessions.</p> <ul style="list-style-type: none"> - Should support hardware based firewall and IPS for department wise security. - Manageability & Up gradation. - Switch needs to have console, port for administration & management, SNMPv1, SNMPv2/v3 , Support management using CLI, GUI using Web interface. Additionally, management can also be done using NMS. - Support FTP/TFTP for upgrading the operating System. TCP-MIB, UDP-MIB. RFC1213-MIB (MIB-II), RFC1398-MIB (ETHERNETMIB), - Should support server load balancing features, Should support L4-L7 switching, - Should support PoE as 802.3af (either external or internal) - Standards. - IEEE 802.3x full duplex on 10BASE-T and 100BASE-TX ports. IEEE 802.1D Spanning - Tree Protocol , IEEE 802.1p class-of-service (CoS) prioritization, IEEE 802.1Q VLAN, - IEEE 802.3x be on 10 BaseTx/ 100 Base Tx /1000 Base Tx, IEEE 802.3u 10 BaseT /100 Base Tx /1000 Base Tx. - Physical. - 19” Rack mountable, all necessary power cords, adapters, data cables, connectors, CDs, 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		manuals, brackets accessories, wire managers, etc. should be provided.	
1.3	INTERNET ROUTER	<ul style="list-style-type: none"> - Hardware Architecture. High Performance CPU, Modular Chassis, Power supply 230 Volt 50Hz input. - Memory: RAM 256 MB, Flash 64 MB and should be upgradable. - Performance: 120 Kpps. - Interface / Slots. Ethernet 2 x 10/100Mbps, 4 E1/v.35 Ports, scalable to 12. 2 Free slot, Console port 1 number. Optional Interfaces of ISDN BRI, V.35 sync serial (2 Mbps), E1 (G.703) E3 for future uplink purpose. - Routing Protocols: Static Routing , RIPv1, RIPv2, OSPF , BGP4, Policy Routing - Protocols. PPP, Multi link PPP, IPv4, NAT, PAT, Multicasting PIM or MOSPF. - VPN/Tunnel : tunnelling and Hardware based IP Sec 3DES/AES VPN with at least 40 Mbps 3DES / AES throughput - Encryption: IP Sec 3DES/AES. - Security: NAT, PAT, Multilevel Access control, Support for ACL to provide supervision and control. Controlled SNMP Access through implementation of Access Lists on the router to ensure SNMP access only to the SNMP manager or the NMS workstation. Support for Remote 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>Authentication User Service (RADIUS) and MD5 Authentication, Controlled SNMP, Integrated Firewall, IPS to provide security for internet router.</p> <ul style="list-style-type: none"> - Management & Upgradeability: Accessibility using Telnet, SSH, Console access for administration and configuration, Support FTP or TFTP for easy software upgrades over the network. SNMPv1, snmpv2/v3, Support configuration management through the CLI, GUI or web interface shall be available. Event and system history logging functions shall be available. Support Syslog Support pre-planned timed reboot to upgrade their hardware to a new software feature and plan the rebooting as an off-peak time. - Physical. <p>Router should be provided with 19” Rack mountable unit.</p>	
1.4	Firewall	<ul style="list-style-type: none"> - Power Supply: 200-240 VAC, 50 Hz, - Physical attributes: Should be mountable on 19” Rack, Modular Chassis. - Hardware Interfaces 6 x GE (SX/T), Console Port 1 number. - Adequate memory DRAM/Flash Encrypted throughput: minimum 1Gbps, Concurrent connections: up to 200,000, Simultaneous VPN tunnels: 2000 - Architecture. Should be installed in Redundancy, - Routing Protocols - Static Routes, OSPF Firewall Route 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>redistribution between any of the above protocols (optional)</p> <ul style="list-style-type: none"> - Protocols. TCP/IP, PPTP, RTP, IPSec, PPPoE, RTP , SIP, H.323 , FTP, HTTP, HTTPS, SNMP, SMTP, TFTP, DHCP, DNS - Other support. 802.1Q, NAT, PAT, IP Multicast support, Remote access VPN, Logical interface support (VLAN), Layer 2 Firewall. Additionally Time based Access control Lists may be an optional feature. - Access.: Radius/AAA /QoS. QoS features like traffic prioritization, differentiated services, committed access rate. Should support for QoS features for defining the QoS policies. Support for Low Latency Queuing. L2 and L3 CoS/DSCP Priority Mapping. - Encryptions: IPSec, DES/3DES/AES, Hardware, software. - Management: Console, Telnet, SSHv2, Browser based configuration, SNMPv1, snmpv2/v3. - Maintenance & Serviceability.: Scheduled System Reload (Reboot), Main components like motherboard, IO board, power supplies and fan tray should be replaceable. 	
1.5	DMZ/Internet Switch	<ul style="list-style-type: none"> - Interface /Slots: 1 x 24 ports 10/100/1000 BaseTX out of which four ports should support 1000 Mbps single mode fiber. - Performance: Packet forwarding rate should be above 35.7 Mpps, 32 Gbps Full Duplex or 48 Gbps Half Duplex switching fabric capacity. - General Features 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<ul style="list-style-type: none"> - Layer3 - with following support (RIPv1, v2, OSPFv2/v3, VRRP, DHCP) , Support Port Mirroring , Support Port Trunking, Link Aggregation , IEEE 802.1Q VLAN encapsulation Minimum 255 VLAN , Support Port based network access control (802.1x), Support port security. Traffic shaping and policing , MAC Address security/MAC Address Notification support which allows for notification of new users added or removed. - Management RS-232 Console port, Easier Software upgrades through network, using FTP / TFTP, etc. Accessibility using Telnet, SSH, Console access. Easier Software upgrades through network, using FTP/TFTP, etc. SNMPv1, snmpv2/v3 , Configuration management through CLI, GUI based software utility and using web interfaces. GUI tools shall be provided. Event and system history logging functions shall be available. Support for Syslog Server required. Switch should Have CPU utilization monitoring & Port description. - Standards. IEEE 802.1x support , IEEE 802.3x full duplex on 10BASE-T or 100BASE-TX or 100BASE- TXports , IEEE 802.1d Spanning-Tree Protocol, IEEE 802.1p class-of-service (CoS) prioritization IEEE 802.1Q VLAN, IEEE 802.1s , IEEE 802.1w IEEE 802.3 10BASE-T specification , IEEE 802.3u 100BASE-TX specification. - Power Supply 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>Internal power supply 230 Volt 50Hz input. Should have support for redundant power supply.</p> <ul style="list-style-type: none"> - Mounting: 19" Rack mounting kit - L3 features <p>IGMP v1, v2, / v3, ICMP support, IPv6 support with delivered configuration. If the equipment do not support IPV6 from day One, OEM and Successful bidder (both) will give in writing that equipment will be made IPV6 enabled before the end of year 2008, without any additional cost, without affecting running network and without causing any considerable downtime in the network at that time.</p>	
1.6	RAS	<ul style="list-style-type: none"> - Hardware Architecture: Modular Chassis , Power supply 230 Volt 50Hz Input - Memory: RAM 256 MB, Upgradeable to 512 MB. Flash 64MB, Upgradeable to 128 MB. - Performance: 0.5 Mpps - Interfaces : 2xGigabit Ethernet 10/100/1000 Mbps, ISDN PRI 8 ports, Console port 1 Port. - Routing Protocol: Static routing, OSPF, RIP v1, v2, BGP4. - Protocol.: Multi protocol over IP/ MPLS , TCP/IP , PPP, IP Sec , 802.1x, 802.1Q, NAT, PAT. - Dialing: Multicast traffic forwarding, Dial-backup using ISDN, Dial (in/out). - Security Access control list, Multi-level Access control, Support for Remote Authentication User 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>Service (RADIUS) and AAA, Dial (in/out).</p> <ul style="list-style-type: none"> - QoS <p>IP Precedence, Bandwidth optimization.</p> <ul style="list-style-type: none"> - Encryptions. <p>IP-Sec, 3DES/AES.</p> <ul style="list-style-type: none"> - Management <p>SSH, Browser based configuration, Accessibility using Telnet, SSH, Console access for administration and configuration, Support FTP or TFTP for easy software upgrades over the network, SNMPv1, snmpv2/v3, Support configuration management through the CLI, web interface shall be available. Event and system history logging functions shall be available.</p> <p>Support Syslog, Support pre-planned timed reboot to upgrade their hardware to a new software feature and plan the rebooting as an off-peak time.</p> <ul style="list-style-type: none"> - Physical <p>Should be mountable on 19” Rack, All accessories Including data cables, clamps, connectors, etc to be provided.</p>	
1.7	IP Phones Type -1	<ul style="list-style-type: none"> • The IP phone should include a backlit, high-resolution color touch-screen display for easy access to communication information, timesaving applications, and feature usage. • The IP Phone should enable customers and developers to deliver more innovative and productivity-enhancing Extensible Markup Language (XML) applications to the display. • The IP Phone should support access to eight telephone lines (or combination of lines and direct 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>access to telephony features), a high-quality hands-free speakerphone, a built-in headset connection and IEEE 802.3af PoE.</p> <ul style="list-style-type: none"> • The IP Phone should have the following: <ul style="list-style-type: none"> ○ Message ○ Directories ○ Settings ○ Services ○ Help • Settings & Specifications: The IP Phone should have the following settings: <ul style="list-style-type: none"> ○ Display contrast ○ Ring type ○ Network configuration ○ Call status <p>Network Features</p> <p>Network features for the IP Phone should have the following:</p> <ul style="list-style-type: none"> • Layer 2 Discovery Protocol • Automatic IEEE 802.1q (VLAN) configuration • G.711a, G.711u, and G.729ab audio compression codecs • Integrated Ethernet switch • 10/100BASE-T Ethernet connection through an RJ-45 interface for LAN connectivity • Software upgrade supported using a TFTP server • Provisioning of network parameters through DHCP • Voice activity detection, silence suppression, comfort-noise generation, and error concealment 	

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		<p>Additional Features</p> <ul style="list-style-type: none"> • G.711 and G.729a audio compression • An IP address assignment-DHCP client or statically configured • Comfort noise generation and voice activity detection (VAD) programming on a system basis • The phone should support SCCP or H.323 or SIP • Video Telephony support. 	
1.8	<p>IP Telephony System (Soft-Switch)</p>	<p>General Requirements</p> <p>IP PBX also referred as central soft switch. The solution should be active-active configuration. Architecture should be Server-client, where server is central soft switch, providing VoIP based calls to IP telephone (clients). The system should be scalable to 4000 IP phones. There should be provision for expansion for Analog and digital phones. Soft switch would support for call processing and call-control centrally. The system should support at least four party audio conferences. Shall provide integrated end2-end QoS feature for voice quality across LAN as well as WAN connectivity. (Optional). System should have IP architecture and provide support for integrated telephony solution for Digital, Analog & IP Phones. IP Telephony Soft switch System should support survivability across the WAN;</p> <p>Such as in the event of WAN failure local site should be able to carry IP Telephony Operations between DHQ and its BHQs.</p> <p>- System capabilities</p> <p>Attenuation and gain adjustment per IP Phone , Silence suppression, voice , activity detection , G.711 mu-law, a-law , G.723.1 (optional) ,</p>	

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		<p>G.729A/B , Distributed call processing - Solution should be fully redundant and fail-over in active-active configuration. Deployment of devices across an IP network. Soft switch should support for auto-call dis-connection. English Language support for client user, Pre-packaged alerts, monitor views, and historical reports. Real-time and historical application performance monitoring using tools and SNMP. Monitored data collection service. Real-time event monitoring and presentation to common Syslog. IP Telephony Soft switch should support Redundancy and automated fail over on call-processing failure, in active-active / active-standby configuration.</p> <p>- Solution features</p> <p>Abbreviated Dial, Answer and answer release, Barge, Call back busy, no reply to station , Call connection, Call coverage, Call forward-all, Call forward—busy, Call forward, no answer, Call hold and retrieve, Call Join, Call park and pickup Call pickup group-universal, Call status per line (state, duration, number), Call waiting and retrieve, Calling Line Identification, Calling Line Identification Restriction, Calling party name identification , Conference Barge, Conference List & Drop any party, Directory dial from phone Directories missed, placed, received calls list stored on IP phones, Distinctive rings, Extension mobility support, Hands-free, speakerphone, Immediate Divert to voicemail. Should support voicemail for future purpose, Last number redial, Malicious Call ID and Trace , Solution Features supported on IP Phones, analog and digital phones.</p> <p>- Administrative Features:</p> <p>Application discovery and registration to SNMP manager, Call detail records. CDR Analysis and Reporting Tools (such as statistics – calls</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>successful, duration, Call drops, etc.), Centralized, replicated configuration database, distributed Web-based management, Configurable Call Forward Display, Database automated change notification , Date and time display , Remote upgrading of IP phone devices , Dynamic Host Configuration Protocol block IP assignment for IP phones , Multilevel. Administration Access, QoS statistics recorded per call, Single point system and device Configuration.</p> <ul style="list-style-type: none"> • The system should be supplied with four party audio conference system. It should be available to DHQ and BHQ users if the link between SHQ and DHQ fails. 	
1.9	NMS	<p>Network Management Server/Software</p> <ul style="list-style-type: none"> - Should be centralized architecture at SHQ - Can be RISC /CISC based servers - should be inclusive with hardware, OS, patches, etc - should provide for future scalability of the whole system without major architectural changes - Should support monitoring / managing of SNMP v1, v2C, v3 supporting devices - Should be MIB-II compliant - Filtering of events should be possible, with advance sort option based on components, type of message, time, etc - Should support Web Interface. - Should provide accessibility to internal built-in database as well as compatibility to standard 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>data base including Oracle / SQL</p> <ul style="list-style-type: none"> - Network Monitoring <p>Ability to monitor network devices of various vendors and easily accessible through a common interface. Ability to monitor WAN links and LAN based on SNMP and RMON, providing traffic /percentage utilisation, error statistics etc. through various reports based on the environment monitored. Measure and collect data from, and set service level reporting on, ICMP echo (ping), SNMP MIB variable, services like HTTP, if required, Ability to monitor and report on availability, delay of target IP nodes – i.e. router interfaces - and monitor and provide reports on historical utilisation of CPU, memory of critical monitored servers running SNMP and system agents if required, Integration with enterprise management system and ability to provide monitoring of the network based on SNMP and also support RMON / RMON2.</p> <ul style="list-style-type: none"> - Service Level Monitoring <p>To provide various real-time and historical reports, providing the ability to format and present data in a graphical and tabular display. Should support automatic base lining on historical data, and thresholds that can be adjusted as required, based on data collected The system should have a Web-based user interface and provide service level reporting using a console. It should support data collectors distributed across locations on collect systems, which should be able to gather and measure statistics from the IT infrastructure if required Provide a status view of all data collections and systems involved, group data collections into report groups and assign them individual service goals and business hours if required. Ability to monitor and report on availability, delay of target IP nodes – i.e.</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>router interfaces - and also monitor and provide reports on historical utilisation of CPU, memory of critical monitored servers running SNMP and system agents if required. It should also be integrated with other modules of Enterprise management to provide service level reporting and be able to generate service level reports based on customised business process views if required.</p> <ul style="list-style-type: none"> - Security <p>Should be able to provide secured windows based consoles as well as secured web-based consoles for accessibility to NMS using network Should have web browser interface with user name and Password Authentication. It should be possible to view topology maps, events, reports etc. in full graphical format using standard web browser. Administrator / Manager should have privilege to create/modify/delete user. The Administrators can provide a restricted access to the user based on location, domain, device types, etc.</p> <ul style="list-style-type: none"> - Polling Cycle <p>Support discriminated polling Should be able to update router configuration changes like re-indexing of ports.</p> <ul style="list-style-type: none"> - Fault Management <p>Should be able to get fault information from the network in real time, and present the same in alarm window with description, affected component, time stamp, etc. arising due to any of the following, Pair Wise events (ex: link up/down) Chassis, Multiple reboot, De-duplication, Physical address mismatch, Authentication failure, Connector down, Scheduled maintenance. Should support</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>advanced filtering, to eliminate extraneous data / alarms in Web browser and GUI. Should be configurable to suppress events for key systems/devices that are down for routine maintenance or planned outage.</p> <ul style="list-style-type: none"> - Discovery <p>Should provide accurate discovery of layer 3 and heterogeneous layer 2 switched networks for Ethernet, LAN, WAN, Servers, etc.</p> <ul style="list-style-type: none"> - Presentation <p>Should be able to discover redundant and ISDN Backup Links with proper colour status propagation for complete network visualization. It should support dynamic object collections and auto discovery. The topology of the entire Network should be available in a single map. It give user option to create his /or her map based on certain group of devices, or region & Should be capable of taking snapshots of Network maps at a certain point of time for future reference Should have ability to display port labels on the connected devices on the Network map, as configured in the routers.</p> <ul style="list-style-type: none"> - System Monitoring <p>Should be able to monitor/ manage large, heterogeneous systems environment continuously.</p> <ul style="list-style-type: none"> - Windows OS <p>Should monitor / manage following: Eventlog monitoring, Virtual and physical memory statistics , Paging and swap statistics , Operating System , Memory , Logical disk , Physical disk , Process , Processor , Paging file , IP statistics , ICMP statistics , Network interface traffic ,</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>Cache , Services , MS Active Directory , Should be capable of view/start/stop the services on windows servers , Should be capable to present “Task Manager” of the Windows Server centrally and show the current running processes.</p> <ul style="list-style-type: none"> - Unix / Linux. <p>Should monitor with statistics : System CPU, idle CPU and wait I/O , System virtual memory (includes swapping and paging) , System load Disk Usage , Disk inode usage on each file system , Network interface traffic , Critical System log integration</p> <ul style="list-style-type: none"> - Infrastructure Services <p>IIS / Tomcat / Web server statistics , HTTP service , HTTPS service , FTP server statistics , POP3 Services , SMTP Services , Mail Server Services , ICMP services , Database Servers.</p> <ul style="list-style-type: none"> - Reporting <p>Shall able to generate reports for PBH, ESH and 24 hours separately. Shall be able to present the reports through web, and also generate “pdf” version reports of the same. Should provide user flexibility to create his /or her custom reports. Should provide information regarding capacity utilization and error statistics for physical and logical WAN links. Should create reports from historical data for trend analysis, capacity planning (also including MTBF) . Should be capable to send the reports through e-mail to pre-defined user with pre-defined interval .Should have capability to exclude the planned-downtimes or downtime outside SLA. Should be able to generate web- based reports both near real time and historical data for the systems and</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>network devices.</p> <ul style="list-style-type: none"> - Availability Reports <ul style="list-style-type: none"> o Overall Network Availability and Uptime o Daily, Weekly, Monthly, Yearly Basis , o Lease Lines, ISDN, LAN, Network o Devices, firewall and IPS and Servers Availability and Uptime o –Daily, Weekly, Monthly, Yearly Basis , o Trend Report , Top N report , Custom report , MTTA and MTTR reports , o Overall Network Availability and Uptime – Daily, Weekly, Monthly, Yearly Basis. - Performance Reports - Device Performance (Router, Switch, Security Device) - CPU and Memory utilized. - Link Input/Output Utilization (percentage, bps, kbps, mbps, octets/sec) - Lease Line, ISDN, Wireless, Trunks between Switches, - Link errors (lease lines, isdn, trunks, etc) - Network Latency , - Server and Infrastructure services statistics , - Trend report based on Historical Information, - Top N report, Custom report, Network Jitter. - SLA Reporting 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>Computation of SLA for entire CGSWAN network, Individual links , Able to generate automated Daily, Weekly, Monthly, Quarterly and Yearly SLA reports , Trend Report , At A Glance report , Top N report , Custom report.</p> <p>- Data collection</p> <p>For reporting, required DB (Oracle /SQL or any other) to be provided with all licenses.</p> <p>Should support ODBC /or relevant database and interfaces to RDBMS such as Oracle, SQL.</p> <p>Should have tools for building MIB</p> <p>Application used for testing devices on Multiple MIB parameters.</p> <p>Data Collection Should be possible on MIB</p> <p>Expressions using specific formulas like link utilisation in Kbps, Mbps, etc or any other OID.</p> <p>Should be having Storage capacity (HDD)</p> <p>Should support, all reporting data for 5 Years of CGSWAN operation.</p> <p>The Database for NMS can reside on different server/box.</p> <p>- Integration</p> <p>Should be able to receive and process SNMP traps from infrastructure components such as router, switch, servers, etc.</p> <p>Should be having integration of fault and configuration functions of element managers like Cisco Works 2000, Nortel Optivity, Enterasys manager, Microsoft's MOM etc.</p> <p>Should be able integrate with Helpdesk system</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>for incidents ,</p> <p>Should be able to send e-mail or Mobile –SMS to pre-defined users for pre-defined faults,</p> <p>Should trigger automated actions based on incoming events / traps.</p> <p>These actions can be automated scripts/batch files.</p> <ul style="list-style-type: none"> - Hardware - CPU : 2 numbers (capabilities to expand to 4 CPU), Processor 3.0Ghz (dual core) or higher with 2 x 2 MB L2 cache (dual-core) and 667 MHz FSB - RAM: 4 GB PC2-3200 DDR II 677 MHz RAM with ECC expandable up to 12 GB. - HDD:3x72GB or higher Serial Attached Storage (SAS) HDDs (10K rpm) with RAID 5 implementation - Network Card :2 X 10/100/1000Mbps - CD & DVD: 16x or higher DVD-ROM/ CD Writer Combo drive DAT Drive :20/40 GB SCSI DAT Drive. - Graphics card: minimum of 8 MB Display memory. - Ports: 1x Serial, 2xUSB, 1x PS/2 Mouse, 1x PS/2 KBD, 1xVGA , 2xRJ45, 1 Parallel Port Bays “:1x3.5” External , 3x5.25” External, 6x3.5” (Hot Swap) - Internal Keyboard :104 key - Standard. Mouse :Scroll Mouse (Optical) with OEM PAD 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>- Monitor :19" SVGA colour LCD monitor with maximum 0.27mm dot pitch & MPR -II compliant, anti glare, anti static coating, 1024 x 768 resolution at 72 Hz and 16 million colours, EMI/FCC (or ETDC Report for meeting FCC norms)</p>	
1.10	Help Desk Management	<p>- Framework</p> <p>Should be based on ITIL framework and support following ITIL processes: configuration, incident, problem, change and release management</p> <p>- Capabilities and Features</p> <ol style="list-style-type: none"> 1. Should support customizable thresholds for automated escalation of incidents, using SMS or e-mails, etc. 2. Should be capable to provide reports, like Total calls, calls resolved and unresolved, server calls, network calls, etc. 3. Should be have capability to assign incidents to technical specialist and groups automatically Calls assignment and escalation should be flexible enough to work as per the CGSWAN requirement. 4. SWAN successful bidder has to define and build and implement entire (CGSWAN) support process for: <ul style="list-style-type: none"> • Incident Management, • Service Level Management Problem Management • Change Management 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<ul style="list-style-type: none"> • Release Management <ol style="list-style-type: none"> 5. SWAN Successful bidder has to build entire support process / logic as per best practices of ITIL. 6. Support process can be reviewed bi-annually with CGSWAN appointed agency and suitable changes should be incorporated. 7. Should provide a graphical wizard or rule manager to create escalation, assignment, and database field update rules, without any need for programming. 8. Should help in preparing management reports from incident records 9. Should provide support to search the knowledge base by an end user 10. Should have Capability to support secure transaction over CGSWAN network 11. Should support role based access and views 12. Should give capability to Helpdesk personnel to assign incidents to the Technical Specialist either manually or automatically depending on the Nature of the Call. 13. Should help in creating escalation matrix on basis of incident Nature / Severity / Other Defined Parameters. 14. Should have ability to automatically create Trouble Tickets (TT) automatically, by integration with NMS 15. Should always provide accessibility through web or GUI using defined password by administrator. 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>16. Shall allow authorised users to change the passwords</p> <ul style="list-style-type: none"> - Incident Management <p>Should have option to log call through Web interface from user Creation, modification and closure of incident records incident registration with along with following fields: time, date and incident number fields mandatory</p> <p>Restricted access to incident records Classification of incidents</p> <p>Customizable call status and closure codes tool enable and maintain the relationships between incidents, known error, and problem records the tool facilitate the closure of all incidents when the associated problem or known error is resolved</p> <p>The helpdesk shall allow tracking progress of an incident with deadline management.</p> <ul style="list-style-type: none"> - Configuration Management <p>Should facilitate the recording of categorization codes in terms of affected service or CI type. Should facilitate the recording of CI attributes, such as serial number, version, and location</p> <p>Should facilitate the establishment of relationships between CIs, and with associated User/or people</p> <p>Should facilitate only authorized access to the CMDB for read, write, and modify activities</p> <p>Should facilitate the logging of historical changes to the CI record for auditing purposes Should facilitate the verification of the CI data with the actual physical infrastructure</p>	

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		<p>Should provide flexible management reports regarding CI inventory, asset and financial information to facilitate configuration audits</p> <p>Solution CMDB facilitate in identifying of infrastructure components that are problematic or unstable</p> <p>Should facilitate the automated reestablishment of parent and child relationships when Clients are added, deleted, or updated Should have capability to record User/People data, such as Name, ID, location, Address, contact, or customised field whenever required.</p> <p>Should have capability to export or import the CMDB in xml format</p> <p>Should have capability to archive older records in CMDB for incidents, faulty equipment</p> <p>- Service Level Management</p> <p>Should facilitate the input of service level targets in terms of operational requirements</p> <p>Should manage the scheduling of the review cycle and life span of an SLA</p> <p>Should automate service delivery threshold monitoring against defined service agreements</p> <p>Should record the actual resolution and response time against the required as per SLA</p> <p>Should facilitate the linkage of CI impact attributes such as critical CI's to Service Level Agreements</p> <p>Should facilitate the production of real time graphical service summaries, including identification of threshold breaches</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>Should facilitate the customization of reports to a specific audience Should have capability to monitor SL for under-pinning services.</p> <ul style="list-style-type: none"> - Problem Management <p>Should facilitate in supporting Problem Management process.</p> <p>Should facilitate in linking the similar incidents for fixing the issues by identification of true cause of failures.</p> <p>Should maintain the audit trail of entire problem management process.</p> <ul style="list-style-type: none"> - Change Management <p>Should facilitate in Supporting the Change management process.</p> <p>Should provide suitable interface with Change Advisory Board (CAB) for approving the recommended changed .</p> <p>Should maintain the audit trail of change management process.</p> <ul style="list-style-type: none"> - Release Management <p>Should facilitate the task of software auditing.</p>	
1.11	Multipoint Control Unit (MCU)	<ul style="list-style-type: none"> - General <p>Should be flexible enough to start with small and simple video conferencing need but expandable to large and complex video conferencing.</p> <p>Should support both desktop software based Video endpoints and hardware based conference room endpoints.</p> <p>The software and hardware based video endpoints</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>should be from same OEM as that of MCU to avoid any kind of interoperability /compatibility issues. However, TV/LCD can be from different OEM.</p> <ul style="list-style-type: none"> - Protocols Support H.323, SIP, H.320, H.239, H.235, H.281,H.243, H.245, G.711, G.729 , H.261, H.263, H.263+, H.263++, H.264. - System Capacity Should have dial-in and/or dial-out capability Picture in Picture Dynamic layout according to the number of conference participants Multiple voice-activated modes, including All-See-One, You-See-Me, Auto-Zoom Should support symmetrical and asymmetrical up and down streams for optimal bandwidth utilization Should provide the ability to directly connect IP Should have the capability that allows users to easily identify other conference participants by displaying names, locations, active speaker indication, background colours or other identifying information, etc. Should dial-out automatically to all participants, retry dial-out conferences to complete call setup and should report specific failures Should have dial-in feature providing one number access for all participants on the call 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>PSTN, mobile (GSM and CDMA) participants in the same call with external gateway (Optional)</p> <p>Should provide video participants and audio participant in a single conference</p> <p>From day one it should have capacity to handle 8 participants on single screen, expandable upto 16</p> <p>Should support 180 ports on IP @ 384kbps and 12 ports on ISDN @ 384kbps</p> <p>Should support integrated audio conferencing (“audio add-on”), enabling people to participate in the audio portion of the conference using any telephone with POTS service</p> <p>Should provide true full-duplex audio to all conference participants.</p> <p>To prevent background noise from being included in the audio mix and to minimize the unwanted and distracting noise-triggered video switching, the MCU should adjust to the varied acoustic conditions of different rooms and distinguish speech from background noise. For this each of the audio conferencing ports should have embedded network</p> <p>echo cancellers that prevent telephone network (hybrid) echo from disrupting the conference</p> <p>Should provide a host of audio and video processing capabilities. System shall support hardware based video conferencing end points and software based video end points over IP.</p> <p>- Gatekeeper</p> <p>It should be provided along with MCU and end-points. It should also be from the same MCU manufacturer or certified partners, along with</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>required hardware and software.</p> <ul style="list-style-type: none"> - Bandwidth flexibility Each endpoint in a video conference should participate according to individual video bandwidth capabilities without affecting the connection of other participants. - QOS Support for Differentiated Services markings (ToS, CoS) - Security & Privacy Password protection for conferences to ensure privacy for participants Administrative functions should be password-protected. - Scalability Capable of creating large conferences by cascading conferences between multiple Multipoint Control Units. Capable to increase the conferencing capacity by creating an MCU cluster. Capable to support conferencing with non CGSWAN Videoconferencing system or equipment using IP networks. - Monitoring and Management Should help in administration by using GUI or Web interface for remote monitoring and configuration The MCU across chassis and modules should support the same Operating System and software The upgrade to new software on the MCU should 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>be possible through the GUI/Web based interface.</p> <p>The MCU administration interface should support viewing to conference level monitoring and management up to participant level and MCU resource management. Real-time conference control , Password protection for Administrator, Conference organiser and User , Conference statistics , Conference admission , Successful bidder assistance.</p> <ul style="list-style-type: none"> - Interface Support : Ethernet 1 x 10/100 Mbps Port . ISDN PRI (Optional) - Power: Input 220 V AC, 50 Hz. - Physical attributes: Should be mountable on 19” Rack. 	
1.12	Interface Server	<ul style="list-style-type: none"> - Users <p>Infrastructure Services required for 3000 end devices for immediate use.</p> <ul style="list-style-type: none"> - Directory Services <p>Should provide for Directory Services, which is compliant with LDAP v3 specifications.</p> <p>Support for integrated LDAP compliant directory services to record information for users, desktops, and network resources and help in availing resources to users and applications.</p> <p>Should support integrated authentication mechanism across operating system, messaging services.</p> <p>Should support directory services for ease of management and administration/replication.</p> <p>Should provide support for Group policies and software restriction. Should provide support for</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>modifiable and extensible schema .</p> <p>Should support security features, such as Kerberos, smart cards, public key infrastructure (PKI), etc</p> <p>Should support that user account creation/deletion rights within a group or groups can be delegated to any nominated user.</p> <p>Should support that password reset capabilities for a given group or groups of users can be delegated to any nominated user.</p> <p>- DNS</p> <p>Support integration with other network services like DHCP, directory, etc.</p> <p>Should support DNS zone storage in Directory</p> <p>Should support conditional DNS forwarders e.g. forwarding based on a DNS Domain name in the query.</p> <p>Should allow clients to dynamically update resource records secure and non-secure</p> <p>Should Support incremental zone transfer between servers</p> <p>Should provide security features like access control list</p> <p>Should support several new resource record (RR) types like service location (SRV) , etc.</p> <p>Should support Round robin on all resource record (RR) types.</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
1.13	Mailing server	<p>Server platform: Windows/ Solaris AIX/ AS400 / Linux</p> <p>Should provide support for digital signatures</p> <p>Should provide support for LDAP V3 Directory access.</p> <p>Should provide support for simple, flexible administration using a Web browser / MMC or any other management console.</p> <p>Should support tools for message tracking and monitoring management.</p> <p>Should support for application level or OS level clustering and automatic fail over and load balancing services</p> <p>Should provide support for POP, IMAP4, SMTP and Web based Access.</p> <p>It Should support SSL encryption with 128/168 bit key and RSA keys.</p> <p>Should Allow administrators to automate notification and distribution of e-mail client software upgrades remotely. (optional)</p> <p>Administrators should be able to assess server performance and behavior in a historical context and in real-time.</p> <p>X.509 V3 support - that provides a standard for all digital certificates.</p> <p>Periodic or per-message notification when the quota is exceeded.</p> <p>Support for Admin Script.</p> <p>Should support for application level or OS level clustering and automatic fail over and load</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>balancing services.</p> <p>Infrastructure should be scalable to support collaboration and workflow / rules automation.</p> <p>Should be capable of developing these workflow applications rapidly and easily. Mailing server can leveraged by other application or can leverage other workflow application. Application development should support both J2EE and .Net integration.</p> <p>Support for SOAP 1.1 over HTTP.</p> <p>Messaging server should be capable of implementing Private Blacklist, Private White lists and DNS White lists.</p> <p>Should support browser access of email.</p> <p>Should provide a facility to monitor, manage and administer all the messaging related servers and applications centrally</p> <p>Should provide support for simple, flexible administration using a web browser or any other management console.</p> <p>Should be capable of providing policy based administration controls.</p> <p>Should provide for horizontal and Vertical scalability.</p> <p>Should provide reporting features to monitor Statistics and Events on the servers. NMS Should Support monitors all the messaging servers in the enterprise. The monitoring tool should provide suggestive measures in case of problems found by the monitoring tool. This way the administrator can take pro-active measures on the applications deployed on the messaging.</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>Messaging System should have in build compliance engine to enforce government compliance & regulation requirements</p> <p>Messaging system can be able to provide archiving & message indexing/ journaling capabilities on per user, per distribution list and per database basis. This feature is required for fast recovery of messages on mailbox or portal server</p> <p>Messaging solution can be able to provide customizable message classification like confidential, personal, company/department confidential, do not forward, client attorney privileged etc</p> <p>Messaging solution should be able to provide end to end encryption with a minimum of 128 bit key encryption</p> <p>Messaging solution can be able to enforce email retention settings on users so emails can be retained/archived/deleted as per CGSWAN policies</p> <p>Messaging solution should provide with Up-to-date notifications synchronization with Pocket PC and smart phones with unlimited user license within the State of Chhattisgarh.</p> <p>Messaging solution can be capable of administration through a interface to provide server level control and configuration of the messaging system for all servers including: Create / rename /delete mail accounts Reset / set user passwords for both Directory</p> <p>Security & Encryption: Messaging solution should be able to provide end to end encryption of data namely from Client-to-Server, Server-to-</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		Server.	
1.14	Proxy Server	<p>- Proxy</p> <p>Should support High Performance web caching.</p> <p>Should support web caching features like fast random access memory caching and disk caching to enhance web performance.</p> <p>Should support distributed and hierarchical caching.</p> <p>Should support integration with directory services.</p> <p>Should support caching rules and policies.</p> <p>Should support Multiple network configuration</p> <p>The solution should provide HTTP protection by blocking executable files that launch dangerous code such as spy ware, worms, and viruses. The HTTP filter should be configurable to block dangerous file types, Web page extensions, and pages containing keyword (optional if it is already available as a part of Antivirus Solution).</p> <p>- Anti-Virus</p> <p>Should restrict e-mail bound Virus attacks in real time without compromising performance of the system.</p> <p>Should be capable of providing multiple layers of defence and should be capable of installation on both the gateway as well as Mailing servers</p> <p>Should be capable of detecting and cleaning virus infected attachments as well.</p> <p>Should support scanning for ZIP, RAR</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>compressed files, and TAR archive files Should support Hot upgrade, where by most product upgrades and patches can be performed without bringing messaging server off-line.</p> <p>Should use multiple scan engines during the scanning process</p> <p>Should support in-memory scanning so as to minimize Disk IO.</p> <p>Should support Multi-threaded scanning.</p> <p>Should support scanning of a single mailbox or a one off scan.</p> <p>Should support scanning by file type for attachments</p> <p>Should support scanning of nested compressed files</p> <p>Should be capable of specifying the logic with which scan engines are applied; such as the most recently updated scan engine should scan all emails etc</p> <p>Updates to the scan engines should be automated and should not require manual intervention</p> <p>Updates should not cause queuing or rejection of email</p> <p>Updates should be capable of being rolled back in case required</p> <p>Should support content filtering based on sender or domain filtering</p> <p>Should provide content filtering for message body and subject line, blocking messages that contain keywords for inappropriate content</p> <p>File filtering should be supported by the proposed</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>solution; file filtering should be based on true file type.</p> <p>Should support integration of an anti-spam software</p> <p>Should support various types of reporting formats such as CSV, HTML and text files</p> <p>Should be capable of being managed by a central management station</p> <p>Should support insertion of disclaimers to message bodies.</p>	
1.15	Hardware Specification for All Infrastructure Servers	<ul style="list-style-type: none"> - OS Windows / Unix / Linux (with patches, license, Support, Subscription, Anti virus, etc). - Hardware CPU :1 number (capabilities to expand to 2 CPU) Processor Intel Xeon 3.0Ghz (dual-core) or higher with 4 MB L2 cache (dual-core) and 1333 MHz FSB / or equivalent RAM: 4 GB PC2-3200 DDR II 667 MHz RAM with ECC fully buffered memory expandable up to 12 GB HDD: 3x146GB or higher Serial Attached SCSI (SAS) Hot Pluggable HDDs (10K rpm or higher, 3.5”) with RAID 5 implementation. Network Card: Dual: 10/100/1000Mbps RAID: SAS RAID controller with at least 256MB of battery-backup cache. CD & DVD: 16x or higher DVD-ROM/ CD Writer Combo slimdrive 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>Graphics card: minimum of 8 MB Display memory.</p> <p>Ports: 1x Serial, 2xUSB, 1x PS/2 Mouse, 1x PS/2 KBD, 1xVGA , 2xRJ45,.</p> <p>Slots: At least 3 PCI/ PCIe slots.</p> <p>Keyboard: Please see details of KVM.</p> <p>Mouse: Switch along with one.</p> <p>Monitor: Keyboard and one Optical Mouse.</p> <p>- Chassis</p> <p>The chassis with redundant hot-swap power supplies. The chassis should have necessary provision to connect to an external SAN array with 2 FC Ports on separate cards (4 gig., option for additional 2 redundant ports). LEDs to show system activity and status of components chassis having 6 HS drive bays with Hot Swap power supply, (Optional: Daisy chaining feature to connect more Rack Server).</p> <p>- Ports</p> <p>1x Serial, 2xUSB, 1x PS/2 Mouse, 1x PS/2 KBD, 1xVGA , 2xRJ45,</p> <p>- Software</p> <p>All required device driver software as per above configuration, in media with manual, for OS installation, System Configuration & Management.</p> <p>- Server Management Features</p> <p>Remote management of the server over LAN/WAN</p> <p>Hardware remote console feature</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>In band & out of band remote management</p> <p>Remote power On</p> <p>Server health logging & Monitoring Advance warning for processor & memory failure</p> <p>Integrated management log.</p> <p>- Certifications</p> <p>Energy star compliant, NSTL, FCC (EMI EMC/ETDC) certified, ISO 9001: ISO 14001, ACPI compliant, PCI compliant.</p> <p>- OS Certifications: Certified for proposed OS.</p>	
1.16	Web Server	<p>Should support integrated Web server solution with fault tolerance, requesting queuing, application health monitoring, automatic application recycling, caching</p> <p>Should support load balancing.</p> <p>Should be capable to store web server configuration data in XML, configuration versioning.</p> <p>Should support web based administration.</p> <p>Should Support for Web Distributed Authoring and Versioning and Web Folders.</p> <p>Should support XML web services.</p> <p>Should support Digest and advanced Digest authentication.</p> <p>Should support integration with certificate services</p> <p>Hardware specification same as given above for Infrastructure Servers</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
1.17	KVM Switch	<p>- Hardware</p> <p>19" Rack Mountable , 16 Port KVM Switch</p> <p>Port: Video ,VGA, Standard Keyboard/Mouse: PS/2 or USB, 12 foot Cables for Keyboard/ Display/ Mouse</p> <p>Screen Resolution: PC text mode: 720x400 , PC graphic modes: 640x480, 800x600, 1024x768, 1152x864, 1280x1024.</p> <p>Monitor, KBD, Mouse :17" TFT color monitor with minimum Brightness 300cd/m2, Contrast Ratio 600:1, Resolution 1280 x 1024 or higher, Viewing Angle (Degrees) 130° (vertical), 140° (horizontal) or better , response time 8ms, Horizontal Frequency(kHz) 30~81 KHz, Vertical Frequency(Hz) 56~75 Hz, TCO99/ 03, EMI/FCC (or ETDC Report for meeting FCC norms) compliance, energy star compliance, same brand as that of PC. Keyboard, Mouse same brand as that of PC.</p> <p>SWAN Successful bidder can design the placement of Servers as per their Design. Keyboard, Mouse and Monitor asked with each</p>	
1.18	Workstations to be provided at each PoP	<p>- Hardware</p> <p>HDD :80GB SATA or higher (7200 rpm or higher)</p> <p>Keyboard :Standard 104 keys</p> <p>Mouse :Optical Scroll mouse with OEM Pad</p> <p>Network Card :10/100/1000Mbps with full duplex and WOL support</p> <p>FDD :1.44 FDD</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>CD :16x DVD ROM- CD RW (Combo Drive) or higher</p> <p>Ports :1x Parallel, 1xSerial, 8xUSB, 1x PS/2 Mouse, 1x PS/2 KBD, 1xVGA, 4xUSB & 1xRJ45</p> <p>USB :4 or more</p> <p>Monitor :17" TFT color monitor with minimum Brightness 300cd/m2, Contrast Ratio 600:1, Resolution 1280 x 1024 or higher, Viewing Angle (Degrees) 130° (vertical), 140° (horizontal) or better , response time 8ms, Horizontal Frequency(kHz) 30~81 KHz, Vertical Frequency(Hz) 56~75 Hz, TCO99/ 03, EMI/FCC (or ETDC Report for meeting FCC norms) compliance, energy star compliance, same brand as that of PC</p> <p>OS :Pre-installed Operating System with patches, license, 5 years' Support/ Subscription, (Anti-virus if any), Standard Desktop software (like office tools)</p> <p>Multimedia :Onboard audio with 2x3 watt rms speakers, microphone</p> <p>Certifications :Energy star compliant, NSTL, FCC (EMI EMC/ ETDC) certified, ISO 9001: ISO 14001, ACPI compliant, PCI compliant</p> <p>OS Certifications :Certified for proposed OS</p>	
1.19	RACK 42U	<p>- Physical Attributes</p> <p>Height :42U</p> <p>Rack Type :Floor mount with caster wheels</p> <p>Wire managers :Two vertical and four horizontal</p> <p>Power distribution :(5Amp sockets) power</p>	

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Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>distribution</p> <p>Door :Glass door in front with lock</p> <p>Fan trays :With 4 fans</p> <p>Depth :1000 mm</p> <p>Metal :Aluminum extruded profile</p> <p>Side panels :Detachable side panels</p> <p>Width :19" equipment mounting, extra width is recommended for managing voluminous cables</p> <p>Castors: Suitable castors with brakes.</p> <p>Size to suit network equipment specified by the bidder with sufficient free power points.</p>	
1.20	<p>Authentication, Authorisation and Accounting (AAA) Server.</p>	<ul style="list-style-type: none"> - Hardware Architecture <p>Should support high availability and shall be appliance based architecture.</p> - Administration <p>Web based GUI Interface for configuring users, groups and server configuration.</p> <p>Should be able to configure different access level for various administrators.</p> <p>Should be capable of defining the group policy to enforce and change of administration over all the devices on network.</p> - Feature Set <p>It should support LDAP authentication forwarding for user profiles stored in CGSWAN directories.</p> <p>Should provide Authentication, Authorization and</p> 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>Accounting services for users dialing into CGSWAN from remote locations to RAS</p> <p>Should support RADIUS features</p> <p>Should be able to define multiple ACL's which can be applied on networking device per user or per group basis.</p> <p>Should be able to manage and control accessibility based on time of day, number of sessions and day of week access restrictions, MAC Address, IP Address, etc.</p> <ul style="list-style-type: none"> - Log <p>Should maintain log files internally</p> <p>Should support logging of files to a Syslog server.</p> <ul style="list-style-type: none"> - Control <p>Should be capable to restrict or allow session based on IP address, Hostname or MAC address.</p> <ul style="list-style-type: none"> - Power <p>230 V AC , 50Hz</p> <ul style="list-style-type: none"> - Cables and accessories <p>Should be Rack mountable in 19" Rack , All accessories including data cables, clamps, connectors, etc to be provided.</p> <ul style="list-style-type: none"> - Hardware <p>Hardware specification same as given above for Infrastructure Servers.</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
1.21	UPS 20 KVA	<ul style="list-style-type: none"> - Manufacturer: ISO 9001-2000 And ISO 14001 Certification - Safety Standards EMC/EMI as per SAMEER/ ERTL/ Equivalent Certification - Technology Inverter device IGBT based , Microprocessor controlled, Double Conversion True Online UPS - Voltage Regulation: 220,230,240V +/- 1%. - Rated Output current: 41A - Switching Frequency >15 KHZ. - Output Frequency regulation Free running Mode 50/60 Hz \pm 0.5%, Sync Mode 50/ 60Hz \pm 2 Hz. - Harmonic Distortion(THD) <2% (linear load), <6% (non-linear load). - Output Waveform Pure Sine wave. - Crest Factor 3:1. - Output Power Factor 0.7 - Battery Backup 2 Hours on full resistive load. - Battery Type Sealed Maintenance Free VRLA type. Minimum VAH - 12480 - DC Bus Voltage 	

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Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>DC Bus Voltage of UPS to be specified.</p> <ul style="list-style-type: none"> - Battery Enclosure MS Rack Powder Coated. - Operating Temperature: 0 to 45 degree centigrade. - Operating temperature: 0 to 40 degree C. - Power 220V-240V AC, 50Hz, with redundant supply. - Noise level: <55 dB @ 1 Meter. - Alarms & Indications All necessary alarms & indications essential for performance monitoring of UPS to be incorporated. - Bypass: Automatic Bypass. - Overload capacity 105% to 120 for 10 minutes >130 % for 1 Sec. - Compatibility UPS to be compatible with DG Set supply and mains supply. - Standard RS 232 port for software interface, SNMP interface support. - Dimensions Bidder to specify dimensions (H x W x D) for UPS & Batteries Set. 	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<ul style="list-style-type: none"> - Architecture <p>UPS systems should have redundancy upto 3 module.</p>	
1.22	<p style="text-align: center;">Air-Conditioner – 4 tonnage</p>	<ul style="list-style-type: none"> - Capacity <p>Capacity 4 Tonnage, Cooling 50000 BTU/Hr, Compressor Rotary, Refrigerant R-22 type, Power Supply 230V/Ph.</p> <ul style="list-style-type: none"> - Performance <p>EER 10.6, Air Circulation CFM 1030, Noise level <50db.</p> <ul style="list-style-type: none"> - Operation <p>Remote Control LCD.</p>	
1.23	<p style="text-align: center;">Generator Set – 30 KV</p>	<ul style="list-style-type: none"> - Engine type <p>Multi-cylinder, in accordance with IS 10002-1981 with latest amendments.</p> <ul style="list-style-type: none"> - General Features <p>Electric start 12 V DC. Water cooled /Air cooled, Mechanical/Electronic Governor, Fuel Æ High speed diesel, Rating Continuous.</p> <ul style="list-style-type: none"> - Output <p>Suitable HP rated to match the alternator Rated Speed 1500 RPM.</p> <ul style="list-style-type: none"> - Over load capacity <p>10% overload – 1 hour , 50% overload – 15 second</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>- Accessories</p> <p>Flywheel to suitable diameter and fuel injection equipment , Air cleaner</p> <p>Lubricating oil cooler</p> <p>Electric motor starting equipment like motor, battery, charging generator with voltage regulator etc.</p> <p>Heavy duty radiator with fan.</p> <p>Residential type silencer with exhaust piping with vibration isolator. Fuel tank suitable for 8 Hrs of continuous running with necessary piping and fuel gauge, drain valve, inlet and outlet connections.</p> <p>Anti vibration mounting pads.</p> <p>Speed controlling governor.</p> <p>Suitable coupling system to the Alternator.</p> <p>Tachometer.</p> <p>Lubricating oil pressure gauge.</p> <p>Hour meter to indicate number of Hrs of operation.</p> <p>Auto trip on low oil pressure</p> <p>Over speed alarm with trip.</p> <p>Thermal insulation for exhaust line with glass wool, Aluminium sheet, chicken mesh, Diesel line 12 mm dia including beads flanger etc.</p> <p>Battery 12 V with lead and terminal.</p> <p>Battery charger. Protection against low lubricating oil pressure, high water temperature and over speed shall be provided for engine with</p>	

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Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>alarm and fuel shut off.</p> <p>- Alternator</p> <p>Output 30 KVA.</p> <p>P.F 0.8 lag.</p> <p>Voltage 415V, 3Ph.</p> <p>Type continuous running duty type.</p> <p>Frequency 50 Hz.</p> <p>Phase 3,4 wire .</p> <p>Speed 1500 rpm.</p> <p>Cooling Air-cooled / water cooled.</p> <p>Over load capacity 10% overload – 1 hour 50% overload – 15 second.</p> <p>Lubrication forced.</p> <p>Excitation Self excited, self regulated, automatic voltage regulator with remote voltage control facility.</p> <p>Permissible voltage variation \pm +/-1.5% of rated voltage.</p> <p>Insulation Class H.</p> <p>Base frame Engine and alternator shall be coupled and mounted on sturdy, fabricated, welded construction, channel iron base frame with coupling guard.</p> <p>- Control Panel</p> <p>The Genset control panel shall be of 14 SWG CRCA sheet and powder coated finish. The panel shall be provided with standard engine instrumentation, Voltmeter with selector switch,</p>	

Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>Ammeter with selector switch, Frequency meter, Current transformer, Instrument Fuses etc. MCCB/MCB of suitable rating shall be provided for overload and short circuit protection.</p> <ul style="list-style-type: none"> - AMF <p>AMF facility shall be provided for the DG set. AMF relay shall be provided in the control panel/Electrical panel with required control wiring and Contactors for automatic operation shall be done.</p> <ul style="list-style-type: none"> - Acoustic enclosure <p>Weather and sound proof Acoustic enclosure shall limit sound level below 70 db at 3 m distance from the set. Minimum 50 cm all round clearance shall be provided inside. The exhaust pipe shall be minimum 1.8 m above ground level. Additional Canopy shall be provided over the Acoustic enclosure with suitable steel structure.</p> <ul style="list-style-type: none"> - Dimensions <p>Bidder to specify dimensions (H x W x D).</p>	
1.24	<p>Modem Specifications for Leased Lines</p>	<ul style="list-style-type: none"> • Visual Indication & RS-232 Port for set-up, control & monitoring. No jumper settings should be required for configuring the modem. • It should be compliant to ITU-T G.991.2 • The desktop modem at the horizontal office should support either V.35 or 10/100 Base-T Ethernet Interface. • The desktop modem at the BSNL Exchange of horizontal office should support G.703/G.704 Interface. • It should support distance of 5.0Kms at 0.5mm 	

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Sr. No.	Hardware	Specifications	Compliance / Deviations
		<p>copper over single pair. The distance should be mentioned over TEC Certificate.</p> <ul style="list-style-type: none"> • The modem should run on 230VAC as well as - 48VDC power supply. • Features of link performance monitoring and time based statistics should be available. • Should be SNMP enabled. • Support for configuration backup for future reference. 	

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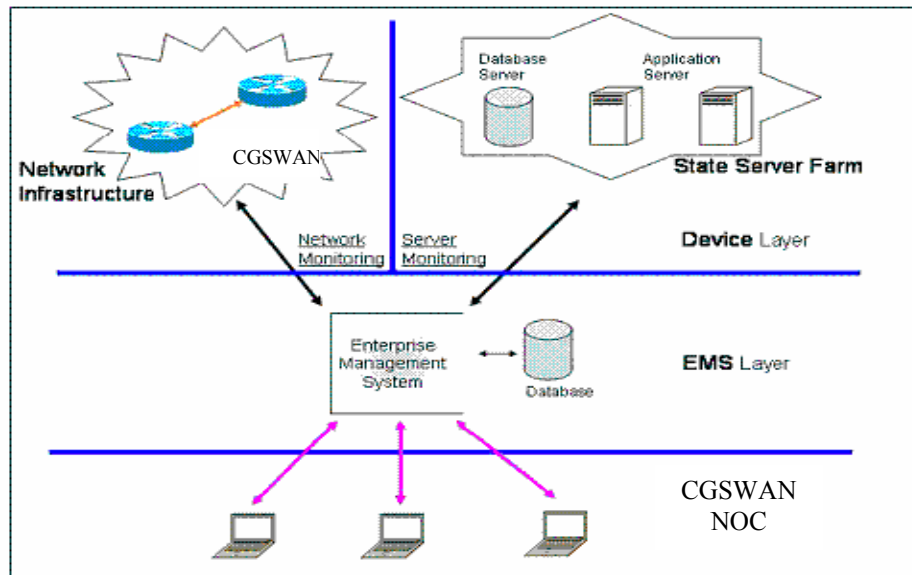
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Network Management System (NMS)

NMS will be deployed at State Data centre, to manage and monitor the entire CGSWAN Network components (including Routers, Switches, VSAT HUB, Remote VSAT and links, etc.), Servers and applications at State Data centre round the clock basis. This will help in pro-actively diagnosing and resolution of any technical hindrance for smoother CGSWAN operations. In addition of fault detection, these tools will be capable in providing reports for network availability, link utilization, network device performance, Server statistics and performance, SLA reports, which are required for analysis and future capacity building.



- (i) NMS will be continuously monitoring the links, network devices and servers of the CGSWAN.
- (ii) Network monitoring for CGSWAN will be based on SNMP, which is basically server-client architecture.
- (iii) NMS will automatically discover the entire network devices and present the same in a logical network topology map connected to each other using various network connectivity modes.
- (iv) The network components on the topology map will be presenting the status of the components with various colors.
- (v) Additionally whenever there is any network component failure, NMS will be logging all the faults in the event window with a timestamp, event description or

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event details etc.

- (vi) NMS will also create various reports in graphical format, for the performance and availability of network components such as links and network devices.
- (vii) NMS will be collecting these raw data and storing the same in a database repository. The database should be integral part of NMS/ NMS and not separate entity.

The reporting engine will generate the reports based on the data collected, and help user in accessing these graphical reports using standard Web browser such as Internet Explorer or any standard browser.

NMS will be having provision for the reports, for consolidating automatically on hourly, daily, weekly, monthly, Quarterly or Yearly basis.

User can create his /or her customised reports based, such as on basis of certain objects or for any time period of the choice.

NMS will enable management of heterogeneous, e-business infrastructures and includes support for a broad range of Windows and UNIX systems and applications, including web and application servers, and email, databases, and many standard applications.

NMS will log the event messages with information about system status, system events, or problem related to a server within the system.

NMS will notify status change, an event, or a problem on a server or network equipment by sending a message as an e-mail or Mobile-SMS.

NMS can forward or help in generating Trouble tickets in 'Help Desk' system automatically.

NMS provides performance, resource, and end-to-end transaction response time measurements and supports network and database measurement information.

NMS can provide statistics about the servers in the Data-centre such as Disk Space (logical/Physical), memory usage, swap, paging, CPU, http, interface traffic, etc.

The bidders are requested to quote Network Monitoring and Server (including Application) Monitoring as separate modules, so that appropriate modules can be purchased as per need and approvals.

Helpdesk Management System

As CGSWAN will be core IT platform of e-Governance for Government of Chhattisgarh Pradesh (GOC) and its citizens, so it becomes necessary to have reliable services available 24 x 7 basis to GOC offices and state citizens. These services will be provisioned across the State using various components such as routers, switches, security devices, modems, lease lines, ISDN/dial-up lines, LAN, application servers, e-mail, information and utility portals, workstations, and Internet of course. These problems can be overcome, with the use of centralised Helpdesk for CGSWAN. In all Helpdesk management comprises of Helpdesk tool, policies, and helpdesk personnel along with supporting people.

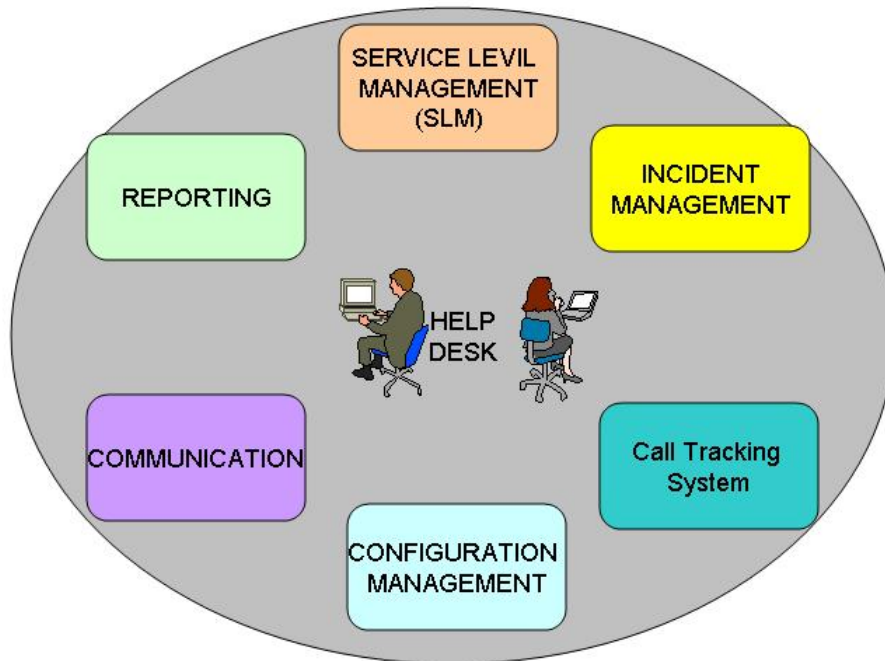
The key highlights of Helpdesk systems are:

- Recording of all service calls and Incidents
- Configuration management
- Service level management
- Problem management
- Change management

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- (i) Service calls – logging of end user calls with details and generating trouble tickets (TT). The users can log the calls either on phone or using the web interface of the tool, or can also be entered by the helpdesk coordinator.
- (ii) Incident Management – automated recording (logging) of critical component failures and generating TT.
- (iii) Manual or through automation assigning calls to specialist or technical support team members depending on the type of call; such as problem related to any Server failure will be assigned to the Server .
- (iv) Service calls can also be awarded to the OEM support team (under-pinning) and does tracking of the status of the resolution as per agreed service level

Escalation of the calls, if the services are not available or not recovered within time frame
Help in tracking calls till resolution

Closing the Calls and updating of database
Generating MIS reports for management on daily, weekly, monthly basis
Update to user/customer whenever there is change in the status.
Capability to send the alerts to users, Management, Technical specialist and 3rd party contractors
Helps in minimizing the regular faults (Service and Incident calls), to provide services smoothly
Identify, document, classify and analyse historical issues to avoid similar problems in future
Reduction in service downtimes
Minimizing the errors due to recommended changes
Changes are more controlled and more process driven, which eventually helps in maintaining the quality of services.
Provides transparency for making management decisions with proper information flow
Provides precise up-to-date secure information for entire configuration items (CI – IT components)
All the CI's are interlinked as per their inter-relationship
Provides status of the CI's such as in-use, spare, faulty, etc.
Helps in auditing
Provides CI's detailed information such as supplier/vendor, Warranty,
Support contract, purchase or hire cost, etc.

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Capability to list all the components of same category, such as if management wants to have list of all the Routers active on network
Single database (CMDB) for storing the all information of CI inventory,
Calls, problem management, change management and Service level management
Helps in creating, monitor and control the service level agreements and their underlying service quality.
Helps in monitoring and reporting the SLA with Support vendors or 3rd party external providers appointed by CGSWAN
Helps continuous lateral thinking for Service levels during operations
Ability to generate TT, by integrating with NMS

Requirements for VSAT HUB

- The proposed should based on a star architecture for Data/ Voice (VoIP). The Bidders should separately clearly indicate the details of materials (H/w & S/w) required at the Hub and VSATs to offer Data/Voice
- The network shall be used for both data and voice communications. The network should offer voice and IP data in star architecture. The cost of system to support Voice Over IP at the Hub and Remote site should be clearly offered.
-
- The VSAT network will operate in normal Ku-band of RF spectrum on transponders provided by Department of Space in their INSAT series of Satellite.
-
- The transfer of data packets from remote VSATs to HUB (inbound stream) will be on M/F-TDMA access mechanism. The access mechanism should support slotted ALOHA, reservation, Dedicated Access/Partial dedicated access mechanism. The VSAT inbounds should be capable of upto 1.6 Mbps and above inbound bit rates with the corresponding Hub hardware (demodulators) also capable of supporting the same.
- The transfer of data packets from the HUB to the remote VSATs (outbound stream) shall support DVB –S2 mechanism. The outbound stream from the Hub should be scalable to 80 Mbps and above without any additional hardware / software.
- It shall be a state-of-the-art Network with features like Turbo coding in the inbound, DVB –S2 compliant error correction in Outbound, Embedded TCP spoofing and TCP acceleration etc.
- The new VSAT equipment should be compact and easily configurable & should have an external power supply.
- The other functional and operational technical specifications of Inbound, Outbound, VSAT (IDU) and Hub are provided below.

LINK DESIGN

The bidder shall provide link budget analysis. For the purpose of link analysis 9 mtr (For Hub) & 1.8 mtr (for remote) antenna has to be taken. Following INSAT Satellite parameters of Ku Band transponder shall be assumed for the purpose of link budgeting.

PARAMETER	VALUE
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Up-link Frequency	13.75 to 14.5 GHz
Down-link frequency	10.95 GHz to 12.75 GHz
Saturated EIRP	46dBW
Saturated flux Density	-85dBW/m ²
End of life Rx G/T	-2dB/deg K (min)
Transponder B.W	36MHz
Input Back off	10dB
Output Back off	4.0 dB
IMP Noise Density	-65dBW/Hz
Inter Modulation	18.0 dB

- On Site Comprehensive Maintenance of the network on 24 hours a day/ 365 days a year basis and ensure Quality of Service (QoS) to the users of the network, for a minimum of 5 years.
- Operation of the network on 24 hours a day/365 days a year basis and ensure Quality of Service (QoS) to the users of the network for a minimum of 5 years from the date of commissioning.

Technical Requirements (Section B)

2. Network features / Specifications:

Bidder should supply Base band IF equipment and other associated integration items and sub-systems as mentioned in this part and sections below. The Baseband equipment should be designed to achieve the desired level of Quality of Service. The baseband and VSATs should meet all the following specifications mentioned in this section:

Hub Antenna Specifications:

The Hub Antenna shall fully comply to the requirements specified in the TEC Specification GR No. G/SAN/011/02. SEP.2000 or latest with latest amendments on the minimum side. Following are the required parameters for Hub Antenna system.

SI No	Parameter	Specifications
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1.	Diameter	9 Meter or more motorized with fully auto track capability
1.	Frequency - Tx	14.0 to 14.50 GHz
2.	Rx	10.95 to 12.75 GHz
3.	Polarisation	Linear
4.	Off axis radiation pattern of antenna	As per ITU-R.580-5 or latest
5.	Tx-X-Pol Isolation	On-axis – 30 dB
		Off axis – as per ITU R-S.731
6.	Rx-.X-Pol Isolation	On axis- >30 dB(As per Antenna Spec)
		Off axis – as per ITU R-S.731
7.	VSWR-(Max Permissible)	1.30:1
8.	Mount	El over Az
9.	Feed	Cassegrain /Gregorian
10.	Elevation Adjustment Range	5 Deg. To 90 Deg.
11.	Azimuth Adjust range	120 Deg. Continuous
12.	Receive G/T	More than 37.0 dB/K With 70 Deg.K LNA
13.	Wind loading – operational	Upto 70 km/hr
14.	- Survival	Upto 200 km/hr
15.	Tracking	a) Manual/motorized
16.	Drive Speed	0.2 Deg/Sec (Dual Speed Preferred)
17.	Av. Power handling capacity	2 kW

2.1.1 Antenna Integration Material

- Filters, Cables, Uplink Wave Guides, Connectors, Dehydrator and Miscellaneous Hardware required for antenna ACU, Beacon RX
- IFL Cables of appropriate length(Bidders need to quote per mtr prices)
- Provisioning the Theodolite kit etc for alignment/ NOCC clearance shall be the bidder's responsibility

2.1.3 LOW NOISE AMPLIFIER :

The LNA shall fully comply to the requirements specified in the TEC Specification GR with latest amendments on the minimum side. Following are the required parameters for LNA

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Frequency Band	10.95 GHz to 12.75 GHz
Noise Temperature-	Better than or equal to 65 Deg.K
Gain	60 dB min
Gain Flatness	Better than ± 0.20 dB over 40 MHz
Input VSWR	1.25:1 (max)
Output VSWR	1.25:1 (max)

2.1.4 DOWN CONVERTER

Conversion type	Dual conversion- Non-inverting
Input Frequency Range	10.95 GHz to 12.75 GHz
Frequency Selection	Frequency Synthesised
Output Frequency Range	70 + 18 MHz/ 140 + 36MHz
Gain	0.75 dB over 36 MHz
Ripple	0.75 dB over 36 MHz
Input level	-45dBm typical
Frequency stability	Better than 1×10^{-8}
Phase Noise	As per IESS
Step Size	125 Khz

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2.1.5 UP CONVERTER

Conversion type	Dual Conversion- Non-inverting
Output Frequency	14.0Ghz to 14.50 GHz
Input Frequency Range	70 + 18 MHz/ 140 + 36MHz
Gain	30 dB Min
Ripple	0.75 dB over 36 MHz
Frequency Selection	Frequency synthesized
Frequency Stability	Better than 1×10^{-8}
Phase Noise	As per IESS
Step Size	125 KHz

2.1.6 HPA (TWTA/SSPA) AMPLIFIER

The high power amplifier is to be used for the final power amplification of the digital RF signal in Ku band, to be fed to the antenna after proper processing through filters etc. The following will give a standard specification of the amplifier.

S.No	Type	Rack Mount SSPA
1.	Frequency	14.0 to 14.5 GHz
2.	Saturated O/P nominal	+52dBm
3.	Output Power(P1 dB)	+51dBm
4.	Gain at rated power	60 dB min
5.	Gain flatness over 500 MHz	+/- 1 dB max.
6.	Gain Slope	0.6 dB/40 MHz max.
7.	Gain Variation	+/- 1.5 dB max. over operating temperature
8.	Gain adjustment range	20 dB min

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9.	Input VSWR	1.3:1 max
10.	Output VSWR	1.3:1 Max
11.	Noise figure	10 dB at max gain
12.	Spurious at rated power	-65 dBc, max
13.	Harmonics at rated power	-60 dBc, max
14.	AM/PM conversion at rated power	2.5 /dB max. at p1 dB max at 3 dB backoff
15.	Two tone intermodulation (5 MHz apart)	-25 dBc max. at 3 dB total back off from rated p1 dB.
16.	Power Requirements	
17.	Operating Voltage	110-240VAC 47-63 Hz
18.		+/- 48 V operation
19.	Environmental Conditions	
20.	Temperature	Operating: 0-50 C
21.		Storage :-55 to 85 C
22.	Humidity	Upto 90%

2.1.7 Technical Specifications for Spectrum Analyzer

- The instrument must have the following features:
 - Largest color display
 - Resolution bandwidths from 1Hz to 10 MHz
 - Highly selective digital filters and FFT
 - Quasi peak detector and EMI bandwidths
 - ACP and multi-carrier ACP measurements
 - Interfaces GPIB, RS-232-C, LAN
 - Automatic test routines for measuring TOI, OBW, ACP(R)
 - Split Screen up-to 3 trcaes per screen
 - fast measurement in the time domain
 - gated sweep for measurement on TDMA signals

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- RMS Detector for fast and reproducible power measurements on
- digitally modulated
- Statistical measurement functions for determining crest factor and CCDF
- Up-to 55 measurements on GPIB interface
- 80 measurements on GPIB in interface in Zero Span
- Minimum Sweep time of 2.5 ms
- micro second time domain
- 100 measurement in manual operation and digital filters with sweep time 2.5 time faster than comparable analog filters

2.1.8 Hub Base Band Equipment

1 Outgoing stream

- i) No of outbound streams : 1(1:1) configuration
- ii) DVB –S2 compliant Outbound: Scalable from 2Mbps to 81 Mbps.
- iii) Modulation : 8PSK,QPSK or better
- iv) Bit error Rate : Better than 1×10^{-10}
- v) FEC Coding Rate : Rate $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{7}{8}$, Viterbi coding
Reed Solomon, 8/9,9/10 BCH with LDPCACM
Capable.

2 Incoming Stream:

- i. Data rate for single Inbound : CIR: 32 Kbps & MIR 512 kbps.
- ii. Modulation : QPSK/OQPSK
- iii. Bit Error Rate : Better than 1×10^{-7} at Eb/No of 5dB
- iv. Coding : Turbo Coding
- v Inbound Mechanism : F-TDMA/MFTDMA
- vii FEC : $\frac{1}{2}$, $\frac{2}{3}$, or better

3 Protocols and features (STAR IP Data)

- i TCP Spoofing
- ii IP Routing : RIP v1/v2, Static routing
- iii IP Multicast and UDP broadcast Support

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3.1 Expandability

- Hub and the Network Management System should have provision to expand its capacity. (Hub should be sized as per the current traffic profile detailed above)
- It shall be the State-of-the Art Network with features like error correction, echo cancellation techniques, TCP spoofing, DHCP, NAT etc.
- All the new software versions and development related to upgradation shall be provided free during the warranty period of five years.

3.2 Network Elements

The following elements would form the VSAT Network with adequate capabilities to provide desired services:

- (i) Hub Station
- (ii) Remote VSAT Terminal

3.3.1 Hub Station:

The Hub Station will be located at the premises of CHiPS, Raipur and would consist of various subsystems named as

- Hub electronics (9 Mtr Hub antenna, 400Watt SSPA, UP/DN converters, LNA, Antenna Tracking unit will be deployed)
- Upgraded Broadband Baseband Hub as per the specifications mentioned in this section B.
- Network Management System (H/w&S/w).
- All supplied equipment at the Hub shall be neatly mounted on a standard 19 inch racks. All the inter-rack & intra-rack cabling shall be done with cable markers. Detailed wiring diagram shall be supplied with the rack.
- All the required hardware/software like Workstations, Network Controllers, etc. shall be supplied and housed in the racks at the Hub center.
- All equipment at the Hub Center shall operate with 230 V \pm 10%, 50 Hz, AC (Single and three phase as required). Bidder would indicate the power requirement for the equipment, systems, air conditioning, lighting etc. for making suitable arrangements for power load.

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Satellite Transponder capacity requirement:

As per the present allocation of Department of Telecommunications (DoT), for the national connectivity through VSAT network, INSAT3A has to be used.

The transponder requirements shall be provided for and a reference throughput of:

- For inbound traffic to Hub: 32 Kbps CIR per VSAT & 512 kbps MIR per
- For Outbound Transponder Calculation: 1 Outbound, Transponder in saturation

Bidder needs to provide Link Budget calculations for:

- Outbound : For Maximum data Rate under transponder Saturation
- Inbounds : Minimum size of one inbound is 128 Kbps & should be scalable upto 512 kbps. (as specified above 2.2.4)
- Hub antenna : 9 Mtr at Raipur
- VSAT : 1.8 M

Note: For the purpose of sizing & link budget, the bidder should consider that at a particular moment 6 % of the user would be concurrent.

Following Satellite Parameters should be considered for Link Budget (INSAT 3A, Ku Band)

- EIRP = 46 dBW
- G/T= -2 dB/K
- SFD= -85 dBW/m²
- IBO= 10 dB
- OBO= 4.0 dB
- IMP Noise Density=-65 dBW/Hz
- Inter Modulation=18.0 dB
- Transponder Bandwidth = 36 MHz

3.3 VSAT Network operating license and other statutory approvals:

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The Bidder shall obtain all necessary Clearances, on behalf of the customer, from various regulatory bodies like Department of Telecom, WPC/SACFA, Department of Space and NOCC etc which are or may be required for starting the Operation of VSAT by Govt. of Chhattisgarh. The License fees or the Mandatory fees will be paid by Govt. of Chhattisgarh as and when required. The bidder will provide all the required technical details and will co-ordinate with the regulatory bodies for obtaining the Licenses/ Clearances for starting the operations.

3.4 VSAT Network Equipment Specifications

Detailed equipment specifications of various sub-systems are given in Section B. However, the Bidder is required to ensure latest state-of-the art technology and standards and accordingly ensure supply of equipment/systems with the best performance and Quality of Service.

The above equipment shall be latest state-of-the art systems complying with the applicable standards and shall be sized adequately to take care of the requirements of the users.

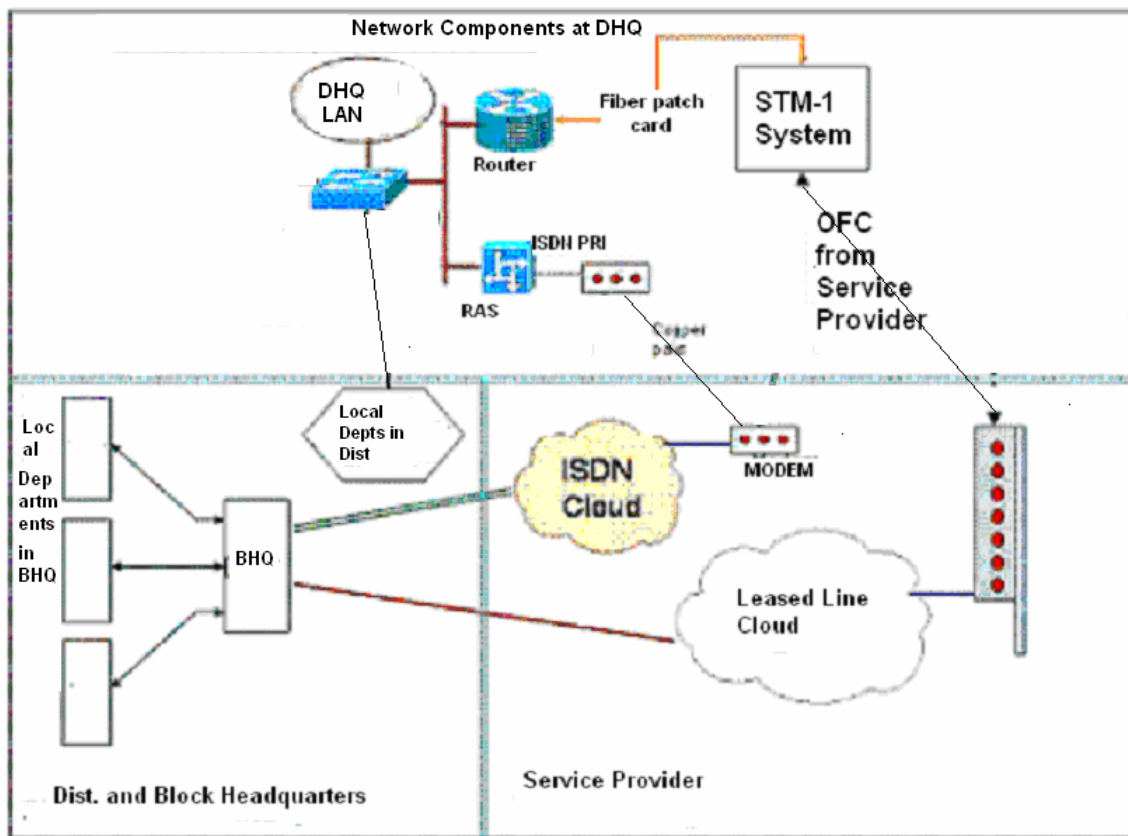
All necessary interfaces, connector, cables etc. as may be required shall be included by the Bidder.

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Schematic Diagram showing DHQ



Considerations at DHQ

All the 2Mbps leased lines from SHQ & respective BHQs and $n \times 64\text{Kbps}$ links from horizontal offices would be provisioned using E3 links from STM-1 (OFC) system. Using Fibre patch cord E3 links will be integrated from STM-1/OLT to Router E3 interface directly.

ISDN PRI lines will be availed at DHQ for providing the backup to the primary vertical link (SHQ and BHQ). From STM-1 DDF the ISDN lines will be directly integrated to router or RAS interface or also using last mile as copper as an alternative route.

The co-located departments within the DHQ PoPs building will be accessing CGSWAN using LAN technologies directly on the LAN switch at DHQ; while 20% of the rest of GOC offices in District level will be connected using $n \times 64\text{Kbps}$ link, as Horizontal connectivity and remaining 80% using wireless / VSAT as per details given herein after.

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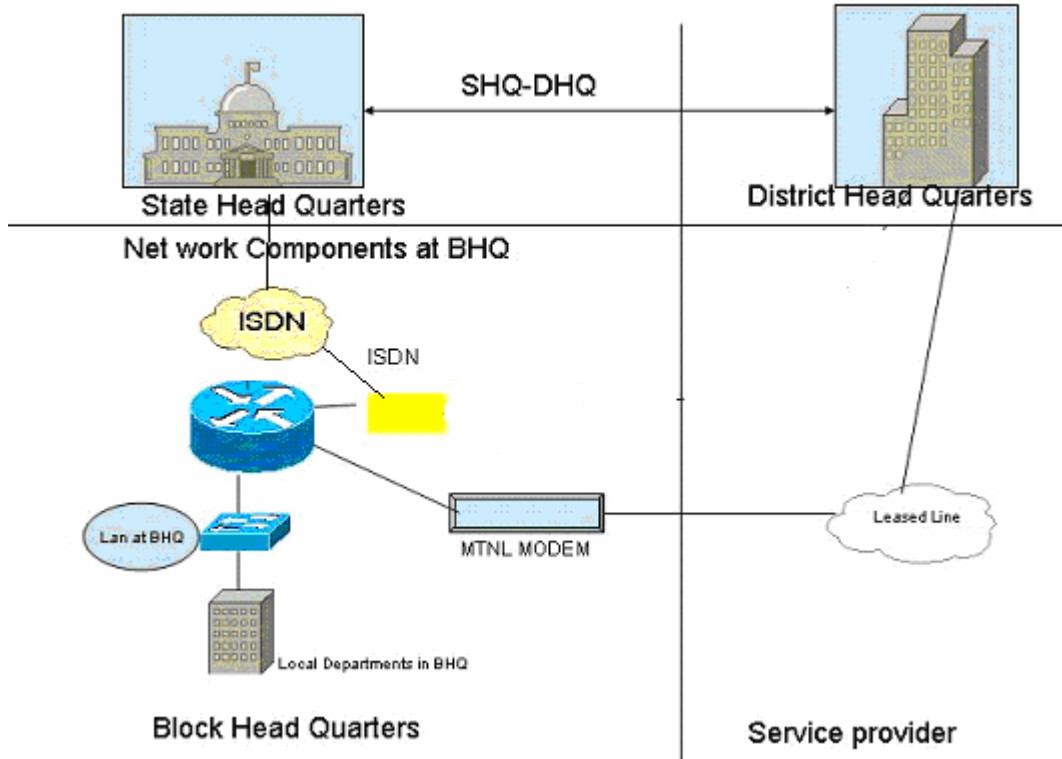
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For taking care of the Horizontal connectivity Wireless equipment will also be installed and integrated with networking components at DHQ.

Logical links schematic at DHQ Router

Technical requirements at DHQ /BHQ



Highlights of DHQ/BHQ

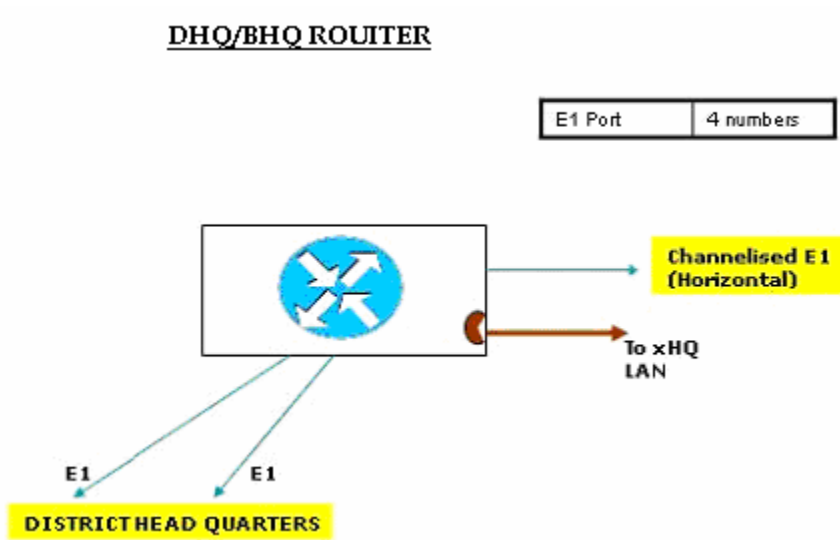
2Mbps leased lines to DHQ terminating at SHQ/DHQ/BHQ and n x 64Kbps links from local GOC Offices & Departments will be provisioned using MLLN based links from the Bandwidth Provider.

BHQ(s) will be connected to DHQ with primary 2Mbps lease link and ISDN as backup.

The co-located departments within the Block PoPs building will be accessing CGSWAN using LAN technologies directly on the LAN switch at BHQ; while 20% of the rest of GOC offices in Block level will be connected using n x 64Kbps link, as Horizontal connectivity and remaining 80% using wireless / VSAT as per details given herein after.

ISDN BRI line will be availed at BHQ(s) for providing the backup to the primary link i.e. 2Mbps leased line.

Logical links schematic at SHQ/DHQ/BHQ Router



Backup connectivity requirements

E1 connectivity will be provisioned from SHQ to DHQ and further DHQ will be connected using E1 links to the respective BHQs. Thus in case of these Primary E1 links failure, alternative connectivity mode is required in order to maintain the network availability.

ISDN Links

Thus ISDN connectivity is proposed to be the backup of the Primary links. The main advantage of ISDN links is quick call setup, which is required for High network availability. ISDN will be used as backup in case of primary vertical & horizontal lease line failure. Network device will automatically sense the lease line failure, and then dial the ISDN link to establish the backup connectivity.

POP Type	ISDN Type
SHQ	PRI

DHQ	PRI
BHQ	BRI

Understanding DHQ/BHQ Network Components

S.NO	Particulars	Description
1	Distribution Router	It provide connectivity from DHQ to BHQ
2.	LAN Switch	It provide Horizontal connections
3.	IP Phones	To provide VoIP to CGSWAN locations
4.	Server farm	Servers to provide CGSWAN services

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DHQ Components

S.No.	Item Details	Item Specifications	Compliance / Deviation
2.1	District Router	<p>Hardware Architecture</p> <p>Multiple services (Data, voice, video), Should support IP, MPLS etc. Modular Chassis (Minimum six slots), Fast reboot for minimum network downtime, Power supply for 230 V AC 50 Hz with Redundant power supply.</p> <p>Interface / Slots</p> <p>Gigabit Ethernet Ports 2 x 10/100/1000Mbps, 1 x 1000Base-SX/LX, Should have 1 x Ch STM-1, and 1* CHE3, E1 PRI - 2 Ports (either externally or internally). ISDN as auto dial backup when the primary link is down, should be provided either externally or internally to Auto SHQ RAS.</p> <p>Console port 1 and two free slots for future expansion.</p> <p>Interfaces – Should also support V.35 / G.703, CHE1 (to be able to connect 30 remote offices @ 64 Kbps per remote office)</p> <p>Memory</p> <p>Adequate memory to support all OS features. A minimum of 1 GB DRAM.</p> <p>Minimum 256 Mb of flash memory</p> <p>Performance</p> <p>2Mpps or more on 64 bytes packet or more, Back plane performance of at</p>	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
		<p>least 2Gbps is required.</p> <p>Security</p> <p>IP Sec 3DES/AES, VPN for configuration of VPN tunnels. The solution should offer this feature either internally or externally.</p> <p>Routing Protocols</p> <p>Static Routes, RIPv1, RIPv2. OSPFv2 and v3. BGP4, IS-IS , Route redistribution between any of the above protocol</p> <p>Protocols</p> <p>PPP, Multi-link PPP , , IPv4, IPv6 MPLS L2 & L3 , VRRP</p> <p>Congestion</p> <p>Random Early Detection , Weighted Fair Queuing, Selective Packet Discard</p> <p>IP Multicasting</p> <p>IGMPv1&v2, PIM-SM,</p> <p>IP Accounting</p> <p>Using external hardware/software infrastructure Packet & Byte Counts, Start & End Time Stamp. Network Time Protocol, Input & Output interface ports. Type of service, TCP Flags & Protocol , Source & Destination IP addresses, Source & Destination TCP/UDP ports</p> <p>Management</p> <p>Accessibility using Telnet, SSH,</p>	

S.No.	Item Details	Item Specifications	Compliance / Deviation
		<p>Console access. Easier Software upgrades through network, using FTP/TFTP, etc. SNMPv1, snmpv2/v3, Configuration management through CLI, GUI based software utility and using web interfaces. GUI tools shall be provided. Event and system history logging functions shall be available. Support for Syslog Server required. Support pre-planned timed reboot to upgrade hardware to a new software feature and plan the rebooting as an off-peak time. Shall support boot options booting from remote Network node</p> <p>QoS</p> <p>ToS, CoS, Queuing, prioritizing. Committed Access Rate/ Rate limiting, IP Precedence, Policy based routing, Congestion avoidance algorithm, such as WRED, Priority queuing, Class based weighted fair queuing. The offered router should support adequate queues per port.</p> <p>Debug & Diagnostics</p> <p>Display of input and output error status on all interfaces, Display of Dynamic ARP table. Display of Routing table, Trace-route, Ping, extended PING</p> <p>Physical</p> <p>Router should be provided with 19" Rack mounting kit, All necessary power cords, adapters, data cables, connectors, CDs, manuals, brackets accessories, wire managers, etc.</p>	

S.No.	Item Details	Item Specifications	Compliance / Deviation
		should be provided	
2.2	DHQ LAN Switch	<p>Interface /Slots</p> <p>1 x 24 ports 10/100/1000 BaseTX out of which two ports should support 1000 Mbps single mode fiber , 2 x 1000 Mbps ports base Single Mode.</p> <p>Packet forwarding rate should be 35 Mpps or more, 32 Gbps Full Duplex or 48 Gbps Half Duplex switching fabric capacity Switch should be stackable,</p> <p>Switch should have support for redundant power supply.</p> <p>General Features</p> <p>Layer3 - with following support (RIPv1, v2, OSPFv2/v3, VRRP, DHCP) , Support Port Mirroring , Support Port Trunking , Link Aggregation , IEEE 802.1Q VLAN encapsulation , , Support Port based network access control (802.1x) , Support port security , Traffic shaping and policing , MAC Address security/MAC Address Notification support which allows for notification of new users added or removed</p> <p>Management</p> <p>RS-232 Console port . Easier Software upgrades through network, using FTP / TFTP, etc. Accessibility using Telnet, SSH, Console access. Easier Software upgrades through network, using FTP / TFTP, etc. SNMPv1,</p>	

S.No.	Item Details	Item Specifications	Compliance / Deviation
		<p>snmpv2/v3 , Configuration management through CLI, GUI based software utility and using web interfaces. GUI tools shall be provided. Event and system history logging functions shall be available. Support for Syslog Server required , Switch should CPU, utilization monitoring and Port description</p> <p>Standards</p> <p>IEEE 802.1x support , IEEE 802.3x full duplex on 10BASE-T or 100BASE-TX or 100BASE-TXports, IEEE802.1d Spanning-Tree Protocol , IEEE 802.1p class. of-service (CoS) prioritisation . IEEE 802.1Q VLAN , IEEE 802.1s , IEEE 802.1w IEEE 802.3 10BASE-T specification , IEEE 802.3u 100BASE-TX specification</p> <p>Power Supply: Internal power supply 230 Volt 50Hz input</p> <p>Mounting: 19” Rack mountable</p> <p>L3 features</p> <p>IGMP v1, v2, / v3 , ICMP support , IPv6 support with delivered configuration. If the equipment do not support IPV6 from day One, OEM and BOOT Successful bidder (both) will give in writing that equipment will be made IPV6 enabled before the end of year 2008, without any additional cost, without affecting running network and without causing any considerable downtime in the</p>	

S.No.	Item Details	Item Specifications	Compliance / Deviation
		network at that time.	
2.3	IP Phones-Type I	<ul style="list-style-type: none"> • The IP phone should include a backlit, high-resolution color touch-screen display for easy access to communication information, timesaving applications, and feature usage. • The IP Phone should enable customers and developers to deliver more innovative and productivity-enhancing Extensible Markup Language (XML) applications to the display. • The IP Phone should support access to eight telephone lines (or combination of lines and direct access to telephony features), a high-quality hands-free speakerphone, a built-in headset connection and IEEE 802.3af PoE. • The IP Phone should have the following: <ul style="list-style-type: none"> ○ Message ○ Directories ○ Settings ○ Services ○ Help • Settings & Specifications: The IP Phone should have the following settings: <ul style="list-style-type: none"> ○ Display contrast ○ Ring type ○ Network configuration 	

S.No.	Item Details	Item Specifications	Compliance / Deviation
		<p style="text-align: center;">○ Call status</p> <p>Network Features</p> <p>Network features for the IP Phone should have the following:</p> <ul style="list-style-type: none"> • Layer 2 Discovery Protocol • Automatic IEEE 802.1q (VLAN) configuration • G.711a, G.711u, and G.729ab audio compression codecs • Integrated Ethernet switch • 10/100BASE-T Ethernet connection through an RJ-45 interface for LAN connectivity • Software upgrade supported using a TFTP server • Provisioning of network parameters through DHCP • Voice activity detection, silence suppression, comfort-noise generation, and error concealment <p>Additional Features</p> <ul style="list-style-type: none"> • G.711 and G.729a audio compression • An IP address assignment-DHCP client or statically configured • Comfort noise generation and voice activity detection (VAD) programming on a system basis • The phone should support SCCP or H.323 or SIP • Video Telephony support. 	

S.No.	Item Details	Item Specifications	Compliance / Deviation
2.4	RACK 42U	<p>Physical Attributes</p> <p>Height :42U</p> <p>Rack Type :Floor mount with caster wheels</p> <p>Wire managers :Two vertical and four horizontal</p> <p>Power distribution :10 points – 5Amp sockets horizontal and vertical mounting type</p> <p>Door :Glass door in front with lock</p> <p>Fan trays :With 4 fans mounted on top</p> <p>Depth :1000 mm</p> <p>Metal :Aluminum extruded profile</p> <p>Side panels :Detachable side panels</p> <p>Width :19” equipment mounting, extra width is recommended for managing voluminous cables</p> <p>Castors:Suitable castors with brakes.</p>	
2.5	Air-Conditioner – 2 tonne	<p style="text-align: center;">- Capacity</p> <p>Capacity 2 Tonnage , Cooling 50000 BTU/Hr , Compressor Rotary , Refrigerant R-22 type , Power Supply 230V/Ph</p> <p style="text-align: center;">- Performance</p> <p>EER 10.6 , Air Circulation CFM 1030 , Noise level <50db</p>	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
		<p style="text-align: center;">- Operation</p> <p>Remote Control LCD</p>	
2.6	UPS – 5 KVA	<p>- Manufacturer ISO 9001-2000 And ISO 14001 Certification</p> <p>- Safety Standards EMC/EMI as per SAMEER/ ERTL/ Equivalent Certification</p> <p>- Technology Inverter device IGBT based , DSP/ Microprocessor controlled, Double Conversion True On-line UPS</p> <p>- Inverter efficiency :>90 %</p> <p>- Capacity 5KVA online UPS with 1hour battery backup</p> <p>- Input Voltage & Range 230V 50Hz, Range 180V – 270V</p> <p>- Input Frequency Range 50Hz ± 8%</p> <p>- Input Phase Single Phase with ground</p> <p>- Input Power Factor >0.95</p>	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
		<ul style="list-style-type: none"> - Output Voltage Regulation 220/230/240 +/- 1% - Output 5 KVA - Standard RS 232 port for software interface SNMP interface support feature - Rated Output Current 21 A . 	
2.7	Generator Set – 8 KVA	<ul style="list-style-type: none"> - Engine type Multi cylinder, in accordance with IS 10002-1981 with latest amendments. - General Features Electric start 12 V DC , Water cooled /Air cooled , Mechanical/Electronic Governor , Fuel Æ High speed diesel , Rating Continuous - Output Suitable HP rated to match the alternator , Rated speed 1500 RPM - Over load capacity 10% overload – 1 hour , 50% overload -15 second 	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
		<p>- Accessories</p> <p>Flywheel to suitable diameter and fuel injection equipment Air cleaner Lubricating oil cooler Electric motor starting equipment like motor, battery, charging generator with voltage regulator etc. Heavy duty radiator with fan , Residential type silencer with exhaust piping with vibration isolator , Fuel tank suitable for 8 Hrs of continuous running with necessary piping and fuel gauge, drain valve, inlet and outlet connections. Anti vibration mounting pads , Speed controlling governor, Suitable coupling system to the Alternator</p> <p>Tachometer</p> <p>Lubricating oil pressure gauge , Hour meter to indicate number of Hrs of operation , Auto trip on low oil pressure Over speed alarm with trip, Thermal insulation for exhaust line with glass wool, Aluminium sheet, chicken mesh, Diesel line 12 mm dia including beads flanger etc , Battery 12 V with lead and terminal Battery charger. Protection against low lubricating oil pressure, high water temperature and over speed shall be provided for engine with alarm and fuel shut off</p> <p>- Alternator</p> <p>Output 8 KVA , P.F 0.8 lag , Voltage 220V, 1 Ph , Type continuous running duty type ,</p>	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
		<p>Frequency 50 Hz , Phase single , Speed 1500 rpm , Cooling Air-cooled , Over load capacity 10% overload – 1 hour 50% overload -15 second , Lubrication forced ,. Excitation Self excited, self regulated, automatic voltage regulator with remote voltage control facility , Permissible voltage variation \pm +/-1.5% of rated voltage , Insulation Class H , Base frame Engine and alternator shall be coupled and mounted on sturdy, fabricated, welded construction, channel iron base frame with coupling guard.</p> <p>- Control Panel</p> <p>The Genset control panel shall be of 14 SWG CRCA sheet and powder coated finish. The panel shall be provided with standard engine instrumentation, Voltmeter with selector switch, Ammeter with selector switch, Frequency meter, Current transformer, Instrument Fuses etc. MCCB/MCB of suitable rating shall be provide for overload and short circuit protection AMF facility shall be provided for the DG set. AMF relay shall be provided in the control panel/Electrical panel with required control wiring and Contactors for automatic operation shall be done</p> <p>- Dimensions</p> <p>Bidder to specify dimensions (H x</p>	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
		W x D)	
2.8	Modems Specifications for Leased Lines	<ul style="list-style-type: none"> • Visual Indication & RS-232 Port for set-up, control & monitoring. No jumper settings should be required for configuring the modem. • It should be compliant to ITU-T G.991.2 • The desktop modem at the horizontal office should support either V.35 or 10/100 Base-T Ethernet Interface. • The desktop modem at the BSNL Exchange of horizontal office should support G.703/G.704 Interface. • It should support distance of 5.0Kms at 0.5mm copper over single pair. The distance should be mentioned over TEC Certificate. • The modem should run on 230VAC as well as -48VDC power supply. • Features of link performance monitoring and time based statistics should be available. • Should be SNMP enabled. - Support for configuration backup for future reference. 	

S.No.	Item Details	Item Specifications	Compliance / Deviation
2.9	Workstations to be provided at each PoP	<p>- Hardware</p> <p>HDD :80GB SATA or higher (7200 rpm or higher)</p> <p>Keyboard :Standard 104 keys</p> <p>Mouse :Optical Scroll mouse with OEM Pad</p> <p>Network Card :10/100/1000Mbps with full duplex and WOL support</p> <p>FDD :1.44 FDD</p> <p>CD :16x DVD ROM- CD RW (Combo Drive) or higher</p> <p>Ports :1x Parallel, 1xSerial, 8xUSB, 1x PS/2 Mouse, 1x PS/2 KBD, 1xVGA, 4xUSB & 1xRJ45</p> <p>USB :4 or more</p> <p>Monitor :17" TFT color monitor with minimum Brightness 300cd/m2, Contrast Ratio 600:1, Resolution 1280 x 1024 or higher, Viewing Angle (Degrees) 130° (vertical), 140° (horizontal) or better , response time 8ms, Horizontal Frequency(kHz) 30~81 KHz, Vertical Frequency(Hz) 56~75 Hz, TCO99/ 03, EMI/FCC (or ETDC Report for meeting FCC norms) compliance, energy star compliance, same brand as that of PC</p>	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
		<p>OS :Pre-installed Operating System with patches, license, 5 years' Support/ Subscription, (Anti-virus if any), Standard Desktop software (like office tools)</p> <p>Multimedia :Onboard audio with 2x3 watt rms speakers, microphone</p> <p>Certifications :Energy star compliant, NSTL, FCC (EMI EMC/ ETDC) certified, ISO 9001: ISO 14001, ACPI compliant, PCI compliant</p> <ul style="list-style-type: none"> • OS Certifications :Certified for proposed OS 	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
3.1	BHQ Router	<p>Hardware Architecture</p> <p>Multiple services (Data, voice, video) Shall support IP, VPN etc , Device should have sufficient slots, Power supply for 230 V AC 50 Hz.</p> <p>Interface / Slots</p> <ul style="list-style-type: none"> - Gigabit Ethernet Ports 2 x 10/100 Mbps ports. - 2 un-framed E1 interface (G.703) or 2 synchronous serial interfaces capable of supporting 2 Mbps leased line are required. - 1 Ch - E1 (G.703) interface . <p>- Should support variety of interfaces like: ChE1/E1, E1 - E1 ports should support both ChE1 and E1 (unframed) links,</p> <p>-1 Console port</p> <p>Memory 256 MB,</p> <p>Inbuilt / Flash Memory 64 MB or more</p> <p>2 free slots for future expansion</p> <p>Performance: 200Kpps or more</p> <p>Security</p> <p>IP Sec 3DES/AES, VPN for configuration of VPN tunnels.</p> <p>All interfaces shall support wire</p>	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
		<p>rate throughput for L2, L3, VPN with QoS and Security features enabled.</p> <p>Encryption Hardware assisted IPSec 3DES/AES</p> <p>Should have Integrated Firewall services</p> <p>Routing Protocols</p> <p>Static Routes RIPv1, RIPv2, OSPFv2 /v3. BGP4, Route redistribution between any of the above protocols</p> <p>Protocols</p> <p>PPP, Multi-link PPP , IPv4, VRRP Random Early Detection Weighted Fair Queuing, Selective Packet Discard</p> <p>IP Multicasting</p> <p>IGMPv1&v2, PIM-SM, IP Accounting support</p> <p>Using external hardware/software infrastructure, Packet & Byte Counts, Start & End Time Stamp, Network Time Protocol, Input & Output interface ports. Type of service, TCP Flags & Protocol Source & Destination IP addresses Source & Destination TCP/UDP ports</p> <p>Management</p> <p>Accessibility using Telnet, SSH, Console access. Easier Software upgrades through network, using FTP / TFTP, etc. SNMPv1, snmpv2/v3,</p>	

S.No.	Item Details	Item Specifications	Compliance / Deviation
		<p>Configuration management through CLI, GUI based software utility and using web interfaces. GUI tools shall be provided. Event and system history logging functions shall be available. Support for Syslog Server required. Shall support boot options booting from remote Network node.</p> <p>QoS</p> <p>ToS, CoS, Queuing, prioritizing, Committed Access Rate/ Rate limiting, IP Precedence, Policy based routing, Congestion avoidance, algorithm, such as WRED, Priority queuing, Class based weighted fair queuing</p> <p>Debug & Diagnostics</p> <p>Display of input and output error status on all interfaces, Display of Dynamic ARP table , Display of physical layer line status signals like DCD, DSR, DTR, RTS, CTS on all interfaces, Display of Routing table, Trace-route, Ping.</p> <p>Physical</p> <p>Router should be provided with 19” Rack mounting kit. All necessary power cords, adapters, data cables, connectors, CDs, manuals, brackets accessories, wire managers, etc. should be provided</p>	

S.No.	Item Details	Item Specifications	Compliance / Deviation
3.2	BHQ LAN Switch	<p>Interface /Slots</p> <p>1 x 24 ports 10x100 FE ports, 2 x 1000Mbps ports base single mode fiber (LX).</p> <p>- Performance</p> <p>Packet forwarding rate , should be 6 Mpps, 8 Gbps switching fabric capacity</p> <p>General Features</p> <p>L2 Managed Switch, Support Port Mirroring, Support Port Trunking, Link Aggregation</p> <p>VLAN features</p> <p>IEEE 802.1Q VLAN encapsulation, support for 250 VLANs per switch</p> <p>Security</p> <p>Support Port based network access control (802.1x) , Support port security , Traffic shaping and policing</p> <p>MAC Address security/MAC Address Notification support which allows for notification of new users added or removed</p> <p>Management</p> <p>RS-232 Console port, Easier Software upgrades through network, using FTP / TFTP, etc. Accessibility using Telnet, SSH, Console access. Easier Software upgrades through network, using FTP, TFTP, etc. SNMPv1, snmpv2/v3, Configuration</p>	

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SIGNATURE OF ISSUING OFFICER

S.No.	Item Details	Item Specifications	Compliance / Deviation
		<p>management through CLI, GUI based software utility and using web interfaces. GUI tools shall be provided. Event and system history logging functions shall be available. Support for Syslog Server required , Switch should CPU utilization monitoring and Port description</p> <p>Standards</p> <p>IEEE 802.1x support, IEEE 802.3x full duplex on 10BASE-T and 100BASE-TX ports, IEEE 802.1d Spanning-Tree Protocol, IEEE 802.1p class-of-service (CoS) prioritisation,</p> <p>IEEE 802.1Q VLAN , IEEE 802.1s, IEEE 802.1w, MAC address authentication, IEEE 802.3 10BASE-T specification , IEEE 802.3u 100BASE-TX specification, 802.3af</p> <p>IGMP V1/V2</p> <p>Power Supply</p> <p>Internal power supply 230 Volt 50Hz input,</p> <p>Mounting: 19” Rack mountable.</p>	
3.3	IP Phones-2	<ul style="list-style-type: none"> The IP Phone should provide two programmable backlit line/feature buttons and four interactive soft keys that should guide a user through call features and functions, and audio controls for high-quality duplex speakerphone, handset, and headset. 	

S.No.	Item Details	Item Specifications	Compliance / Deviation
		<ul style="list-style-type: none"> • The IP Phone should have a built-in headset port and an integrated Ethernet switch • The IP Phone should have higher-resolution grayscale pixel-based LCD. The display should provide features such as date and time, calling party name, calling party number, and digits dialed. The graphic capability of the display should allow for the inclusion of higher value, more visibly rich Extensible Markup Language (XML) applications and double-byte languages. • The IP Phone should support software updates to the phone flash memory. Firmware changes should be downloaded from the OEM site directly. • The IP Phone should have the following: <ul style="list-style-type: none"> ○ Message ○ Directories ○ Settings ○ Services ○ Help • The Settings feature key should allow the user to adjust display contrast, select background images (if available), and select from a large number of unique ringer sounds through the User Preference menu. Network Configuration preferences also should be set up (usually by the system administrator). 	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
		<p>Configuration should be either automatically or manually set up for Dynamic Host Control Protocol (DHCP), Trivial File Transfer Protocol (TFTP), IPT Server software, and backup IPT Server Software. Other available Settings submenus should include Device Configuration and Security Configuration.</p> <ul style="list-style-type: none"> • There should be an internal 2-port Ethernet switch allowing for a direct connection to a 10/100BASE-T Ethernet network through an RJ-45 interface with single LAN connectivity for both the phone and a co-located PC. The system administrator should designate separate VLANs (802.1Q) for the PC and IP phones, providing improved security and reliability of voice and data traffic. • The IP Phone should support the following: <ul style="list-style-type: none"> ○ Support for IEEE 802.3af ○ G.711u & G,729a Audio Compression codecs ○ DSCP & IEEE 802.1q/p standards ○ Provisioning of network parameters through DHCP ○ Voice activity detection, silence suppression, comfort-noise generation, and error concealment ○ IP phones should be available with Software, 	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
		camera to support video telephony. <ul style="list-style-type: none"> ○ Support for IEEE 802.3af ○ G.711u & G,729a Audio Compression codecs ○ DSCP & IEEE 802.1q/p standards ○ Provisioning of network parameters through DHCP ○ Voice activity detection, silence suppression, comfort-noise generation, adaptive jitter buffer, echo cancellation and error concealment ○ Multi-line appearance (six extensions / speed dials) ○ Calling Name and Number Display ○ Call Waiting / Call Forward / Call Transfer ○ Three-way dialing (inbuilt conference) ○ Pre dialing before sending ○ Redial / Call hold/resume / Call mute / Call pick-up/group pick-up / MWI facility on phone ○ Language support : English ○ Local phone book ○ Power supply 	
3.4	Rack – 15 U	- Physical Attributes 15 U - Type Wall / floor mount	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
		<ul style="list-style-type: none"> - Wire managers One horizontal - Power distribution Sufficient points – 5Amp sockets power distribution - Door glass door in front with lock - Fan trays With 1/2 fans - Equipment Tray One number - Depth 800 mm - Metal Aluminium extruded profile - Side panels Detachable /non detachable side panels - Width 19” equipment mounting, 	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
3.5	Air-Conditioner – 2 tonnage	<ul style="list-style-type: none"> - Capacity Capacity 2 Tonnage Cooling 50000 BTU/Hr Compressor Rotary Refrigerant R-22 type Power Supply 230V/Ph - Performance EER 10.6 Air Circulation CFM 1030 Noise level <50db - Operation Remote Control LCD 	
3.6	UPS – 2 KVA	<ul style="list-style-type: none"> - Manufacturer ISO 9001-2000 & ISO 14001 certification - Safety Standard EMC/ EMI certification be Sameer/ ERTL/ or equivalent certification - Technology Inverter device IGBT based DSP/ Microprocessor based Technology Double Conversion True On-line UPS 	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
		<ul style="list-style-type: none"> - Inverter efficiency >90% - Capacity 2 KVA online UPS - Input Voltage & Range 120-280VAC - Input Frequency Range 50Hz \pm5%,7% & 10% user settable - Input Phase Single Phase with ground - Input Power Factor 0.99 - Switching frequency >15KHz - Output 2 KVA - Voltage Rated output voltage 230VAC - Rated Output Current 5.83 A. - Voltage 220/ 230/ 240V \pm1% - Switching frequency 15 KHz - Output Frequency 50 Hz \pm 2% - Output Waveform Pure Sine wave - Crest Factor 3:1 - Output Power Factor 0.7 - Battery Backup 1 Hours on full resistive load - Battery Type Batteries SMF (VRLA) Type of reliable brand to provide 1 hr 	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
		<p>backup: Min 3700 VAH (Battery Calculation to be Enclosed)</p> <ul style="list-style-type: none"> - DC Bus Voltage DC Bus Voltage of UPS to be specified - Battery Ratings 2 Hours backup: Min 5350 VAH - Overload capacity 105% - continuous operation 125% of rated load for 5 min 150% of rated load for 1 min - Battery Enclosure MS Rack Powder Coated - Operating Temperature 0 to 40 Degree Centigrade - Noise level <45 dB @ 1 Meter - Charger type CVCC SMPS based - Alarms & Indications All necessary alarms & indications essential for performance monitoring of UPS to be incorporated - Bypass Automatic Bypass 	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
		<ul style="list-style-type: none"> - Compatibility UPS to be compatible with DG Set supply - Standard RS 232 port for software interface SNMP interface support feature - Dimensions Bidder to specify dimensions (H x W x D) 	
3.7	Desktops based Video Conferencing	<ul style="list-style-type: none"> - Basic Pc based equipment with necessary software and licenses. The web Cam should be accompanied with the software base code. - Protocol support Standard: H.323/SIP Video: H.261, H.263, H.263+, H264. Audio: G.711, G.729. - Camera Operating System: Windowes 2000,XP. Field of View 54”. Frame Rate upto 30 fps at 640X480 (VGA). Image sensor size :1/3” Manual Focus , Auto White Balance 	

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S.No.	Item Details	Item Specifications	Compliance / Deviation
		<p>0.35 Mega pixels</p> <p>Resolution: Up to 640x480.</p> <p>Focus Distance: 5cm to Infinity</p> <p>Colours: Up to 32 bits RGB</p> <p>USB Cable Length: 1 metres.</p> <ul style="list-style-type: none"> - Audio features <p>Integrated Microphone, Noise suppression, Automatic gain control, Echo cancellation.</p> <ul style="list-style-type: none"> - Video features <p>Brightness Control, Picture-In-Picture (PIP).</p> <ul style="list-style-type: none"> - QoS <p>IP Precedence (ToS), Differentiate Services (DiffServ), Network Address Translation (NAT), (optional), Dynamic bandwidth allocation.</p> <ul style="list-style-type: none"> - Security Features <p>AES/TLS encryption, Should support encrypted calls up to 2 Mbps, including audio, video and content.</p> <ul style="list-style-type: none"> - Dialing options <p>Should support dial out to the system through following options: E.164, DNS names, IP address, Local address book, Active directory, supporting ILS and LDAP, SIP URI support</p>	

S.No.	Item Details	Item Specifications	Compliance
3.8	Generator Set – 5 KVA	<p>- Engine type Single cylinder, in accordance with IS 10002-1981 with latest amendments.</p> <p>- General Features Electric start 12 V DC , Water cooled /Air cooled , Mechanical/Electronic Governor , Fuel High speed diesel , Rating Continuous.</p> <p>- Output Suitable HP rated to match the alternator, Rated speed 1500 RPM.</p> <p>- Over load capacity. 10% overload – 1 hour, 50% overload -15 second.</p> <p>- Accessories Flywheel to suitable diameter and fuel injection equipment, Air cleaner, Lubricating oil cooler. Electric motor starting equipment like motor, battery, charging generator with voltage regulator etc. Heavy duty radiator with fan. Residential type silencer with exhaust piping with vibration isolator. Fuel tank suitable for 8 Hrs of continuous running with necessary piping and fuel gauge, drain valve, inlet and outlet connections. Anti vibration mounting pads, Speed controlling governor, Suitable coupling system to the Alternator Tachometer, Lubricating oil pressure gauge. Hour meter to indicate number of Hrs of operation Auto trip on low oil pressure Over speed alarm with trip, Thermal insulation for exhaust line with glass</p>	

		<p>wool, Aluminium sheet, chicken mesh, Diesel line 12 mm dia including beads flanger etc . Battery 12 V with lead and terminal. Battery charger. Protection against low lubricating oil pressure, high water temperature and over speed shall be provided for engine with alarm and fuel shut off.</p> <p style="text-align: center;">- Alternator</p> <p>Output 5KVA P.F 0.8 lag Voltage 220V, 1 Ph Type continuous running duty type Frequency 50 Hz Phase single Speed 1500 rpm Cooling Air-cooled Output 5KVA Over load capacity 10% overload – 1 hour 50% overload -15 second Lubrication forced, Excitation Self excited, self regulated, automatic voltage regulator with remote voltage control facility. Permissible voltage variation \pm +/-1.5% of rated voltage , Insulation Class H , Base frame Engine and alternator shall be coupled and mounted on sturdy, fabricated, welded construction, channel iron base frame with coupling guard.</p> <p style="text-align: center;">- Control Panel</p> <p>The Genset control panel shall be of 14 SWG CRCA sheet and powder coated finish. The panel shall be provided with standard engine instrumentation, Voltmeter with selector switch, Ammeter</p>	
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		<p>with selector switch, Frequency meter, Current transformer, Instrument Fuses etc. MCCB/MCB of suitable rating shall be provide for overload and short circuit protection. AMF facility shall be provided for the DG set. AMF relay shall be provided in the control panel/Electrical panel with required control wiring and Contactors for automatic operation shall be done.</p> <p style="text-align: center;">- Dimensions</p> <p>Bidder to specify dimensions (H x W x D)</p>	
3.9	Modems Specifications for Leased Lines	<ul style="list-style-type: none"> • Visual Indication & RS-232 Port for set-up, control & monitoring. No jumper settings should be required for configuring the modem. • It should be compliant to ITU-T G.991.2 • The desktop modem at the horizontal office should support either V.35 or 10/100 Base-T Ethernet Interface. • The desktop modem at the BSNL Exchange of horizontal office should support G.703/G.704 Interface. • It should support distance of 5.0Kms at 0.5mm copper over single pair. The distance should be mentioned over TEC Certificate. • The modem should run on 230VAC as well as -48VDC power supply. • Features of link performance monitoring and time based statistics should be available. • Should be SNMP enabled. <p style="text-align: center;">- Support for configuration backup</p>	

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		for future reference.	
3.10	Workstations to be provided at each PoP	<p>- Hardware</p> <p>HDD :80GB SATA or higher (7200 rpm or higher)</p> <p>Keyboard :Standard 104 keys</p> <p>Mouse :Optical Scroll mouse with OEM Pad</p> <p>Network Card :10/100/1000Mbps with full duplex and WOL support</p> <p>FDD :1.44 FDD</p> <p>CD :16x DVD ROM- CD RW (Combo Drive) or higher</p> <p>Ports :1x Parallel, 1xSerial, 8xUSB, 1x PS/2 Mouse, 1x PS/2 KBD, 1xVGA, 4xUSB & 1xRJ45</p> <p>USB :4 or more</p> <p>Monitor :17" TFT color monitor with minimum Brightness 300cd/m2, Contrast Ratio 600:1, Resolution 1280 x 1024 or higher, Viewing Angle (Degrees) 130° (vertical), 140° (horizontal) or better , response time 8ms, Horizontal Frequency(kHz) 30~81 KHz, Vertical Frequency(Hz) 56~75 Hz, TCO99/ 03, EMI/FCC (or ETDC Report for meeting FCC norms) compliance, energy star compliance, same brand as that of PC</p> <p>OS :Pre-installed Operating System with patches, license, 5 years' Support/ Subscription, (Anti-virus if any), Standard</p>	

		<p>Desktop software (like office tools)</p> <p>Multimedia :Onboard audio with 2x3 watt rms speakers, microphone</p> <p>Certifications :Energy star compliant, NSTL, FCC (EMI EMC/ ETDC) certified, ISO 9001: ISO 14001, ACPI compliant, PCI compliant</p> <ul style="list-style-type: none"> • OS Certifications :Certified for proposed OS 	
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State Funded Equipment

Horizontal Connectivity

All the offices and departments of GOC which need CGSWAN connectivity over a period of time will be integrated as and when required. Respective offices will give a formal request to SWAN Successful bidder for the connectivity.

A budgetary price estimate should be included in the Techno Commercial section of the bid and not in the Price Bid. It is to be noted that this is needed at a later date and will not be considered in the Commercial evaluation of this RFP. Also it is to be noted that the above solutions would no way bind the Purchaser contractually for future implementation.

Following horizontal connectivity options can be considered from the respective POPs to GOC offices:

1. The co-located departments within the DHQ/BHQ PoPs building will be accessing CGSWAN using LAN technologies directly on the LAN switch at DHQ/BHQ;
2. while 20% of the rest of GOC offices in District/Block level will be connected using n x 64Kbps link, as Horizontal connectivity and
3. remaining 80% using wireless
4. Connectivity using VSAT shall be provided at 77 locations as per details given herein after.

List of all such location which are not collocated at DHQ / BHQ PoP are provided with the tender document. As per SWAN expansion guideline provision should be kept in the design for providing Wireless connectivity beyond the POPs. The Wireless connectivity is for various government offices as well as CHOICE / CSC Centres located in and around respective POPs (SHQ, DHQ, BHQ) to connect to the CGSWAN. Bidders are required to offer basic design for establishing such Wireless LAN System. The basic design should indicate the reach and channel availability of the base station equipment proposed. Also the operating frequency band and the standard followed should be clearly indicated. While providing the design bidder should ensure that this should be easily up gradable to guard against early obsolescence. However for calculation of financial bid the number of horizontal connectivity shall be limited to the list provided in annexure titled list of horizontal offices to be connected to CGSWAN.

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Specifications for Routers & L2 Switches (Horizontal offices under Blocks, DHQs & SHQ)

S.No.	Item Details	Item Specifications	Compliance
1	HO Horizontal Router	<p>Hardware Architecture</p> <p>Multiple services (Data, voice, video) Shall support IP, VPN etc , Device should have sufficient slots , Power supply for 230 V AC 50 Hz</p> <p>Interface / Slots</p> <ul style="list-style-type: none"> - Ethernet Ports 2 x 10/100Mbps ports. - 2 un-framed E1 interface (G.703) or 2 synchronous serial interfaces capable of supporting 2 Mbps leased line are required. -1 Console port <p>Memory 128 MB</p> <p>Inbuilt / Flash Memory 64 MB</p> <p>Performance: 150 Kpps or more / 15 Mbps 3DES encrypted throughput</p> <p>Security</p> <p>IP Sec 3DES/AES, VPN for configuration of VPN tunnels.</p> <p>The router should support VPN with QoS and Security features enabled.</p> <p>Should have Integrated Firewall services</p> <p>Routing Protocols</p>	

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S.No.	Item Details	Item Specifications	Compliance
		<p>Static Routes RIPv1, RIPv2 , OSPFv2. BGP4.</p> <p>Protocols</p> <p>PPP, Multi-link PPP , IPv4, VRRP Random Early Detection Weighted Fair Queuing, Selective Packet Discard, RSVP, Multicast Forwarding & Multicast Relay.</p> <p>IP Accounting support</p> <p>Using external hardware/software infrastructure, Packet & Byte Counts, Start & End Time Stamp, Network Time Protocol, Input & Output interface ports. Type of service, TCP Flags & Protocol Source & Destination IP addresses Source & Destination TCP/UDP ports</p> <p>Management</p> <p>Accessibility using Telnet, SSH, Console access. Easier Software upgrades through network, using FTP / TFTP, etc. SNMP, Configuration management through CLI, GUI based software utility and using web interfaces. GUI tools shall be provided. Event and system history logging functions shall be available. Support for Syslog Server required. Shall support boot options booting from remote Network node.</p> <p>QoS</p> <p>ToS, CoS, Queuing, prioritizing, Committed Access Rate/ Rate limiting, IP Precedence, Policy based routing, Congestion avoidance, algorithm, such as WRED, Priority queuing, Class</p>	

S.No.	Item Details	Item Specifications	Compliance
		<p>based weighted fair queuing</p> <p>Debug & Diagnostics</p> <p>Display of input and output error status on all interfaces, Display of Dynamic ARP table , Display of physical layer line status signals like DCD, DSR, DTR, RTS, CTS on all interfaces, Display of Routing table, Trace-route, Ping.</p> <p>Physical</p> <p>Router should be provided with 19” Rack mounting kit. All necessary power cords, adapters, data cables, connectors, CDs, manuals, brackets accessories, wire managers, etc. should be provided</p>	
2	HO LAN Switch	<ul style="list-style-type: none"> – Minimum 24 nos of 10/100 Ethernet ports. – Minimum of 8 Gbps Switch Fabric. – Minimum of 6 Mpps wire-speed forwarding rate – Should support minimum 8000 MAC address – IEEE compliant for 802.1Q VLAN, 802.1p, 802.1d STP, , 802.1w, 802.1x user authentication and 802.3x Flow control. – Management – Should have built-in SNMPv1, SNMPv2, 	
3	IP Phones	<ul style="list-style-type: none"> • Pixel-based display---A pixel-based display should provide intuitive access to calling features. 	

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S.No.	Item Details	Item Specifications	Compliance
		<ul style="list-style-type: none"> • Four soft keys should dynamically present calling options to the user. The scroll toggle bar should allow easy movement through the displayed information. • "Menu" key---This key should allow users to quickly access information to access voicemail messages, call logs, network settings, user preferences, corporate directories, and XML services. • A volume-control toggle should provide easy decibel-level adjustments of the handset and ringer. • A single-position foot stand should provide optimum display viewing and comfortable use of buttons and keys. The foot stand can be removed to allow wall mounting via mounting holes located on the base of the phone. • XML Applications should be delivered to the display. • Calling Features <ul style="list-style-type: none"> ▪ Support of a single line or directory number ▪ Calling name and number display ▪ Call waiting ▪ Call forward ▪ Call transfer ▪ Support of Extension Mobility ▪ Three-way calling (conference) ▪ Redial • Network Features <ul style="list-style-type: none"> ▪ Automatic IEEE 802.1Q (voice 	

S.No.	Item Details	Item Specifications	Compliance
		virtual LAN [VVLAN]) configuration <ul style="list-style-type: none"> ▪ IEEE 802.1Q /p VLAN tagging and traffic prioritization ▪ 802.1Q VLAN-based switching of traffic between the phone and access switch ▪ Differentiated Services Code Point (DSCP) tagging ▪ G.711a, and G.729ab audio compression coders-decoders (codecs) ▪ Integrated Ethernet switch ▪ 10/100BASE-T Ethernet connection through an RJ-45 interface for LAN connectivity ▪ Software upgrade supported using a Trivial File Transfer Protocol (TFTP) server ▪ Provisioning of network parameters through Dynamic Host Configuration Protocol (DHCP) ▪ Voice activity detection, comfort-noise generation. 	
S.No.	Item Details	Item Specifications	Compliance
4	Cable Laying	<p>- Cabling</p> <p>Structured Cabling as per industry Standards . UL * R certified for complete channel for both fibre and UTP (CAT 5e/ CAT6) cables. 20/ 25 years' standard performance warranty should be given on passive components.</p> <p>- Documentation & Lay-outs</p> <p>UTP or OFC Cable route, with detailed diagram and plan for laying of UTP and</p>	

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S.No.	Item Details	Item Specifications	Compliance
		<p>OFC for approval.</p> <p>Termination of cabling component, UTP cable and OFC with labels & marking as per approved labeling plan & documentation.</p> <p>Documentation for all PoPs (Hard and Soft Copy) to be maintained for entire 5 years of Projects.</p> <p>- Conduits and Channels</p> <p>PVC pipe or Casing type</p> <p>Should be 1” diameter, with ISI mark., At least 4 cable can laid in one casing Using clamp channel should be fix on wall and distance between two clamps not more then 6 inch. GI pipe Should be 2” inch diameter class B standard , At least 2 cable can laid in one pipe , Underground OFC should be laid in GI pipe only.</p> <p>- Passive component</p> <p><u>UTP cable laying</u> : Should follow approved plan.</p> <p><u>OFC laying on wall or under ground</u> : OFC laying on wall or underground in GI pipe, vendor should follow as approved plan.</p> <p><u>Rack</u> :As approved</p> <p><u>Jack Panel</u> :As approved</p> <p><u>IO</u> :As approved</p> <p><u>LIU</u> :As approved</p> <p><u>Fibre connectors</u> :As approved.</p>	

S.No.	Item Details	Item Specifications	Compliance
		<p style="text-align: center;">- Attributes</p> <p><i>.Type</i></p> <p>24-port, Modular, PCB based, Unshielded Twisted Pair, Cat 6, and ANSI/TIA/EIA 568-B.2.1.</p> <p><i>. Jack Type</i></p> <p>Cat 6.</p> <p><i>. Circuit Identification Scheme</i></p> <p>Port Labelling for port identification on each of 24ports.</p> <p><i>. Port Identification</i></p> <p>Labels on each of 24 ports (to be included in supply)</p> <p><i>. Height</i></p> <p>1 U (1.75 inches) .</p> <p><i>. Modular Jack</i></p> <p>750 mating cycles .</p> <p><i>. Accessories</i></p> <p>Strain relief and bend-limiting boot for cable or rear cable manager for cable , support/ Cable Support accessories .</p> <p><i>. Jack contacts</i></p> <p>Phosphorous bronze, plated with gold</p> <p style="text-align: center;">- Approvals</p> <p><i>. Panel</i></p> <p>Black, powder coated steel , UL*R listed and Should be certified by independent test lab (ETL, etc) for zero</p>	

S.No.	Item Details	Item Specifications	Compliance
		<p>bit error rate Gigabit Ethernet.</p> <p><i>. Termination Pattern</i></p> <p>ANSI/TIA/EIA 568 A and B;</p> <p><i>. Performance Characteristics</i></p> <p>Attenuation, NEXT, PS NEXT, FEXT and Return Loss.</p> <p><i>. Warranty</i></p> <p>Both fibre and UTP (CAT 5e/ CAT6) cables. 20/ 25 years' standard performance warranty should be given on passive components. approved</p> <p><u>IO</u> :As approved</p> <p><u>LIU</u> :As approved</p> <p><u>Fibre connectors</u> :As approved.</p>	
5	UTP Cable	<ul style="list-style-type: none"> - Physical Attributes <p>UTP, Cat 6, ANSI/TIA/EIA 568B.2.1 .</p> <ul style="list-style-type: none"> - Conductors <p>24 AWG solid copper.</p> <ul style="list-style-type: none"> - Insulation <p>Polyethylene/Polyolefin , Thickness 0.22 ± 0.03mm.</p> <ul style="list-style-type: none"> - Operating temperature <p>-20 to +60 Deg. C.</p> <ul style="list-style-type: none"> - Jacket <p>Flame Retardant PVC.</p>	

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S.No.	Item Details	Item Specifications	Compliance
		<p>- Approvals</p> <p>UL*R listed , Should be certified by independent test lab (ETL etc) for zero bit error rate Gigabit Ethernet Performance</p> <p>- Capabilities</p> <p>1. Delay Skew : 25ns-45ns / 100m Max.</p> <p>2.Impedance :100 Ω ± 6 Ω</p> <p>3.Frequency tested up to 100 MHz>=250 MHz</p> <p>- Performance characteristics to Be provided along with bid.</p> <p>Attenuation, Pair-to-pair and PS NEXT, ELFEXT and PSELFEXT, Return Loss, ACR and PS ACR.</p>	
6	Mounting Cord	<p>- Attributes</p> <p>A) Length :3 Feet or 7 Feet .</p> <p>B) Conductor :24 SWG 7 / 32, stranded copper .</p> <p>C) Cable Type :UTP CAT 6 ANSI/TIA/EIA 568-B.2.1</p> <p>D) Plug Protection :Matching colour boot to maintain bend radius</p> <p>E) Warranty :20-year component warranty</p>	

S.No.	Item Details	Item Specifications	Compliance
		<p>F) Cable Type :Cat 6 .</p> <p>G) Terminals :Phosphor Bronze with gold plating</p> <p>H) Jacket :PVC</p> <p>I) End point connector :Factory standard connector should be terminate at both end</p> <p>J) Insulation :Flame Retardant</p>	
7	Information Outlets (I/O)	<p>- Attributes Type</p> <p>1-port, Shuttered, White/Ivory, with surface box for surface mount applications, Cat 6,TIA/EIA 568-b.2.1 Cat 6, 100 Ω, Cable Accomodate minimum of 8-Position/8Conductor Modular Jacks , 22-24 AWG copper cable.</p> <p><u>DC Resistance</u> : 0.3 Ω</p> <p><u>Interface resistance</u> : 20 milli Ω</p> <p><u>Material</u> : ABS/Polycarbonate</p> <p><u>No. of ports</u> : One</p> <p><u>Protection</u> : Shutters</p> <p><u>Identification</u> : To be supplied with label for port identification.</p>	
8	LIU	<p>- Attributes</p> <p><u>Fibre optic patch panel</u> :19-inch, Rack</p>	

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S.No.	Item Details	Item Specifications	Compliance
		<p>mounted or wall mounted</p> <p><u>Height</u> :1U</p> <p><u>No. of ports with connectors</u> :12</p> <p><u>Cable Management rings</u> :Front and rear cable management rings</p> <p><u>No. of 6-port / 12port adapter plates</u> :2/4 Max.</p> <p><u>Fiber Optic Adapter Plate</u> :6 Port SC type, SM.</p>	
9	OFC	<p>- Attributes</p> <ol style="list-style-type: none"> 1) <u>Cable Type</u> : 6 -core, Single Mode, Armoured, Loose-tube, Gel filled 2) <u>Fibre Type</u>: Single Mode, 9 / 125, 250 micron primary coated buffers. 3) <u>No. of cores</u>: 6 4) <u>Armour</u>: Corrugated Steel Tape Armour. 5) <u>Cable Construction Type</u>: BELLCORE GR 20 / IEC 794-1 <p>- Attenuation</p> <ol style="list-style-type: none"> 1) <u>1310nm</u> :0.45 db/KM 2) <u>1500/1550nm</u> :0.4 dB/KM at 1500nm or 0.25dB/Km at 1550nm 3) <u>Tensile rating</u> :1200N 4) <u>Maximum Crush resistance</u> :3000N 	

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		5) <u>Operating Temperature</u> :40 Degree C to +60 Degree C.	
10	Fibre Patch Cord	<ul style="list-style-type: none"> - Cable type single mode , Length \approx 3” ft minimum, Duplex with SC-Style connectors, SM, 9 Micron, Losses < 0.5 db	
11	Fibre connector	<ul style="list-style-type: none"> - Connector Type SC-Style, Simplex Single Mode . MM connectors 500 cycles, Beige . SM connectors 220 cycles, Blue , Ferrules Pre-radius Ceramic Ferrules. <ul style="list-style-type: none"> - Attenuation Not more than 0.5 dB per mated pair. <ul style="list-style-type: none"> - Operating temperature -40 Degree C up to +75 Degree C	
12	IPS	<ul style="list-style-type: none"> - Features. Minimum Throughput --> 1.0 Gig, using single device solution. Number of segments 4 x Gig. Should support fail-open to four Gigabit segments in case of Power / hardware / software failure, Should protect against DoS/ DDoS / SYN-flood/ TCP-flood /UDP-flood Must have “Zero-day” protection against DoS attacks based on traffic behaviour. <ul style="list-style-type: none"> - Action on detection. 	

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S.No.	Item Details	Item Specifications	Compliance
		<p>Block attacks in real time, Drop Attack Packets, Packet Logging , Reset Connections, Action per Attack</p> <ul style="list-style-type: none"> - Stateful Operation. TCP Reassembly, IP Defragmentation, Bi-directional Inspection, Forensic Data Collection Access Lists. - Alerting: Alerting SNMP, SMTP support, Log File, Syslog Support. - Management: Console, SSH, Telnet, HTTPS, HTTP, SNMP v1/v2C/ v3 required. - Operations: Should support 24/7 Security Update Service, Should support Real Time signature update , Should support Provision to add static own attack Signatures - Reporting: System should provide centralized reporting and management. System should provide comprehensive security event reporting, System should provide comprehensive security event reporting (optional). - Power: Power Supply , 230 V AC, 50Hz. 	
13	Video Streaming Server	<ul style="list-style-type: none"> - Protocols <p>Should support Standard IETF protocols - Real Time-Transport Protocol (RTTP), Real Time</p>	

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S.No.	Item Details	Item Specifications	Compliance
		<p>Streaming Protocol (RTSP) and IP Multi cast.</p> <ul style="list-style-type: none"> - Video Format <p>Should support Video formats MPEG - 1, MPEG- 2,MPEG – 4.</p> <ul style="list-style-type: none"> - Server specification <p>Should Support Integrated Event scheduling.</p> <p>Should support Program listing (Should allow to view the happening events).</p> <p>Should support Integrated media synchronization tools like Web presenter, screen caster, slide cast.</p> <p>Should support live, on-demand and scheduled Rebroadcasts.</p> <ul style="list-style-type: none"> - Hardware specification <p>CPU -> processor speed 3.0 Ghz or higher .</p> <p>120 GB SATA or higher and up-gradable .</p> <p>Should have VGA, Sound, USB, Serial interface, keyboard, mouse ports.</p> <p>2 x 10/100/1000 Mbps LAN interface.</p> <ul style="list-style-type: none"> - QOS <p>Should support QoS with protocols like Resource</p>	

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S.No.	Item Details	Item Specifications	Compliance
		<p>Reservation Protocol (RSVP).</p> <ul style="list-style-type: none"> - Security & Privacy Password protection for conferences to ensure privacy for participants. <p>Administrative functions should be password-protected</p> - Web-Based Monitoring and Management Should support central management software. 	
14	Database and application Server	<ul style="list-style-type: none"> - Scalability Cluster file system as option, Support massive internet application systems with massive data warehouse needs. - Performance Tuneable as per requirement as per CGSWAN requirements, Data caching options. Options to improve data proximity online. - Developers Should provide rich set of interface for programmers, Shall enable applications developed on open standard tools, Native compiling of programming units. - High availability and disaster recovery Online Backup and recovery mechanism , Asynchronous and 	

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S.No.	Item Details	Item Specifications	Compliance
		<p>Synchronous DR set up mechanism, Online database re-organisation, Transaction level consistency, Point in time recovery, fast recovery, Detailed log files, Cluster enabled.</p> <p>- Security</p> <p>Password Management , DBA auditing , Proxy Authentication , Encryption , Support creation of fine grained audit trails , Fine-grained Auditing , Security criteria , TCSEC, Level C2 as optional , TCSEC, Levels E3/F-C2 as optional , Level EAL-4 4 as optional.</p> <p>- Administration</p> <p>Space Management</p> <p>Resource Management</p> <p>Backup recovery</p> <p>Event and Alarms as per database standard</p> <p>Support for notification on data driven events as optional ,</p> <p>Support for inbuilt reporting capabilities as optional.</p> <p>- Hardware and Operating System</p> <p>OS :Windows / Unix / Linux (with patches, license, Support, Subscription, Anti-virus, etc).</p> <p>- Hardware specification same as</p>	

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S.No.	Item Details	Item Specifications	Compliance
		given above for Infrastructure Servers	
15	Syslog Server	<p>- Features</p> <p>Should support GUI or Web Based Access .</p> <p>Should be able to receives, logs, displays and forwards Syslog messages.</p> <p>Should provide real-time alerting, filtering and management of Syslog messages.</p> <p>Should report on event logs from distributed Windows host and, Syslog from UNIX hosts, Routers and Switches, Ability to filter reports/Syslog based on: IP Address / Hostname Message string or pattern matching Severity Time or any custom defined rule , Should support with any Database (same box).</p> <p>- Hardware specification same as given above for Infrastructure Servers</p>	
16	Video-Conferencing end-points in the DHQ	<p>Components</p> <p>Wireless remote control, built-in camera, microphone, cables, codec and LCD/TV</p> <p>Interface</p> <p>1 x 10/100 Mbps, 4 x ISDN BRI (512</p>	

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S.No.	Item Details	Item Specifications	Compliance
		<p>kbps) for future requirements (optional)</p> <p>Audio Standards</p> <p>Should support G.722, G.722.1, G.711, G.728, G.729A Should support audio comparable to CD-quality sound for solid audio performance and should have in built echo-cancellation</p> <p>Microphone</p> <p>Should support 360 degrees Voice pickup Should support external microphones connected to MCU</p> <p>Video Standards: Should support H.261, H.263, H.264, H.239 and SIP</p> <p>H.323 Features</p> <p>Video Error correction</p> <p>Audio Error correction, IP Precedence (ToS), DiffServ (DSCP) (COS), Dynamic Bandwidth Allocation. Packet and jitter control, Network Address Translation (NAT) support, Asymmetric speed control, TCP/UDP fixed-port firewall support, Lip synchronization, Echo cancellation, Echo suppression</p> <p>Frame Rates</p> <p>30 frames per second from 384 kbps to 1 Mbps and 60 frames per second from 1 mbps and higher</p> <p>Video Resolution's</p> <p>interlaced video (60/50 fields full-screen video for NTSC/PAL) – VCR</p>	

S.No.	Item Details	Item Specifications	Compliance
		<p>Camera</p> <p>Pan/tilt/zoom (PTZ) camera 65° field of view , Tilt range +25° to -25° , Minimum Pan Range: +/- 100° (Left/Right) , 10 x Optical Zoom , Auto focus , Camera presets - local and far-end</p> <p>Video Inputs</p> <p>Integrated main camera. 1 x Composite or S-Video , VCR and DVD-R</p> <p>Video Outputs</p> <p>1 x S -Video (Main Monitor) , 1 x Composite (Main Monitor) , 1 x S-Video (for Second Monitor) , 1 x XGA (for Second Monitor)</p> <p>Operability</p> <p>Should support in getting video with audio input from any external PC/laptop Should support in connecting to projector through a VGA output port for Video output</p> <p>Security</p> <p>128bit AES encryption. Should provide support for Administrator password</p> <p>Should support secured web access</p> <p>Should support H.235 standard for encryption</p> <p>Network Protocols</p> <p>TCP/IP, DHCP, FTP, Telnet, HTTP</p>	

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S.No.	Item Details	Item Specifications	Compliance
		<p>Picture in Picture (PIP)</p> <p>Should allow users to see both the near and far sites on a single screen with efficient use of a single display area.</p> <p>Management</p> <p>Should support and software upgrades via Console and network.</p> <p>Should be managed from Web interface. SNMPv1, snmpv2/v3</p> <p>Call Statistics</p> <p>Shall provide recent Calls List</p> <p>Shall provide Call Detail Record (CDR) along with call statistics</p> <p>LCD screen/TV: 42" Screen</p> <p>General Specification</p> <p>General 42 inch LCD, Brightness 500 cd/sqm, Contrast Ratio 1600:1, Resolution 1366 x 768 , Channels 100. Search Feature. Automatic and semi automatic search feature Fine Tuning Manual Fine Tuning. Remote Control Full function Remote Control. On-screen display supported with multi-language. On/Off Timer built in, programmable. Auto Power off should be enabled. Sleep Timer Should be inbuilt. Aspect Ratio 4:3 and / or 16:9. Compatible TV PAL, PAL/SECAM, NTSC . Channel Coverage VHF-1, VHF-3, UHF , Side AV Input Should be enabled General 29 inch 100 Hz.</p> <p>Audio Type</p>	

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S.No.	Item Details	Item Specifications	Compliance
		Stereo , Built in speakers Power 230 VAC, 50 Hz Power - Input 220 V AC, 50 Hz	

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Basic Criteria for the Wireless Connectivity Design:

- Wireless connectivity: The end points should be able to easily connect wirelessly in select locations and outdoor areas in the identified locality to various applications and services, at any time.
- Operation: The system should adhere to TRAI rules and regulations.
- Multiple device support: The wireless network should be able to support desktops, laptops, PDAs, and similar devices.
- Support for IEEE standards: The wireless network should support IEEE standards to ensure lower costs and interoperability with different vendor equipment.
- Scalability and adaptability: The proposed wireless network solution should be scalable and adaptable.
- Connection speeds: The vendor's proposed solution should support the maximum allowed speed as per IEEE approved standards.
- Reliability and durability: Fail-over mechanisms should be embedded to ensure high availability of the wireless infrastructure.
- A centralized management solution: Tools should be available for efficient management of infrastructure and to ensure that critical maintenance can be performed quickly with minimal disruption to the network community.
- State shall prefer bidders quoting IEEE standard Wi-Max (802.16d) solution. ,

Base Station Requirements:

- BTS Architecture – Outdoor unit should have radio and baseband modem and indoor unit should provide power, backhaul interfacing and local switching. ODU/IDU connectivity should be supported by up to 100 meters of Cat 5 cable. Outdoor unit should weigh around 4~5 kgs.
- 2.5, 3.3, 3.5 and 5.8 GHz support – There should be WiMAX solution available for 2.5, 3.3, 3.5 and 5.8 GHz range.
- BTS Antenna Options – Both options, integrated 60 degree and external antenna should be supported.
- Multiple RF Channels – Channels of 6, 5, 3.5, 3, 2.75 and 1.75 MHz should be supported in 3.3/3.5 GHz range solution and channels of 20, 10 and 5 MHz should be available in 2.5 / 5.8 GHz solution.
- Output Power – BTS should be able to transmit up to +27 dBm per channel, measured at transceiver RF port.
- CPE transmission level – CPE transmission level should adjust under instructions from BTS.
- VLAN Pass Through – BTS should support VLAN Pass through.
- QoS Features – BTS should support Best Effort, nRTPS, RTPS and UGS. BTS should also support MIR (Maximum Information rate) and CIR (Committed Information Rate).

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- Local and Remote Manager – BTS should host a Web Server for configuration tasks via local browser. For remote management and integration with higher level sub network management, BTS should support SNMP version 2.
- Power Consumption – BTS out door unit one sector Power consumption should be maximum 30 watts.

CPE Requirements:

- Indoor and Outdoor Option – Both options should be available in CPEs.
- Layer 3 support – CPE should support Layer 3 device functions.
- LOS and NLOS - Outdoor CPE should support both.
- Antenna Options – Integral and external antenna options should be there in both type of CPEs.
- Adaptive Modulation – CPE should support adaptive modulation, allowing it to optimize throughput.
- NMS support for CPE – CPE management should happen through NMS.
- Multiple VLAN – Up to 16 VLAN per CPE should be supported.
- Transmit Level – Maximum transmit level should be +27 dBm
- Service Flows – CPE should support up to 16 service flows, 8 on uplink and 8 on downlink.
- Local Browser – CPE should support web server for basic monitoring via a local browser.
- Remote Software upgrade - Software should be up gradable locally and remotely via FTP.
- VoIP – VoIP should be supported.
- VPN – VPN should be supported.
- Self Installation of indoor CPE – Indoor CPEs should be self installable.
- Adaptive Modulation – CPEs should support adaptive modulation on both uplink and downlink.

Sl.No.	Specifications	Compliance / deviations
	Tower at POP : Quantity – 150 Nos.	
	Should be self support mast.	
	Should have minimum height of 30 meters	
	The foundation for mounting the mast should be properly cemented as per IS 456	
	The foundation should have a base plate as per IS 800.	

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Sl.No.	Specifications	Compliance / deviations
	The Mast should be made of GI pipes as per IS (IS – 1161 for properties of tubular sections and IS 806 – 1968 for design of leg members)	
	Loading on the masts as per IS-875-1987 (part 3)	
	Tower material should be galvanized	
	All the bolts and Nuts should be properly secured and should have anti rusting coating.	
	Aviation light and Lighting arrestor should be provided at the top of the mast	
	The mast should withstand the wind load speed of atleast 140 Kmph	
	A ladder shall be provided externally right through from the ground level up to Top of Tower.	
Tower/Pole at Remote: (The nos. are subject to variation as per the actual implementation).		
	Note: If vendor proposes to erect pole based on the feasibility study, then the pole should be made of G.I. pipe having 1” diameter and it should be firmly clamped to the wall appropriately.	
	Should be self support mast.	
	The height of the mast shall be proposed as per the feasibility study done at every remote site.	
	The foundation for mounting the mast should be properly cemented as per IS 456	
	The foundation should have a base plate as per IS 800.	
	The Mast should be made of GI pipes as per IS (IS – 1161 for properties of tubular sections and IS 806 – 1968 for design of leg members)	
	Loading on the masts as per IS-875-1987 (part 3)	
	Tower material should be galvanized.	
	All the bolts and Nuts should be properly secured and should have anti rusting coating.	
	Aviation light and lighting arrestor should be provided at the top of the mast	

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Sl.No.	Specifications	Compliance / deviations
	The mast should withstand the wind load speed of at least 140 Kmph	
	For the towers that are at least 9 meter in height, a ladder shall be provided externally right through from the ground level up to Top of Tower.	

Sl.No.	Specifications	Compliance / Deviations
	Wireless Equipment	
	Quantity - (The nos. are subject to variation as per the actual implementation).	
	Network Architectural Requirements –	
	The wireless system should support multi-service applications like voice, video & data.	
	It should be possible to design a hierarchical network using wireless connectivity.	
	The system shall operate in the 2.4 /5 GHz frequency unlicensed band (ISM Band). The radio frequency & power should follow the FCC regulations and should not violate the regulation by using excessive radio power.	
	The whole system shall comply to the industry standards like IEEE 802.11g/11b/11a. System shall support the data rate of 54Mbps at ISM band in conformance to IEEE 802.11g standard.	
	The wireless system shall support different type of antennas to meet the design and functional requirements.	
	The system shall have a 10/100BaseTX Ethernet interface to connect to the LAN.	
	Feature Requirements	
	The radio shall support for obtaining an IP address automatically from a Dynamic Host Configuration Protocol (DHCP) server.	

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Sl.No.	Specifications	Compliance / Deviations
	Wireless system shall support Spanning Tree Protocol.	
	The radio shall support Virtual LANs (VLAN) of at least 10 in numbers for provisioning of security, QoS and other critical network parameters.	
	All units should support IEEE 802.1Q VLAN trunking for transporting multiple VLANs over a single physical/logical link.	
	Shall support atleast 10 VLANs per radio. Every departmental office will be placed in a separate VLAN and will be mapped to a respective MPLS VRF at the DCR / TCR.	
	System should support IEEE CSMA/CD mechanism for transport of information at physical layer.	
	Available bandwidth between sites shall be increased through the aggregation of multiple radios at each site.	
	Shall support Automatic channel selection	
	Network Security Requirement	
	The system shall support Wi-Fi Protected Access (WPA) & Wi-Fi Protected Access 2 (WPA2) providing access control via per-user, per-session mutual authentication and data privacy via strong dynamic encryption.	
	Solution should support for allowing only legitimate clients to associate with legitimate radio.	
	Stronger encryption is provided by WPA with TKIP enhancements such as message integrity check	
	(MIC), and broadcast key rotation and by WPA2 with AES.	
	Should support filtering based on MAC address, IP Address and Ethertype.	
	Quality of Service Requirement	
	Shall support converged applications like VoIP, IP/VC & data over a single wireless link.	

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Sl.No.	Specifications	Compliance / Deviations
	System shall support QoS for terminating 20 voice over IP circuits at base station radio .	
	The system should support QoS - Wi-Fi Multimedia (WMM that is a subset of IEEE 802.11e) that improves the user experience for audio, video, and voice applications over a Wi-Fi wireless connection.	
	System shall support traffic prioritization based on IEEE 802.1p & IEEE 802.1Q tag values	
	The system should support mapping by assigning IP DSCP, Precedence, or Protocol values to Layer 2 CoS values.	
	Management and Operational Requirements –	
	The system shall support multiple & configurable roles for radio networks i.e., point-to-point and point-to- multipoint.	
	Should support lightening surge protector for safety purpose.	
	System shall support SNMP for management.	
	Support of management through Telnet, HTTP, TFTP, SNMP and console.	

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Remote VSAT Equipment:

- Remote VSATs would comprise of following sub-systems namely Antenna, LNB, ODU, and IDU.
- The antenna shall be manually operated. However, it should be provided with suitable steer ability arrangement (both for Azimuth and Elevation)
- Depending on site conditions, antenna shall be installed on the rooftop or on the ground with permanent civil foundations along with suitable earthing as per the antenna manufacturer.
- The remote VSAT should be capable of providing 1.6Mbps and above of Remote Receive data to the Govt. of CHATTISGARH users.
- The tender should also quote equipment for completely new 77 VSATs.
- The Remote Terminals would be located at the user site and each one would comprise of sub-systems functionally named as ODU (dish antenna, Feed, LNB etc), IDU and IFL cable. The cost of every individual item required to install 77 numbers of completely new VSATs should be offered in the bid.
- .

Frequency of Operations

The VSAT System shall operate in **Ku Band**. However, the bidder would ensure proper fade margin while doing the calculations for Link Budget considering the parameters applicable for Chattisgarh.

Remote VSAT Equipment Specifications:

2.2.1 Antenna Specifications:

The VSAT antenna shall fully comply to the requirements specified in the TEC Specification GR No. GR/SAN-12/02.APR.2001 with latest amendments on the minimum side. Following are the required parameters for VSAT Antenna

S.No	Particulars	Specification
1	Diameter	1.8 mtr
2.	Operating Frequency	14.0-14.5 GHz TX 10.95 Ghz -12.75 GHz RX

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3.	Polarisation	Linear
4	Off axis radiation pattern	As per ITU-R.580-5 or latest
5	TX.X-Pol Isolation	On-axis-better than 30 dB
	RX.X-Pol Isolation	On-axis-better than 30 dB
6	Feed	Off set
7	Mount	EI-over-Az
8	Elevation Adjustment	10 Deg. To 80 Deg. Continuous
9	Azimuth Adjust range	360 deg. Continuous
10	Wind loading-operational	Upto 70 Km/hr
	-Survival	Upto 200 Km/hr

2.2.2 LNB

- Frequency Band : Ku-band
- DC power requirement : from IDU
- Receive Frequency : 10.95 to 12.75 GHz

2.2.3 ODU

- Frequency of operation : Ku Band
- Power output : 2 watt
- Transmit Frequency range : 14-14.50 GHz
- DC power requirement : From IDU

2.2.4 IDU

- Inbound data rate : minimum 128 Kbps & going up to 1600 Kbps and above
- Access-Mechanism : F-TDMA/MFTDMA
- Power Consumption : less than 50 watt
- IDU power requirement : External power supply
- Bit Error Rate : Better than 1×10^{-7} or better

2.2.5 Physical Interface

- No.of ports : 1 ports
- Input Data port : Ethernet 10/100 (RJ 45).

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- Data Transport Protocol : TCP/IP, UDP
- IP Routing Support : ARP, ICMP, IGMP, Routing (RIP v1 / v2), NAT, PAT, DNS
- Following features should be embedded inside the IDU:
 - ✓ NAT (Network Address Translation)
 - ✓ ACLs (Access Control Lis)
 - ✓ DHCP (VSAT should work as DHCP server)
 - ✓ TCP Spoofing
 - ✓ Bidirectional Data Support
 - ✓ QoS
 - ✓ VLAN Tagging

2.2.6 Environmental Specifications:

- Temperature : Operating ----- 0 to 40 C
Storage -20 to 70
- Humidity : 95%

Work Plan Requirements

CGSWAN Project is a multi-location initiative. Its implementation is complex and can go out of control unless all the stake holders, especially the SWAN Successful bidder designs and implements a comprehensive and effective project management methodology. The following requirements are therefore prescribed in this regard.

Work Sheet

The SWAN Successful bidder should design a detailed Project Plan which should include the following components:

(i)	Project Organization and Management Plan
(ii)	Phase-wise Design & Implementation Plan
(iii)	Phase-wise Integration Plan
(iv)	Acceptance-Testing (ATP) and Commissioning Plan
(v)	Helpdesk Management Plan
(vi)	Problem Management Plan
(vii)	Change Management Plan.
(viii)	Training Plan, Methodology and Training Details
(ix)	Any other relevant items related to the Project Development

Project Development

The SWAN Successful bidder shall:

- (i) Manage and monitor project schedules as specified in this Volume Tender.
- (ii) Monitor & review the activities related to rollout of the network and services in tune with the requirements given in the Tender and ensure conformance to requirements for CGSWAN project.

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- (iii) Establish appropriate proactive/ reactive reporting mechanism as required by GOC.
- (iv) Submit weekly project progress and status reports to GOC.
- (v) Design and develop online tools for enabling CGSWAN appointed agency, to monitor the status of the project.

Project Implementation

The SWAN Successful bidder shall:

1. Assume the overall responsibility of managing and monitoring the project as per the Time Schedule.
2. Review implementations at the locations as per the Schedule and report compliance to CGSWAN project coordinator.
3. Monitor the progress of change management plan as laid out in the agreement in order to enable smooth transition to the new system;
4. Monitor the progress related to setting up of major project components like
 - Setting up of Network Operation Centres
 - Commissioning of equipment at SHQ, DHQ and BHQ.
 - Any other component that are felt to be monitored as a priority from time-to-time

Requirements of Project Management

Approvals and Clearances

SWAN Successful bidder has to obtain all necessary approvals/ clearances from concerned authorities / departments including:

- (i) From DoT/ TEC/ TRAI/ BSNL, for establishing CGSWAN network
- (ii) From local authorities (like Municipalities, PWD, BSSEB etc.), as required, including laying their own cables, mast erection, etc.

The various requirements during the entire stages of the CGSWAN project implementation are given below.

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Design

- (i) The SWAN Successful bidder shall conduct site survey and submit the detailed project plan that should include following documentation: 9 Best practices approach document for the connectivity and optimized configuration for network devices. Cabling lay-out for the set-up
- (ii) The SWAN Successful bidder shall design an IP addressing scheme for the CGSWAN. The GOC shall review the IP scheme and if required, the SWAN Successful bidder would have to change IP addressing of the nodes wherever required.
- (iii) The SWAN Successful bidder shall prepare detailed security architecture, deployment and policies document for security components being supplied for securing the IT infrastructure in the CGSWAN.

Supply

- (i) The SWAN Successful bidder shall not bid /supply any equipment that is likely to be declared end of life/ end of sale. The SWAN Successful bidder would be required to replace all such equipment with latest technology and equivalent/ higher configuration.
- (ii) The SWAN Successful bidder shall ensure that the sub-systems of following main categories of CGSWAN are from same OEM, where ever feasible:
 - Network (Routers and Switches)
 - IP Telephony (IP PBX and IP Phones)
 - MCU, end-points and Desktop based VC
 - Cabling Systems (Fibre Optic, UTP and their accessories)
- (iii) Passive components such as patch cords shall be factory crimped and shall carry test certificates (EIA/ TIA with 20 years warranty) to ensure trouble free operations. All the passive components need to be of the same make across the entire network to ensure standardization and ease of Certification from the manufacturers.
- (iv) The SWAN Successful bidder shall be responsible for end-to-end implementation and shall quote and provide/ supply any items not included in the bill of materials but required for commissioning of the network.

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- (v) The SWAN Successful bidder shall supply all the installation material/ accessories/ consumables (e.g. screws, clamps, fasteners, ties anchors, supports, wires, fibre connection kits etc.) necessary for the installation of the systems.

Install

- (i) It shall be the responsibility of the SWAN Successful bidder to bring all the installation equipment and tools required for the installation of the entire system.
- (ii) The SWAN Successful bidder shall install the UPS systems at PoPs & racks and wire up to the racks. The SWAN Successful bidder shall be required to provide & test required electrical ground at each existing power point before connecting networking devices/systems.
- (iii) Civil works, for installation of Mast for antennas for wireless connectivity and passive-cabling systems will be the responsibility of the SWAN Successful bidder.
- (iv) All the work shall be done in a conscientious manner as per the OEM guidelines and best industry practices. The system shall be subjected to inspection at various stages. Local regulation/ codes shall be followed at all times.
- (v) The SWAN Successful bidder shall be responsible for storage and security of material on receipt at the site.
- (vi) The SWAN Successful bidder shall not cause any damage to Government buildings /other premises and property and will perform restoration if any damage occurs. Trenches, path-cutting etc. will be back-filled and restored to the original condition immediately after laying of the conduit/ cable.
- (vii) The SWAN Successful bidder shall plug conduits and entrance holes where the cabling has been installed with suitable sealing material.
- (viii) The SWAN Successful bidder shall install and configure all the active/ passive devices in accordance with OEM guidelines.

Testing

- (i) The SWAN Successful bidder shall prepare detailed acceptance testing plan (ATP) for each of the CGSWAN components e.g. Network, IP Telephony, Video Conferencing Systems (VCS), Security components & cabling systems, Servers, NMS, Helpdesk, Anti Virus, DNS, Proxy, Directory, Messaging, desktops etc. and submit the same to the CGSWAN appointed approval agency..

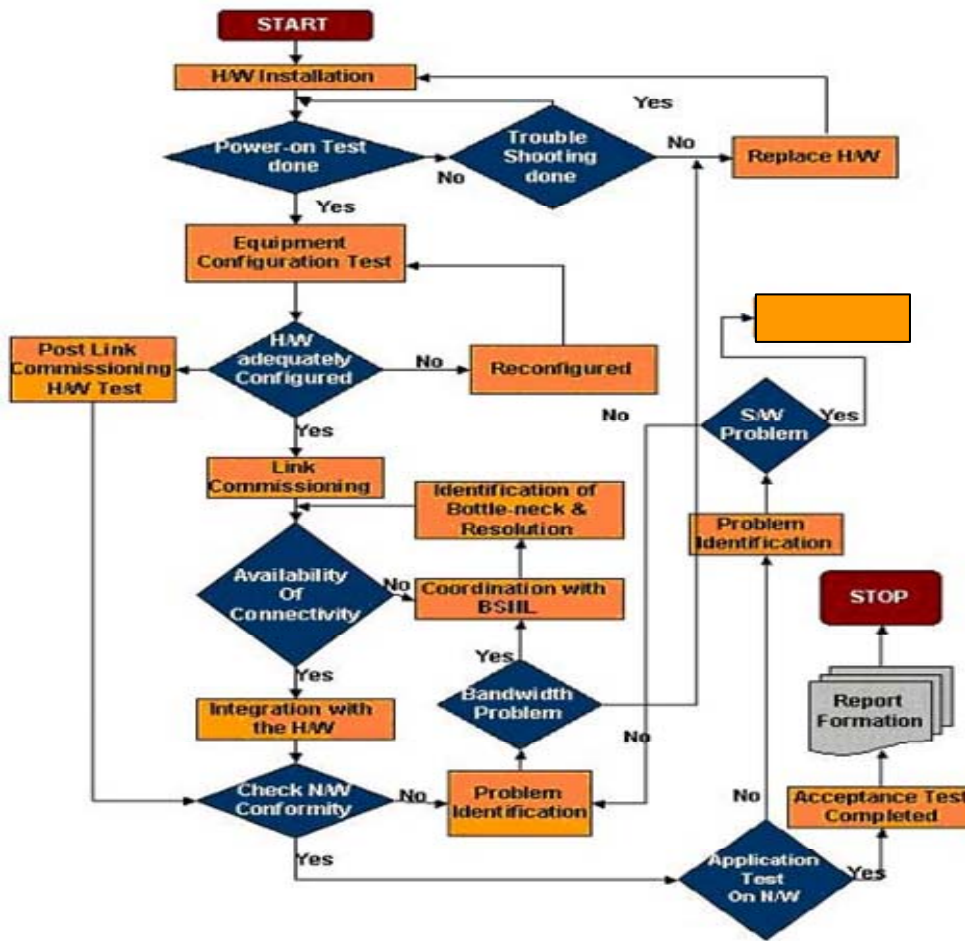
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- (ii) The SWAN Successful bidder shall ensure that the cabling and crimping/ termination is done in accordance with the EIA/ TIA standards and supported by the Original Equipment Manufacturer (OEM) fully tested and certified (complete channel) for operations for a minimum period of 20 years.
- (iii) All the functionalities, features and configuration relevant to the CGSWAN shall be documented by the SWAN Successful bidder for the Network, IP Telephony, Video Conferencing Systems (VCS), Security components & cabling systems, Servers, NMS, Helpdesk, Anti Virus, DNS, desktops etc. and shall be provided to the CGSWAN appointed approving agency.

An indicative Acceptance Test Plan (ATP) for CGSWAN components is described in flow chart as:



Commissioning and Integration

- (i) The SWAN Successful bidder shall configure the Network, IP Telephony, Video Conferencing Systems (VCS), Security components & cabling systems, Servers,

- NMS, Helpdesk, Anti Virus, DNS, , Proxy, Directory, Messaging, desktops etc. for end-to-end user access to applications/ services.
- (ii) The SWAN Successful bidder shall be responsible for the installation and configuration of software applications/ modules for the Network Management and security management, IP telephony, Video Conferencing, Helpdesk, Server OS, infrastructure Services etc.
 - (iii) The SWAN Successful bidder shall provide support to CGSWAN for integration of all existing/ operational LAN and WAN links to provide enterprise wide access to CGSWAN. It shall be responsibility of the SWAN Successful bidder to configure the systems to take care of all IP addressing or similar issues arising at the time of integration and should also ensure that all the existing applications run smoothly.
 - (iv) The SWAN Successful bidder shall be responsible for all the above mentioned points for horizontal connectivity also.
 - (v) The SWAN Successful bidder shall configure quality of service parameters on network switching and routing devices for end-to-end QoS for voice, video and other critical traffic over the network.
 - (vi) The SWAN Successful bidder shall be responsible for integration of security components in the network to ensure a secured network access for users.
 - (vii) The SWAN Successful bidder shall configure network management policies for managing all the network and security devices using network management systems.
 - (viii) The SWAN Successful bidder shall be responsible for integrating the State Data Centre with CGSWAN. Overall network connectivity, data or information flow end to end between State Data centre and any departments/ Offices/ Citizen.

Documentation

- (i) The SWAN Successful bidder shall document all the installation and commissioning procedures and provide the same to the GOC within 30 days of the commissioning of respective components (including SHQ, DHQ, BHQ and all Horizontal offices).
- (ii) CGSWAN Security Policy: The SWAN Successful bidder shall prepare detailed security architecture, deployment and policies document for security components being supplied for securing the IT infrastructure in the CGSWAN.
- (iii) All reports

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- Manpower Deployment schedule
 - Hardware / Software Delivery Report
 - Detailed weekly project Status report location wise
 - Training materials
 - Installation documents for each location.
 - Version Control report
 - Any other reports as mutually agreed.
- (iv) The SWAN Successful bidder shall submit a complete cabling and electrical system layout (as Installed), including cable routing, telecommunication closets and telecommunication outlet/ connector designations. The layout shall detail locations of all equipment and indicate all wiring pathways. This shall be submitted to the CGSWAN appointed agency within 30 days of completion of cabling system.
- (v) Manufacturer's technical documentation on all devices used in the system including user manuals for configuring of switches, routers, etc and their 'As installed' configuration shall be provided by the SWAN Successful bidder (Hard and Soft Copy both).

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