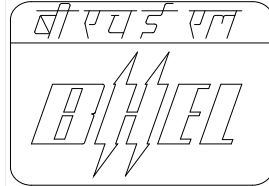


BHARAT HEAVY ELECTRICALS LIMITED



**TECHNICAL SPECIFICATIONS
FOR
REDUNDANT 16MBPS (1:1) INTERNET BANDWIDTH ON
FIBER FOR BHEL-PEM
SPECIFICATION NUMBER: PE888S-1302 REV.01**

**PROJECT ENGINEERING MANAGEMENT DIVISION
PPEI BUILDING
HRDI & ESI COMPLEX
PLOT NO. 25, SECTOR 16A
NOIDA – 201 301**

**TECHNICAL SPECIFICATIONS FOR 16 MBPS (1:1) REDUNDANT
INTERNET BANDWIDTH ON FIBER FOR BHEL-PEM
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1.0 REQUIREMENT

BHEL-PEM at PPEI Building, HRDI & ESI Complex, Plot No. 25, Sector 16A, NOIDA requires 16Mbps (1:1) redundant internet bandwidth on Fiber as per the details of the Service Level Agreement (SLA) stipulated here-under. This bandwidth shall be used by BHEL PEM users as a redundant link / load sharing mode for Internet access.

2.0 LAST-MILE CONNECTIVITY

Last-mile connectivity is to be provided by the Service Provider and, the Service Provider should provide link on Fiber as the last mile in Ring.

3.0 DURATION OF THE CONTRACT

The contract shall be initially for a period of 3 years after which the same shall be extendable on mutually agreed terms and conditions.

4.0 EXISTING SET-UP AT BHEL-PEM

A network consisting of Windows 2003 / 2007 Advanced Server s/w based servers, nodes, switches, Intrusion Prevention System (IPS) network-interfaced LED and Inkjet plotters, laser printers etc. and various design, engineering, drafting and office application s/w already exists at BHEL-PEM. The bandwidth being obtained under this specification is required to be connected and compatible to the existing system. **For a detailed understanding of the existing hardware, software and networking environment at BHEL, the bidders should visit and acquaint themselves of the existing system. Bidder shall visit the site for complete appraisal and assessment of existing facilities and site requirement.**

Appointments for site visits may be taken from the following :

Shri Manoj Kumar
Dy. Manager (IT)
BHEL-PEM
First Floor, PPEI Building
HRDI & ESI Complex
Plot No. 25, Sector 16A
NOIDA – 201 301.
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5.0 **EXISTING SET-UP FOR INTERNET ACCESS AT BHEL-PEM AND THE PROPOSED SOLUTION**

- 5.1 The existing set-up for Internet access existing in BHEL-PEM is given at Annexure-A. The proposed solution is given at Annexure-B. The ISP has to terminate the new Internet line (on Fiber) on a Cisco make Router (specification of Router is enclosed). This CISCO make Router (Model: 2951/K9) shall be provided by BHEL. Bidder/ISP will have to configure this router.

The existing 16Mbps (1:1) Internet bandwidth from M/s Tulip Telecom is terminating on another Cisco make BHEL- Router (3825). And if required, ISP/bidder will have to configure this router also.

Bidder/ISP should also have to configure a Link Load Balancer, Make: Radware Link proof (Model no. 1016 - ODS2) to interface with both ISPs and Intrusion Prevention System along with Checkpoint Firewalls (as shown in diagram at Annexure B). Link Load Balancer shall be provided by BHEL- (specification of Load balancer is enclosed).

It shall be the vendor's responsibility to demonstrate the total solution after configuration of Radware Link load balancer and Cisco Router so that in case of failure of one ISP, another link will take over automatically and also, load of both ISPs may be balanced in case of presence of both ISPs.

- 5.2 The bidder shall have to provide technical guidance to BHEL (or BHEL's AMC vendors) on how to configure the Websense server, Checkpoint Firewalls and Intrusion Prevention System so that the entire solution works as desired.

6.0 **IP ADDRESSES**

- 6.1 The Service Provider shall provide BHEL total **32 nos.** globally valid IP Addresses (both for IPv4 and IPv6).

7.0 **INSTALLATION**

- 7.1 The vendor shall carry out total installation work as per the requirements of the complete specifications and instructions of Engineer to be nominated by BHEL to get the installation done.
- 7.2 Necessary power and communication cables for complete H/W installation including interfacing cables required for inter-connection of different equipment are in the scope of vendor and shall be supplied at no extra cost.
- 7.3 The installation work shall be carried out in a neat workman-like manner by skilled, experienced and competent workmen.

- 7.4 All materials, equipment, instruments, hardware, tools, consumables, fasteners, accessories etc whether specifically mentioned or not in the specification but required for complete installation and testing in all respects and to the satisfaction of the Engineer will be in the scope of the vendor and no extra cost shall be paid for the same .
- 7.5 The vendor shall provide (cost inclusive in the offer), skilled and unskilled labour, supervisory and administrative personnel, erection tools and tackles, equipment for erection, testing and commissioning and implements necessary for timely and efficient execution of the contract.
- 7.6 All materials being supplied or consumed during erection by the vendor in the process of erection work shall be of the best quality conforming to the relevant standards.

8.0 **ACCEPTANCE TEST PROCEDURE (ATP)**

- 8.1 ATP shall be conducted by the Service Provider to establish that the connectivity and all hardware and software has been supplied by the vendor strictly as per the specifications and is in perfect working conditions as per the hardware and software manuals.
- 8.2 Once the redundant 16 MBPS (1:1) Internet bandwidth on Fiber is fully installed and is made operational **as per clause no 5.1**, its operation and performance would be observed for a duration of 7 continuous working days. The ATP would start on a mutually agreed date and time after the preliminary observation of 7 days working days.
- 8.3 At least one representative of the Service Provider shall be present during the entire ATP. Vendor's representative should be capable of performing all tests, interpret the meaning of each diagnostic and satisfy BHEL representative(s) with satisfactory answers.
- 8.4 Following procedure would be followed during the ATP:
- 8.4.1 The complete system with all its hardware and software would be operated continuously for 7 continuous working days on 8 hours per day basis.
- 8.4.2 An overall availability of 99% would be ensured by the vendor during ATP for the leased line and the interface equipment. If any equipment or the leased line is not available for more than eight (8) hours or if it is found at the end of ATP that its availability is less than 99%, BHEL would not accept that particular equipment or the leased line and its ATP would restart (from zero) after making necessary rectifications/replacements. If any equipment or the leased line is not operating to its full specifications, it shall be treated as down for the

purpose of computation of its availability. However, downtime shall not be counted for problems because of the equipment (H/W & S/W) from sources other than the vendor.

8.4.3 During the physical verification, it would be established that all hardware and software have been supplied as per BHEL technical specifications.

8.4.4 All problems/deficiencies as pointed out by BHEL shall be immediately attended to by the vendor.

8.5 BHEL shall issue an ATP certificate on successful completion of ATP, provided that :

8.5.1 An overall availability of 99% has been achieved as per clause 10.3

8.5.2 No hardware or software problem/deficiency reported during the ATP is pending

8.5.3 No major hardware or software problem/deficiency which indicates that the supplied hardware/software is of poor quality and/or faulty design, was detected during the ATP.

8.6 This Redundant Internet Bandwidth shall not be accepted till the entire solution works satisfactorily in terms of load balancing / failover of two ISPs.

9.0 **MODE OF PAYMENT**

Payment shall be released on a quarterly basis at the end of each quarter after the successful completion of Acceptance Test Procedure (ATP) outlined above subject to compensations as per clause no. 10.3.3 below.

10.0 **SERVICE LEVEL AGREEMENT**

10.1 **LATENCY**

Average Latency or round-trip delay (RTD) shall be averaged over 95% best measurement samples collected over the calendar month. The measurements are the response time to test sample ('ping') issued at interval of 5 minutes between designated network routers. The Service Provider shall ensure latency of not more than 350 ms.

10.2 PACKET LOSS

For a transmission taking place, packet loss would be defined as the number of packets lost divided by the total number of packets sent expressed as a percentage (%).

$$\text{Packet Loss} = \frac{\Sigma(\text{Number of Packets not returned})}{\text{Total number of packets sent}} \%$$

The Service Provider will use all the commercially reasonable efforts to minimize Excess Packet Loss.

After discovering or being notified by Customer of packet loss in excess of 6% ("Excess Packet Loss") based on the Service Provider's measurements between the two designated routers within the Network, the Service Provider will use commercially reasonable efforts to determine the source of such Excess Packet Loss and to correct such problem to the extent that the source of the problem is on our Network.

10.3 UPTIME OF ISP NETWORK

10.3.1 SERVICE LEVELS COMMITTED

The Service Provider shall maintain an Up-Time of **not less than 99%** of the total available time on 8 and a half hours per day basis on the Service Provider's National Domestic & International Backbone. The Up-time as above is to be maintained on a quarterly basis. If any equipment or leased line is not operating to its full specifications, it shall be treated as down for the purpose of computation of its availability. For leased line or any equipment which is available for less than 99% during any quarter, deductions shall be made from its charges payable for that quarter. However, downtime shall not be counted for problems because of the equipment (H/W & S/W) from sources other than the vendor.

10.3.2 COMPUTATION OF AVAILABILITY

The availability (%) for the leased line during a given quarter shall be calculated as follows :

$$\frac{\text{Total working hours} - \text{Total down time in hours}}{\text{Total working hours}} \times 100$$

Total working hours = Total no. of BHEL working days during the period under consideration X 8 and a half.

Down time = Hours for which the leased line is not available only during BHEL working days from 9 AM to 5:30 PM.

Total down time = Cumulative down time for during the period under consideration.

10.3.2.1 Downtime breaks comprising of a continuous break in services for 15 minutes or more shall only be considered. Breaks with durations of less than 15 minutes shall be disregarded in computing the downtime.

10.3.2.2 The downtime shall not include the time granted to ISP for the purpose of modifications/ up-gradation on the Network. The downtime calculation shall not include the downtime for less than 15 minutes for each time of occurrence, i.e. any downtime of less than 15 minutes shall not be included while computing the downtime.

10.3.2.3 The planned downtime activities due to the purpose of modifications / up-gradation on the ISP network, will be intimated to BHEL 24 Hours in advance.

10.3.2.4 The uptime percentages will be calculated upto two decimal points, e.g. 98.87%.

10.3.2.5 Vendor's representative shall submit to BHEL a service sheet after each occasion on which the leased line is not available for more than 15 minutes at a stretch. The call sheet shall serve as the basis for calculation of up/down time.

10.3.3 **COMPENSATION FOR FAILURE TO MAINTAIN SERVICE LEVEL**

10.3.3.1 If availability of the leased line during any quarter is less than 99%, deductions to be made from its charges payable for that quarter shall be as per following formula :

$$\text{DEDUCTION} = \frac{C \times (100 - A)}{100}$$

where C = Quarterly charges payable for the equipment under consideration

A = Percentage availability of the equipment during the quarter under consideration

10.3.3.2 If the leased line is down for more than 15 BHEL working days, deductions shall be two times and if it is down for more than 30 BHEL working days, deductions shall be three times the normal leviable deductions as above.

10.3.3.3 However, total of all such deductions in a quarter shall be limited to the total charges payable during the quarter.

11.0 **PROJECT COMPLETION**

The ATP for the project should be successfully completed within 8 weeks of placement of the LOI - subject to reasons beyond the control of the vendor.

12.0 **NON-DISCLOSURE AGREEMENT**

BHEL-PEM is certified against the ISO27001:2005 standard. The successful bidder shall have to sign a Non-disclosure agreement with BHEL-PEM.

13.0 **EMD/Security Deposit**

13.1 **Earnest Money Deposit (EMD)**

All the bidders shall have to furnish a refundable Earnest Money Deposit (EMD) of **Rs.40,000/-** along with the bid in the form of a Demand Draft payable to "Bharat Heavy Electricals Ltd." and payable at New Delhi. The bid shall be rejected without the EMD. The deposit shall not carry any interest.

13.2 **Security Deposit**

Successful bidder shall have to submit a security deposit in the form of a Demand Draft payable to "Bharat Heavy Electricals Ltd." payable at New Delhi or a Bank Guarantee (in the format to be provided by BHEL) valid for the duration of the contract.

The rate of Security Deposit shall be as follows:

1. Up to 10 lakhs: **10%** of the contract value(excluding the element of taxes and duties)
2. Above 10 lakh: **1 lakhs + 7.5 %** of the amount exceeding Rs.10 lakhs. (excluding the element of taxes and duties)
3. Above 50 lakh: **4 lakhs + 5 %** of the amount exceeding Rs.50 lakhs. (excluding the element of taxes and duties)

EMD of the successful bidder can be converted and adjusted against the security deposit. The deposit shall be refunded after the expiry of the contract. The security deposit shall not carry any interest.

Item Name		Router - Type II
Item Code		NS10H
S.No.	Parameter / Feature	Detailed Specifications
1	Make & Model Offered	CISCO2951/K9
2	Router Architecture	The router architecture should have following features Should be based on high speed RISC Processor/ Equivalent. Should be a multi-service capable router supporting data, voice and video.
3	Interface Modules Supported	Fast Ethernet ports 10/100Mbps, V.35 WAN interfaces, Upto 4xE1 G.703 interfaces, 1 E3 interface, ISDN Interface, Console interface. Should support Voice interfaces like FXS, FXO, E&M, E1. Should support onboard integration modules for providing hardware based VPN encryption and intrusion prevention capabilities. Should also support Network Modules for providing services like WAN Optimization, Network Admission Control and network analysis.
4	Ports Required	The following ports should be available from day one. 2 Nos. of V.35 Serial Ports 3 Nos. of Layer 3 10/100/1000 Mbps Ethernet Ports 1 No. of Layer 3 10/100 Mbps Ethernet port 1 No. Console Port
5	Memory Required	512MB DRAM or higher
6	Flash Memory Required	256MB or higher
7	Router Functional Requirements	The router should come with the latest Operating System. The following features should be available from day one. Should support Standard Access Lists, Extended Access Lists & Named Access Lists. Should support Route Maps, Class Maps & Policy Maps. Class of Service, Prioritization, Policy based Routing and Low Latency Queuing, NBAR, etc. Network Address Translation (Static NAT, Dynamic NAT, PAT) Should be capable of supporting IPsec, SSL & Dynamic multipoint VPN on same hardware
8	Routing Protocol Support Required	RIP (V1 & V2) , OSPF, BGP4, Policy based Routing, PPP, Multilink PPP, IPv6
9	Multicasting and QoS	The router should have following multicasting and QoS features: Resource Reservation Protocol (RSVP) Support for QoS Support for WFQ, CAR , IP Precedence, DSCP Internet Group Management Protocol (IGMPv3) Multicast Routing support such as DVMRP or Protocol Independent Multicast (PIM) or MOSPF
10	Performance Requirements	Should have packet forwarding rate of at least 70 Mbps with services enabled

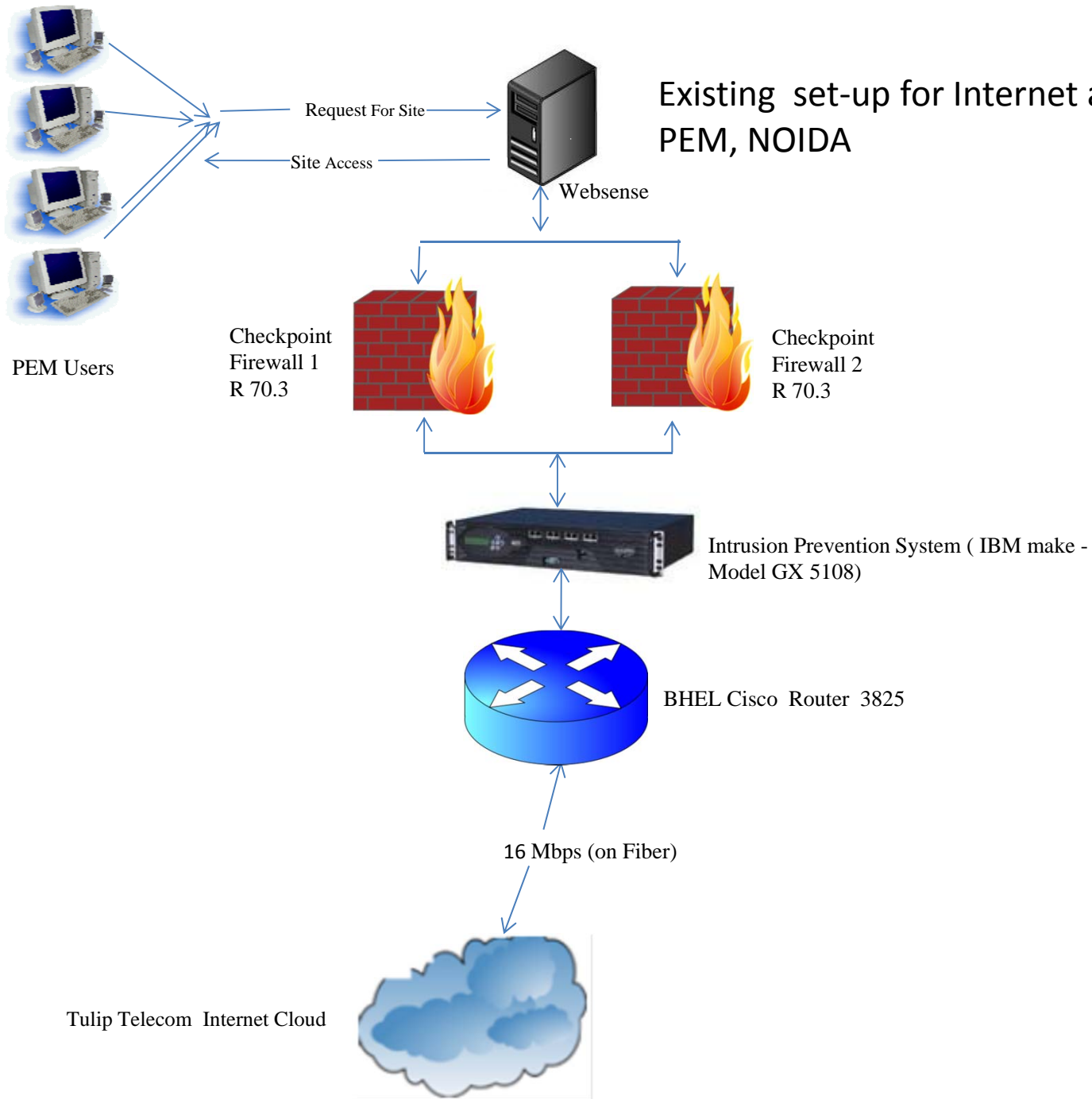
Item Name		Router - Type II
Item Code		NS10H
S.No.	Parameter / Feature	Detailed Specifications
11	IP Telephony Support	Should be future scalable to support call processing and voicemail capabilities for 150 users. Should support onboard DSPs slots to provide support for analog voice, digital voice, conferencing, transcoding, and Secure Real Time Protocol (sRTP) or equivalent. Should also support fallback mechanism for providing connectivity for IP Telephony for remote sites
12	Management Features	Should support Telnet, SSH, TFTP and BOOTP protocols.
		Should support SNMP V1 & SNMP V2 for remote management.
		Should be configurable using CLI & GUI interface.
		Should support NTP & RADIUS protocols
		Should support syslog logs.
13	Sustainability	Should be able to control power to the modules based on the time of day.
14	Operating System	Should come with the latest operating system supporting the above features.
15	Mounting	The offered router should be rack mountable
16	Accessories	Should come with all necessary power cords, adapters, data cables, connectors, CDs, manuals, brackets accessories, etc, required for installation and commissioning of the equipment.
17	Warranty	OEM onsite, labour, parts warranty for the entire lease period

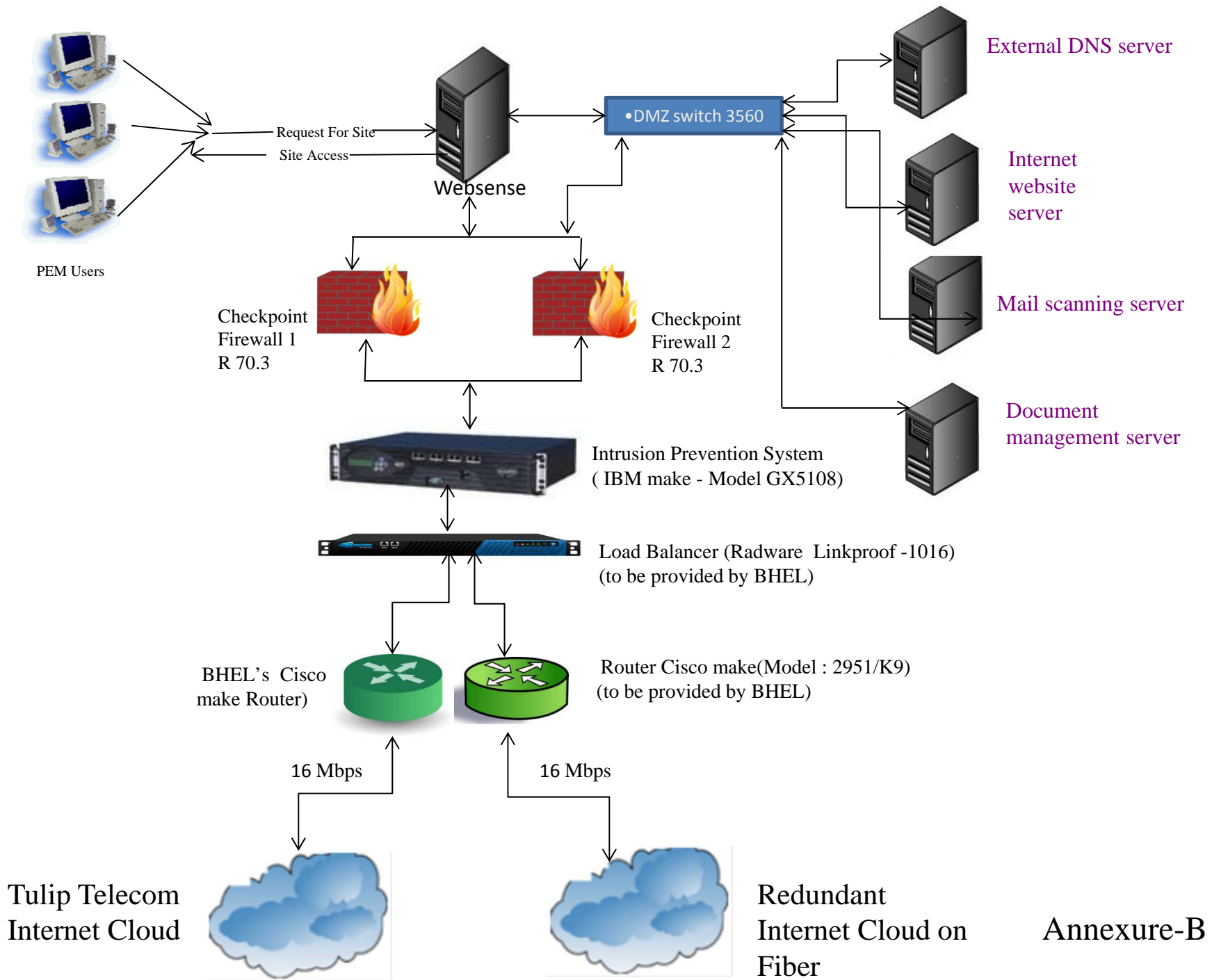
Item Name		Link Load Balancer
Item Code		NS13H
S.No.	Parameter / Feature	Detailed Specifications
	Make & Model	RADWARE LinkProof 1016
1	Architecture	Should have ASICS Based Switch Architecture
		Should have 12 x 10/100/1000 Mbps copper ports + 4 GBIC slots
		Should have minimum 4GB RAM
		Support for 8M Concurrent L4 TCP connections
		Should provide minimum 1 Gbps throughput and should have a provision to be upgraded to 4 Gbps L7 throughput without changing the hardware.
		Should support Dynamic routing protocols like OSPF, RIP1, RIP2
2	Load Balancing Features	Minimum support for 10 internet links
		Should provide Load balancing for inbound & outbound traffic
		Selection of shortest path to dest based on load/Hops/response time
		Should support load balancing algorithms
		a) Least amount of Bytes
		b) Least number of users/session.
		c) Cyclic.
		d) weighted Cyclic
		e) SNMP Parameters, like router CPU utilisation etc
		Should support Static NAT & Dynamic NAT
		In case of link failure device should detect it in not more than 30 seconds
		Should support port mirroring
		Should support port aggregation
3	Link Management Feature	Should able to redirect traffic based on Source/Destination IP & port
		Should have an option to define inbound/outbound Kbps limit of throughput of any given link
		Should provide details of client routed to each link with IP & port details
4	Health Monitoring	Shall provide individual health check for each link
		Should do health check on protocols like HTTP, SMTP, POP3, DNS, Ping, FTP etc
		Should provide AND , OR mechanism between health check
5	Redundancy	Should Support VRRP
		Should support transparent failover between 2 devices
6	Support for Bandwidth Management support for future requirement	Should support bandwidth management based on any L3-L7 information
		Should support CBQ, WRR, RED mechanism for QoS
		Should support Minimum & Maximum bandwidth allocation limit for traffic shaping
		Should support Two-Way bandwidth management

		Should support traffic classification on the basis of layer-3 to layer-7 information
		Should able to classify & limit P2P bandwidth & protocol like Kazaa, Bit-Torrent, eDonkey, etc
		Should also support to define bandwidth per session in any given policy defined on source/destination/application
7	Device Management & Reporting	Should provide GUI interface for configuration & reporting
		Should provide HTTP / HTTPS interface management
		Should provide SSH / Telnet / CLI interface
		Should support SNMP V1, V2c, V3
8	Warranty	OEM onsite, labour, parts warranty for the entire lease period

Annexure-A

Existing set-up for Internet access at BHEL-PEM, NOIDA





Annexure-B