

**Railnet Network
Infrastructure of Central
Railway
and Suggestions for
Road Map for IR's Railnet**

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Railnet Network Infrastructure of Central Railway

Salient Features of Railnet of CRly

End Points connected on date (Approx)		
Unit	Railnet	RCIL B/B (DSLAM)
Hqrs & Mumbai	3000	750
Bhusawal	490	170
Nagpur	556	64
Pune	500	80
Solapur	164	52
Total	4710	1116

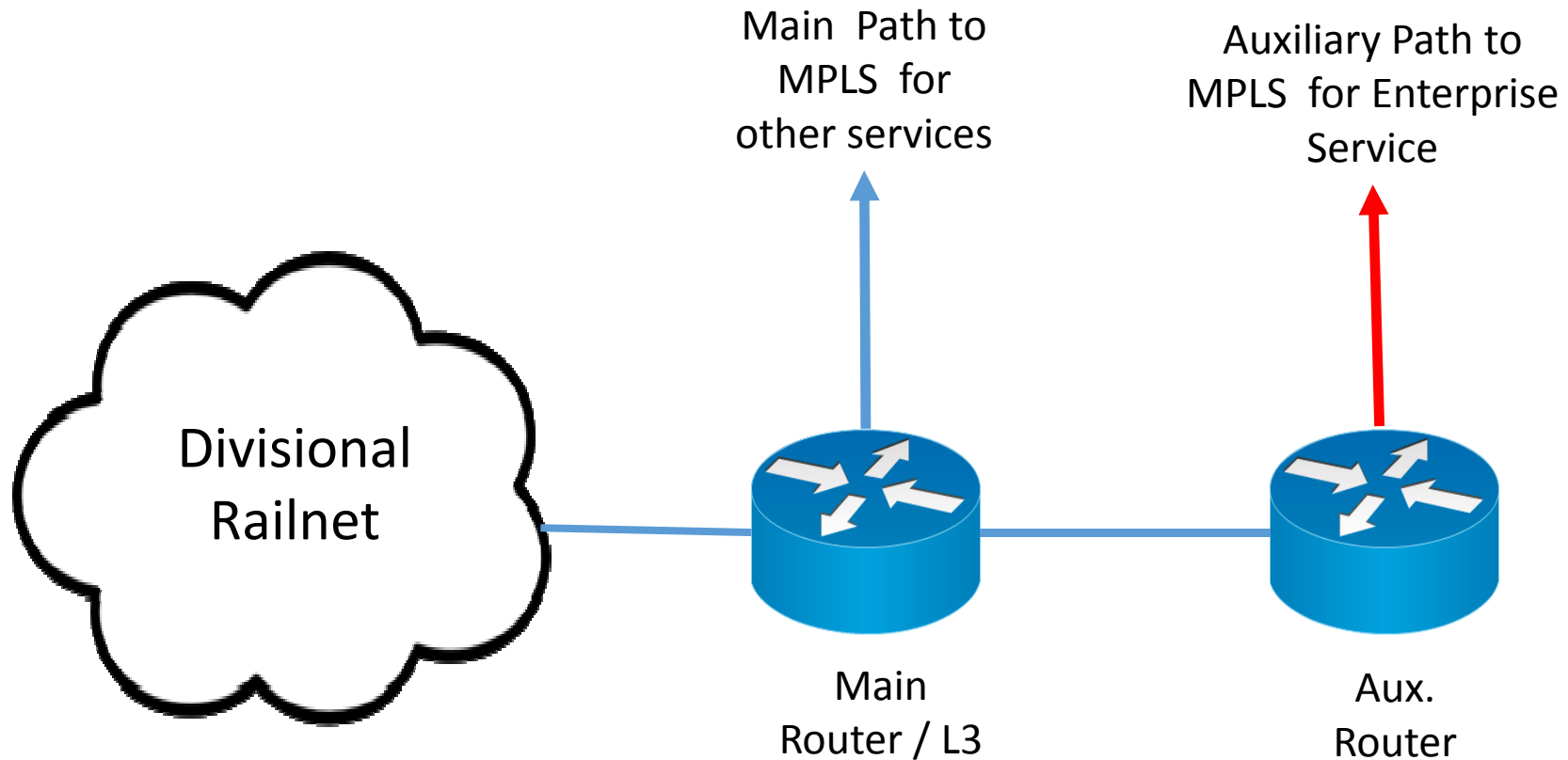
Salient Features (Contd..)

- Served by Independent VPN connectivities for all the 5 divisions from RCIL's MPLS Nodes (5x2 + 1)
- Internet based enterprise applications hosted on CRIS servers as well as NIC Mail run only through Railnet
- Exclusive connectivity provided for enterprise applications for smooth traffic flow
- DNS Server provided at CSTM and configured as split DNS for transparently accessing enterprise services from Internet and Intranet

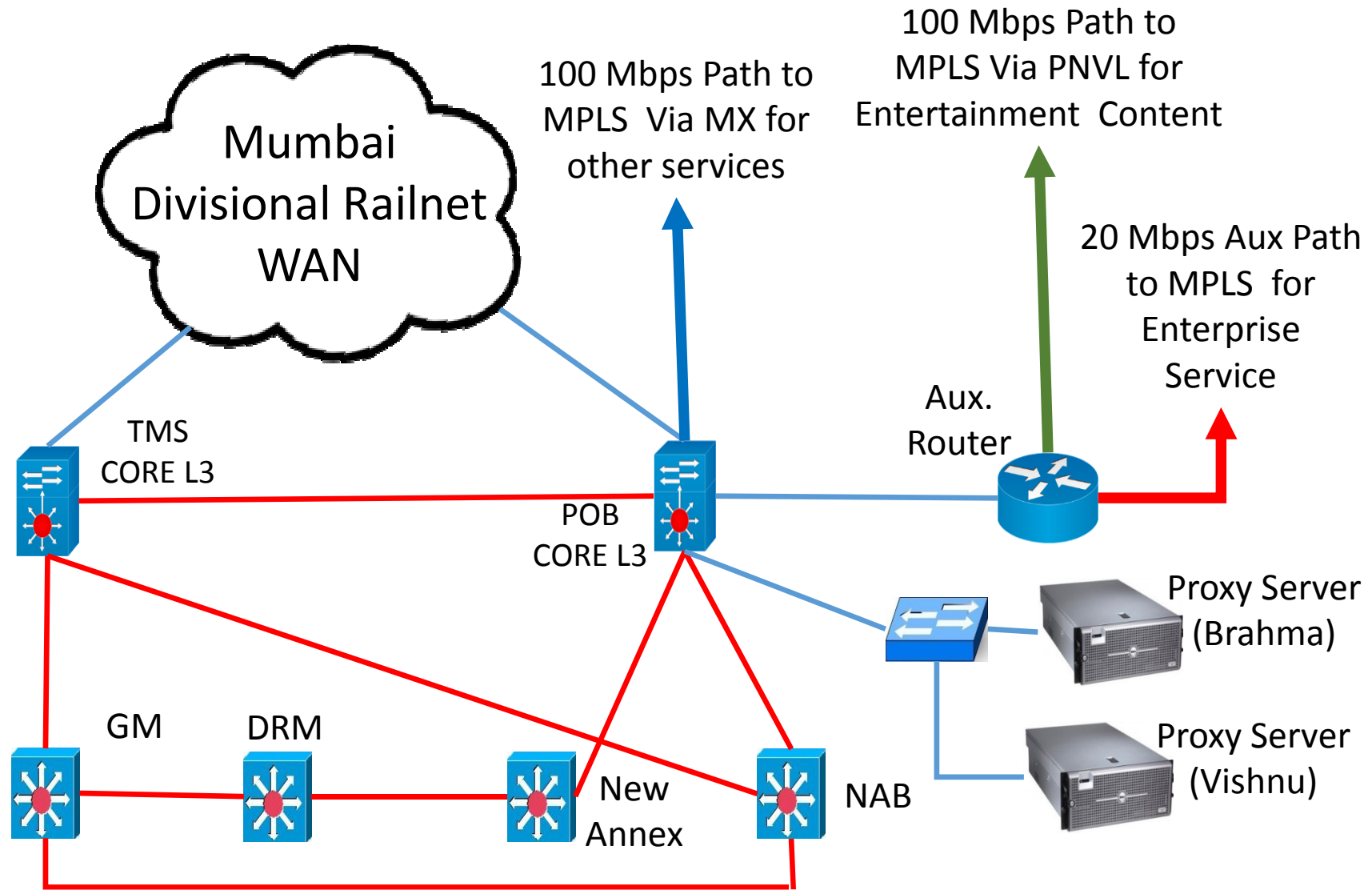
Salient Features (Contd..)

- Access to the Internet : Only through PROXY SERVERs for all the users at all the Gateways
- All the divisions have their individual PROXY Servers
- All the 4710 Railnet users given Internet access
- Access to **UNLIMITED** Internet sites given to the Gaz officers both at offices and residences
- Non-Gaz users given access to ONLY SELECTED sites required for day-to-day works
- This segregation has been achieved through the PROXY server

Typical Railnet WAN Set up for other Divisions



Back Bone Network of CRly Hqrs at CST Mumbai



Railnet Traffic Engineering at CST Mumbai

- Link from MX is main link
- Link from PNVL is auxiliary link
- 20 Mbps link is for enterprise service
- PNVL link & 20 Mbps link are terminated on Aux. Router

Railnet Traffic Engineering at CST Mumbai

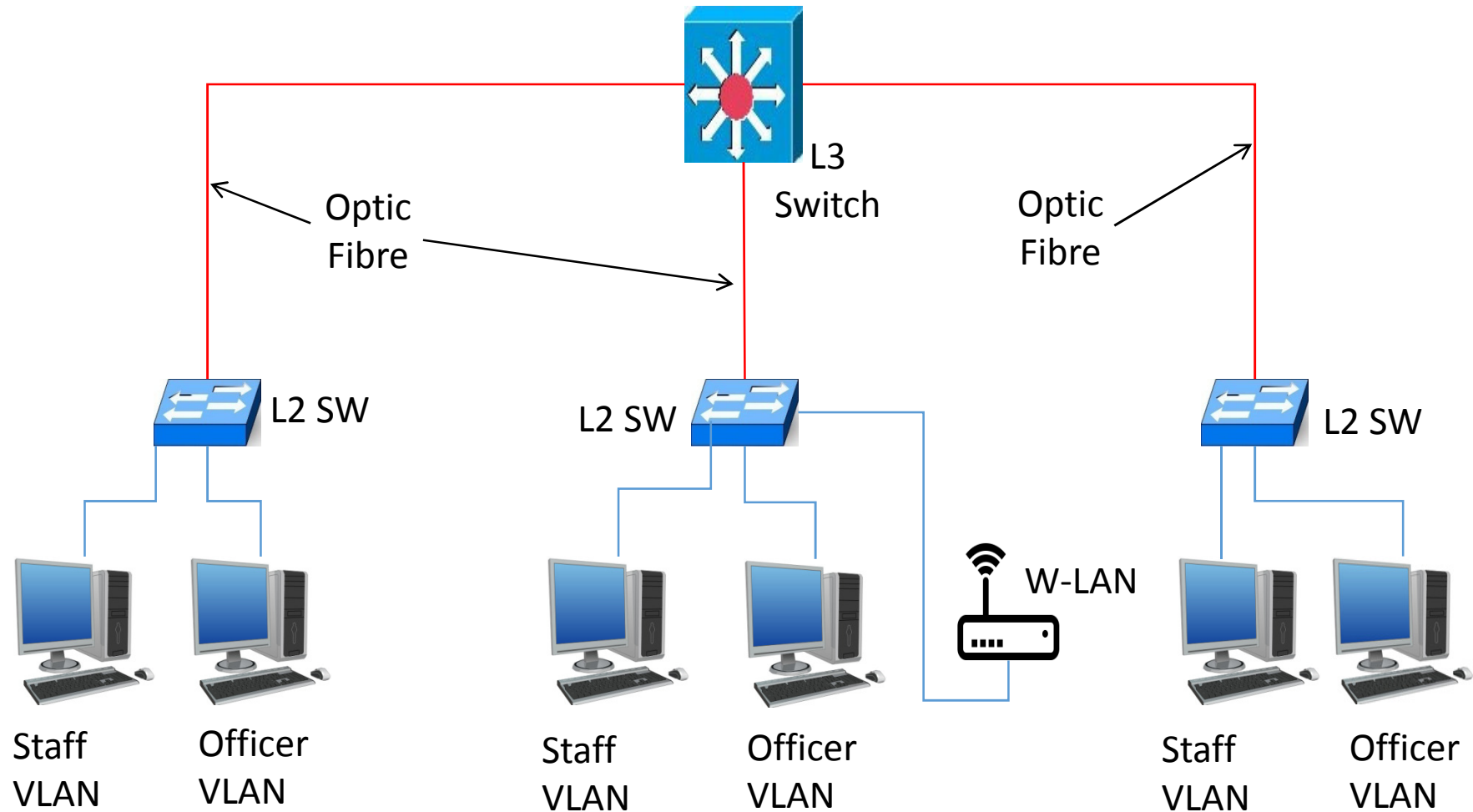
- Static Route provided between Aux. Router and Gateway L-3 switch
- Enterprise service sites are NATed to Railnet IP and routed through 20 Mbps link
- Bandwidth consuming sites such as YouTube are routed through Aux. Link via PNVL

List of Enterprise services accessed through Aux Gateway

Website	URL Name	Website	URL Name
IPAS	www.aims.indianrailways.gov.in	FOIS	www.fois.indianrail.gov.in
IPAS Training	www.aimstrg.indianrailways.gov.in	RCT*	www.rct.indianrail.gov.in
RSMS	www.rpf.indianrailways.gov.in	SIMS*	www.safety.indianrail.gov.in
CR Internet Site	www.cr.indianrailways.gov.in	NTES	www.enquiry.indianrail.gov.in
Indian Rlys Internet Site	www.indianrailways.gov.in	Railnet mail	nicmail.railnet.gov.in
PRS Site	www.indianrail.gov.in	IREPS	www.ireps.gov.in
ICMS	www.icms.indianrail.gov.in	IRPSM	www.ircep.gov.in

Note: * These two URLs share their common Internet IP address given by the owner i.e CRIS

Typical Distribution and Access Network (Separate VLANs for Gaz and N-Gaz users)



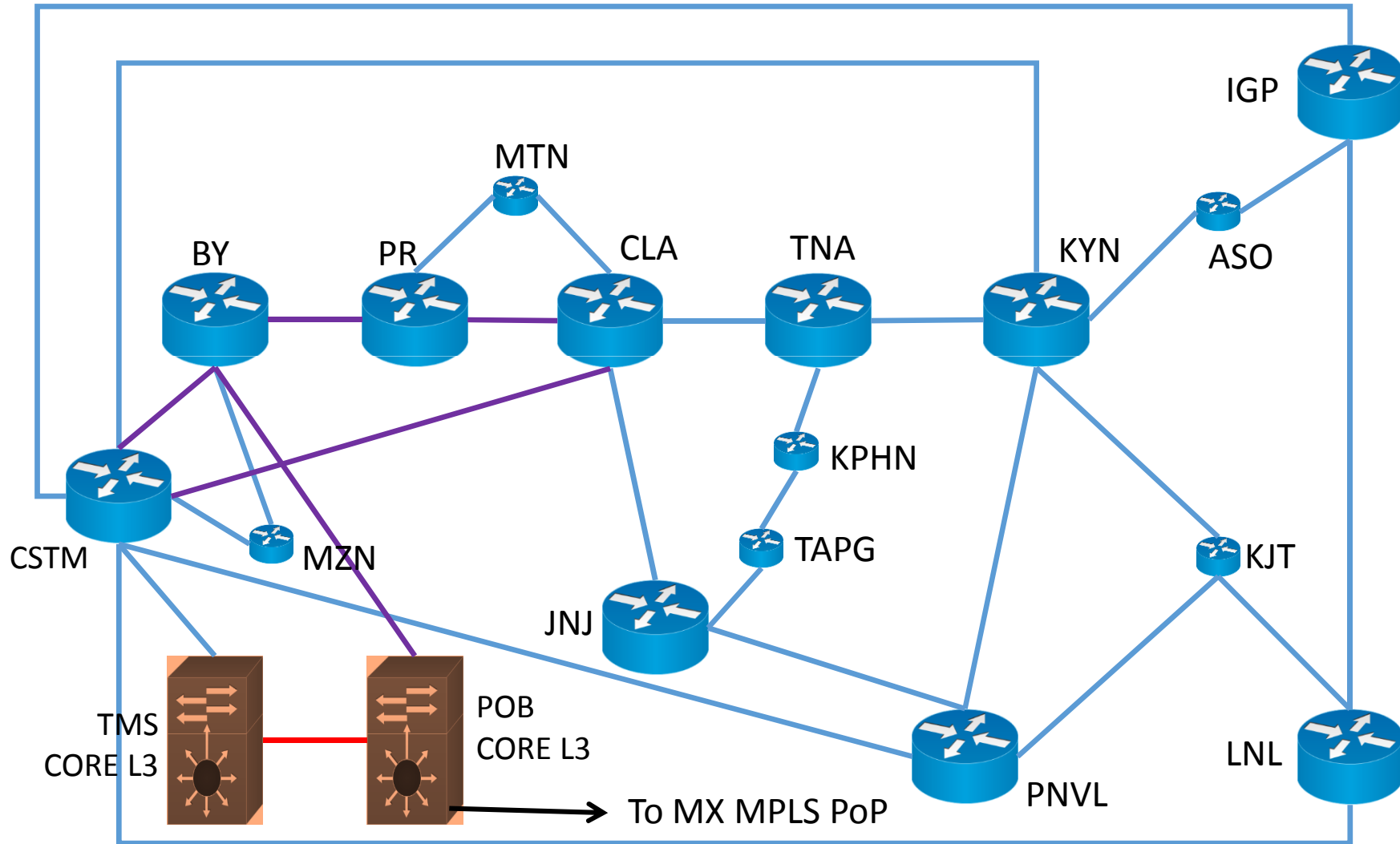
Typical Distribution and Access Network (*Contd..*)

- All the L2 Switches are connected to nearest L-3 switch by optic-fiber 1GB link speed
- VLANs created for Gaz. & Non Gaz Staff
- Gaz. Staff given access to unlimited Internet sites (full Internet access)
- Non Gaz. Staff given access to limited Internet sites (Limited access)

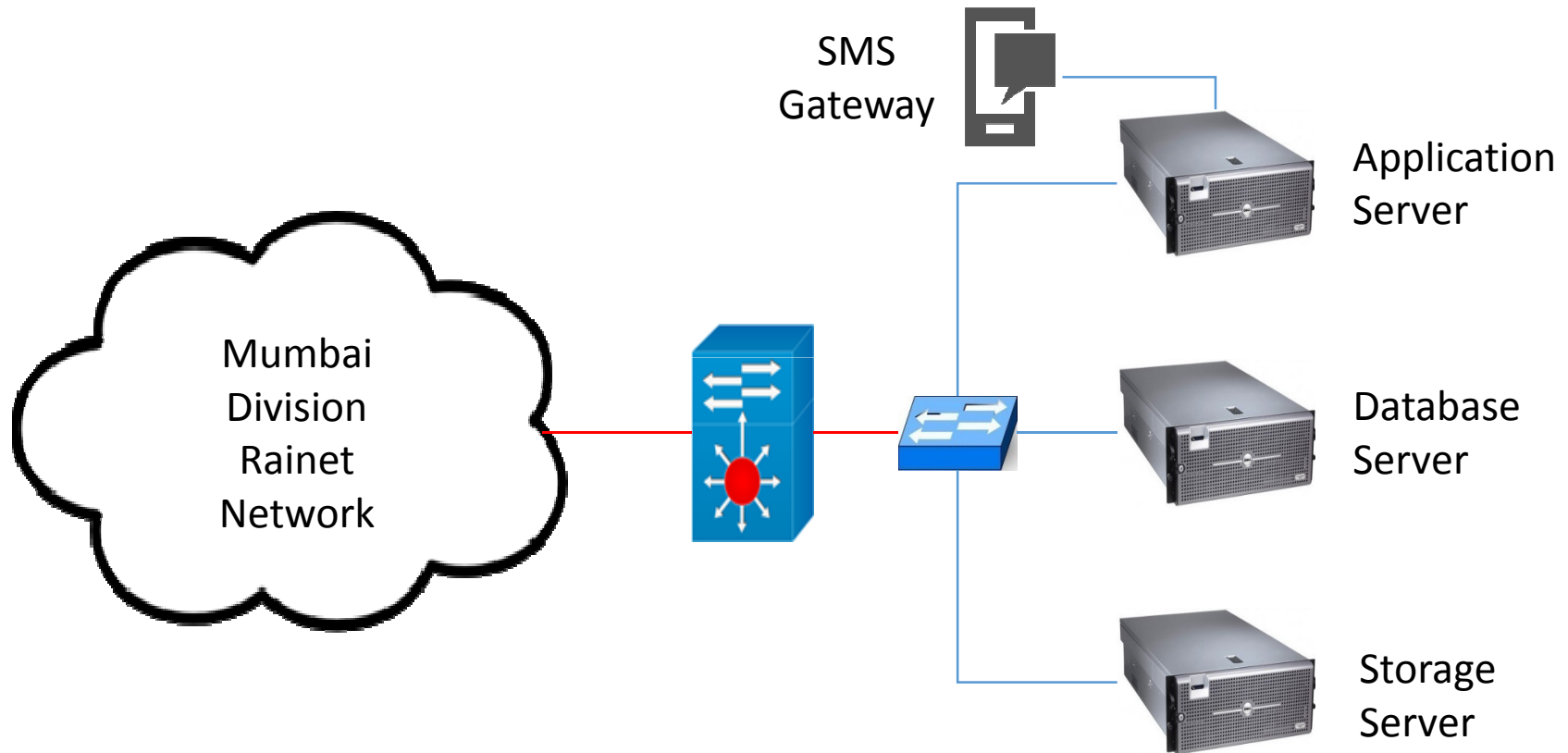
WLAN on Railnet Network with 3 level access control security

- Wi-Fi routers have been provided on Railnet network at Officers Residences
- Wi-Fi Routers are secured by adopting
 - MAC binding
 - Static IPs for all hosts and DHCP disabled
 - WPA2/PSK encryption
- In addition SSID broadcast has been disabled
- For IPv6, we shall have to go for RESERVED DHCP. IP address to a MAC is predefined and the DHCP server only allots that IP to it.

Railnet WAN of Mumbai Division (OSPF)



Railnet NMS for WAN at CST Mumbai



Railnet NMS for WAN at CST Mumbai

- NMS software 'Everest' ver-3.0
- NMS is monitoring all the WAN nodes and links 24x7
- Easy diagnose of failure
- At way stations power failure alarm is configured and the system gives audio & visual alarm in case of power failure
- The system is configured to send SMS to the concerned SSE and Officer whenever any vital link or node goes down



Suggested Architecture for Railnet

Suggested Architecture for Railnet

- Independent MPLS connectivity for Zonal Hqrs and Divisional Hqrs with aggregate B/W as per requirement
- Gateway Routers at Rlys' sites should be duplicated and connected to two different MPLS PoPs
- Traffic engineering between Rly's Node to MPLS Node to support preferably 4 levels of QoS.
- For node-to-node connectivity, for increased throughput, HS LAN Extenders and/or OFC with media converters or SFP modules to be used

Suggested Architecture for Railnet (contd..)

- Broadcast domain to limit upto 60-70 hosts either through VLANs or Physically separated LANs.
- For remote and scattered users Railnet to be extended through DSLAMs from L2/L3 switch
- Hosts to be classified in at least two classes e.g Gaz and Non-Gaz users and Internet access to be controlled according to their need

Suggested Architecture for Railnet (contd..)

- RCIL's Broadband service should be merged with Railnet
- DSLAMs installed by RCIL should be used as access layer network for remote users
- NMS for all Divisions
- Intrusion detection and protection shall be provided by RCIL as the VPN service provider

Suggested Architecture for Railnet (contd..)

- Internet Access must be through Proxy Servers only.
- Install Remote Authentication Dial-In User Service (**RADIUS**) with a central **server** to authenticate WLAN users and authorize their access to the requested system or service.
- Network access control can be implemented through authenticated DHCP Server and DHCP snooping. Latest routers/switches also provide features that if the IP is not allocated through a DHCP, they will not forward those packets.

Suggested Architecture for Railnet (contd..)

Aggregate B/W requirement to be estimated as under:-

- At office for Gaz users 2Mbps for 20% as concurrent users
- At office for Non-Gaz users 512 Kbps for 10% as concurrent users
- At office for Non-Gaz users doing On-lone activities like E-procurement etc. 1 Mbps for 50% as concurrent users
- At Residences, 2Mbps for 50% as concurrent users

Suggested Architecture for Railnet (contd..)

- All Application Servers to be installed at dedicated Server rooms with all basic necessities.
- The Cyber-security of all servers to be under the responsibility of the respective owners.
- Users to be responsible for up-to-date Malware protection arrangements for their PCs/Servers.
- Accessibility from the Internet for information servers should be provided for better dissemination of Information.

Suggested Architecture for Railnet (contd..)

- Railnet.gov.in is a registered domain name and it should be extensively used
- Railnet mail home page URL should be mail.railnet.gov.in instead of nicmail.gov.in
- All Railnet sites be allotted URL names under the domain railnet.gov.in.

Suggested Architecture for Railnet (contd..)

- Here are some examples:
 - CR Railnet site is at www.cr.railnet.gov.in
 - RTI Railnet site is at rti.railnet.gov.in
 - Telecom Dte, Rly Bd Railnet site is at tele.rb.railnet.gov.in
 - E-reconciliation Railnet site is at erecon.railnet.gov.in

Suggested Architecture for Railnet (contd..)

- Railnet mail home page URL should be mail.railnet.gov.in instead of nicmail.gov.in
- Inter-connection between Railnet and other Networks like UTN and FOIS be provided with at least 100 Mbps bandwidth from nearest RCIL PoP
- For this purpose IP address pools need to be re-distributed or new pool taken or migrated to IP V6

Thank you for
appreciating our
efforts

With Regards,

Central Railway's Railnet Team