



No: 1-193/2010-CP&M/10

Dt: 28/09/2010

**Sub:** BSNL Vision and Plan for roll out of IP and NGN (Next Generation Network)

**Ref:** DO Letter No: 1-193/2010 – CP&M from CMD BSNL dated 30/08/2010

1. Kind attention is invited to the DO letter from CMD BSNL highlighting the need for a converged network deployment to facilitate seamless delivery of voice, video and data across different access technologies (DSL, FTTX, 3G, Wi-Max etc). The letter also included set of enclosures indicating details of NGN framework approved by the Management Committee of BSNL board.
2. *The predominant point of NGN framework is 3Cs ( Convergence, Consolidation and Consumer) and 4As (Any Service, Any Device, Any Location, Any Time).*
3. **The said framework is in the backdrop of the Recommendation made by the Sam Pitroda Committee which states that “BSNL shall Plan and Invest in building a financially remunerative next generation end-to-end national IP network of the future to handle ever increasing internet and data traffic”.**
4. The BSNL vision and Macro Level Plan for roll out of IP and NGN in its network is indicated in **Annexure – I.**
5. *The specific guidelines related to Fixed Mobile Convergence by leveraging on existing mobile switching network has been issued vide this office letter No 1-196/2010-CP&M/FMC/Imp./1 dated 15/09/2010. The initial guidelines related to Converged Packet based Aggregation Network (CPAN) has been issued vide this office letter No: 1-193/2010-CP&M/9 dated 27/09/2010.*
6. The deliberations are on with network planning wings of different business units for achieving convergence in different logical components of the network. The periodical update on the same shall be intimated by this office.

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## **BSNL Vision and Plan for roll out of IP and NGN**

1. **VISION:** Plan and Invest in building a financially remunerative next generation end-to-end national IP network of the future to handle ever increasing internet and data traffic
2. **BROAD OBJECTIVE:**
  - a. The intended network shall be a countrywide converged network based on IP protocol to support various spectrum of services under voice, video and data for both retail and enterprise customer.
  - b. The network shall be scalable to cater to ever increasing growth in internet and data traffic. The network should handle 100s of Gbps of traffic at the Nation al level.
  - c. The network shall be cost effective with judicious choice of technology at different logical layers capable of delivering both current and future services with desired Quality of Services for it to be financially remunerative.
  - d. The said network shall leverage on the existing IP / Ethernet network as far as possible to minimize network up gradation cost.
3. **Deliverables:** The key deliverables from the said network are:
  - a. **To provide any service to any customer at any time through any device.** What it implies is a network which is device agnostic (customer end device such as TV, PC, Mobile etc), access agnostic (last mile delivery of service), location agnostic (full mobility) and service agnostic (any service in the combination of voice, video and data)
  - b. **Consolidation of Service Intelligence Layer:** The next generation networks represent an opportunity to reduce capital expenditures by being able to offer all services over a single integrated IP based infrastructure. The services also are managed through a unified control & signalling layer for different wire line and wireless access networks.
  - c. **Synergy across different Access Networks:** Different access network such as landline, broadband (DSL), broadband (FTTH), broadband (Wi-Max), Mobile (2G, 2.5G) etc presently compete with each other. The said network shall enable different access networks to bank on each other's strength for delivering a seamless experience to end customer.
4. **Logical Layers of IP Network along with Key Concern Areas and Way Forward:** Any Telecom Network consists of four key components viz Access, Aggregation Network, Integrated Transport Network (for Voice, Video and Data) and Signalling,& Control layer. *The current status, key concern areas and way forward along with recommendation for each of these domains is submitted below.*
  - 4.1 **Access Network:** This is the layer through which last mile connectivity is extended to the end customer.
    - 4.1.1 **Current Status:**
      - 4.1.1.1 Broadly two types of access are there. Wireline and Wireless.

4.1.1.2 For Wireline, the access technology predominantly deployed in BSNL is DSL (as part of NIB-II and Broadband Multiplay Project) followed by Fibre (FTTH, GPON, GEAPON).

4.1.1.3 In Wireless we have 3G, Wi-Max and in future LTE

4.1.2 **Key Concern Areas:**

4.1.2.1 The design of different access technologies (wireline and wireless) are done independent of each other.

4.1.2.2 These technologies are made to compete with each other rather than complement each other (DSL Vs FTTH Vs Wi-Max Vs GSM).

4.1.2.3 For eg, As a result, as the traffic increases we tend to deploy more BTSs in a city ignoring the fact that we have huge landline assets and statistically 60% of the calls terminate or originate within building.

4.1.3 **Way Forward:**

4.1.3.1 The judicious positioning of different access technology has to be done so that we are able to leverage on each other's strength.

4.1.3.2 For Enterprise and premium customers, we can use a combination of VDSL2+ (for distance upto 1 km) and fibre for distance beyond 1 Km for targeting speed of 20 Mbps.

4.1.3.3 Similarly, there should be synergic convergence between wired and wireless technologies for voice, video and data services through Fixed Mobile Convergence.

4.2 **Aggregation Network:** This layer of the network collates traffic from different access elements such as DSLAM, BTS / Node B, BSC / RNC LMG, Wi-Max BTS and hands it over to a Gateway point which generally is the service intelligence device.

4.2.1 **Current Status:**

4.2.1.1 BSNL presently has both TDM and Ethernet based aggregation network with predominant traffic being carried on TDM.

4.2.1.2 The TDM network consists of hierarchy of various SDH / PDH system starting from E1s to STM-1s to STM-16s to STM-64 / DWDM. For provisioning of enterprise service, we have a large based of MLLN (Managed Leased Line Network)

4.2.1.3 As part of Multiplay project, RPR based aggregation in 112 cities and Ethernet based aggregation network in 2000 cities is deployed for aggregating Ethernet / IP traffic.

4.2.2 **Key Concern Areas:**

4.2.2.1 The TDM network though pervasive is not a effective choice because of its inability to support statistical multiplexing.

4.2.2.2 Gradually, the shift is towards IP/Ethernet because of its effective utilization of bandwidth and low cost. No plan for the converged aggregation network catering to both TDM and IP / Ethernet traffic.

4.2.2.3 The uplink bandwidth in most of the cities where Ethernet based aggregation network is deployed, is of the order of few E1s and as such cannot be used for providing true broadband to all SDCA / Village Panchayat.

4.2.2.4 The existing Ethernet / IP aggregation network cannot be used for Circuit emulation service.

4.2.3 **Way Forward:**

4.2.3.1 The detailed plan for the converged aggregation network catering to both TDM and Ethernet / IP traffic with ability to support true broadband shall be planned.

4.2.3.2 The said network shall also be used for provisioning of Enterprise service such as Layer 3 VPN, Layer 3 VPN, Point-to-Point Leased Line, E-Line, E-LAN etc with guaranteed Quality of Service (QoS) and with complete security

4.2.3.3 The said network shall complement the MPLS based IP network deployed as part of NIB-II for aggregation of internal traffic and also for catering to enterprise service.

4.2.3.4 The existing aggregation network already deployed as part of Multiplay project shall be seamlessly positioned in the new plan.

4.3 **Integrated Transport Network with Service Intelligence IP Edge:**

4.3.1 **Current Status:**

4.3.1.1 As part of NIB-II, BSNL has deployed a multi-Gigabit, MPLS based IP infrastructure to provide ubiquitous access to voice, video and data services. It consist of edge Routers in 106 cities and Core routers in 29 Cities.

4.3.1.2 The Core router carries out high speed transfer of traffic. Core network is further augmented through MNGT-Core to augment the core bandwidth to 10s of Gbps individually and 100s of Gbps collectively.

4.3.1.3 The edge router acts as a service intelligence device to provide various voice, data and video related services with requisite Quality of Service (QoS). It is also used for carrying lawful interception of different service flowing through the said device.

4.3.1.4 Other service intelligence IP edge device deployed in the network are BNG (Broadband Network Gateway) along with its associated components such as

AAA, LDAP as part of Multiplay project, ASN as part of Wi-Max, SGSN / GGSN as part of GSM etc. These network elements.

#### 4.3.2 **Key Concern Areas:**

4.3.2.1 The Transport network and the underlying Ethernet / IP aggregation network are still not viewed as one integrated entity . for either provisioning of service or for connectivity of different network elements. As a result, the enterprise connection are directly terminated on the MPLS PE Router, even though the desired bandwidth can be effectively supported through existing access technologies such as DSL.

4.3.2.2 The connectivity of the different network elements to the MPLS PE router has been done purely based on the interface available in the access element and not on the traffic generating capacity of different access element. This has led to the low utilization of the Router capacity.

4.3.2.3 Different boxes are being used for a specific functionality such as BNG, ASN, SGSN, GGSN etc.

4.3.2.4 Most of the network design pertaining to service intelligence IP edge is still done with the Circle / SSA concept in mind which was correct in the TDM world but not in the IP world.

#### 4.3.3 **Way Forward:**

4.3.3.1 The MPLS based transport network shall fully leverage on the Ethernet / IP aggregation network for both provisioning of service and connectivity of network elements, for both retail and enterprise customer.

4.3.3.2 The connectivity to MPLS network shall be dictated purely from the traffic requirement. The existing connectivity to different network elements need to be analyzed and the connectivity to be optimized by shifting the low traffic access network element to aggregation network such as Ethernet Switch or RPR switch.

4.3.3.3 Action to be initiated for convergence of service intelligence IP edge by clubbing multiple functionality in one box.

4.3.3.4 The deployment of the service intelligence IP edge shall be governed by adopting the balanced approach between deployment based on geography and deployment based on traffic.

4.4 **Signalling and Control:** This is the heart of any telecom network as all functionalities related to Switching and Authentication, Authorization and Accounting are done here.

#### 4.4.1 **Current Status:**

4.4.1.1 Presently each business network is having its own set of AAA systems with its own set of repository for storing customer profile.

4.4.1.2 In Broadband, this functionality is done by AAA + LDAP,

4.4.1.3 In mobile : this functionality is done at MSC-S / Media Gateway with customer profile stored in HLR / VLR

4.4.1.4 For the prepaid services, we have a separate IN (Intelligent Network) Platform for landline as well as mobile. A separate prepaid platform is under deployment for broadband service.

4.4.2 **Key Concern Areas:** The key concern areas are:

4.4.2.1 Because the core –switching function of one business need is independent of other business need, our network has become a collection of independent silos and as such different networks are substituting rather than complementing each other.

4.4.2.2 Lots of duplication is there in rolling out a service across different access network because of independent core-switching + service layer. Also for a customer, there is no seamless experience.

4.4.2.3 Most of the network design is still done with the Circle / SSA concept in mind. In IP world, the deployment of these elements shall be done purely from the technical objectives such as scalability, reliability, Quality of Service etc.

4.4.2.4 Other technology exchanges (TDM Switches) have also become old and difficulties are being faced in their maintenance. Many vendors have declared their equipments as end-of-life and are not willing to extend AMC for long.

4.4.3 **Way Forward:** In our mission to built up an integrated network with seamless experience across all technologies, following has been approved.

4.4.3.1 In the immediate run, Fixed Mobile convergence (FMC) to be implemented through which mobile customer can leverage on the DSL infrastructure. The PoC for the same is in process and is expected to be completed within six months.

4.4.3.2 The existing switching elements of mobile network (MSC-S / MGW) shall also cater to switching requirement of Fixed network planned on IP.

4.4.3.3 Simultaneously from long term perspective, IMS has to be targeted as the converged signalling & control layer for different wireline and wireless access technologies. The deployment of the same be done in a segmented manner with specific focus on enterprise customer to start with.

## 5. **Migration of Old Network:**

### 5.1 **PSTN Network:**

5.1.1 The PSTN network deployed in BSNL is predominantly TDM based with most of the switches reaching the life expired stage.

5.1.2 The technology wise number of DELs working , capacity along with AMC details to be made available.

5.1.3 The AMC plan / migration plan of these life expired switches also needs to be worked upon.

5.2 **GSM Network:**

5.2.1 The network deployed upto Phase – IV is TDM based.

5.2.2 What is the plan on the service equivalency?

5.3 **Ethernet Traffic being transported on TDM :**

5.3.1 Most of the Ethernet traffics are being transported on SDH using Ethernet over SDH particularly the point-to-point leased line.

5.3.2 The migration plan of the same on the converged IP network shall also be worked upon.

6. **Further Action Point, Nodal Cell and Timelines:** Based on the detailed action items indicated in Para 4 above, following action has been initiated.

5.1 **Plan of Converged Packet based Aggregation Network (CPAN):**

5.1.1 The macro level objective has been captured in Para 4.2.3

5.1.2 Deliberation is on among the committee members for the formulation of Specification and the Network roll out is expected in 2011-12.

5.1.3 The initial guideline has been issued vide letter no : *1-193/2010-CP&M/9 dated 27/09/2010*

5.2 **Leveraging on existing Mobile Switching Network for fixed network:**

5.2.1 The macro level objective has been captured in Para 4.4.3

5.2.2 The EOI for the same has been finalized by CP&M Cell. As part of EOI, Proof of Concept (POC) is planned in Bangalore, Pune and Chandigarh

5.2.3 The security clearance of the equipment is under progress. The timeline for completion is six months from the date of Issue of Work Order. The guidelines in this regard has been issued vide Letter No *1-196/2010-CP&M/FMC/Imp./1 dated 15/09/2010.*

5.3 **IMS as a countrywide network:**

5.3.1 The macro level objective has been captured in Para 4.4.3.3

5.3.2 The nodal cell is NWP-CFA cell.

5.3.3 The tender for 6 Mn NGN with control as Softswitch / IMS is under deliberation with CFA unit.

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