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भारत संचार निगम लिमिटेड
(भारत सरकार का उपक्रम)
BHARAT SANCHAR NIGAM LIMITED
(A Govt. of India Enterprise)

No: 66-07/CNP/MNGT/09/56   **Dt: 23/12/2009**

Sub: **Review of existing Connectivity between Broadband Multiplay Network and NIB-II MPLS Network**

Ref: This Office Letter No 66-07/CNP / MNGT / 09 dated 13/10/2009

Kind attention is invited to the letter under reference whereby it was intimated that CNP cell is in discussion with different planning wings in Corporate Office to work out an optimized interconnectivity guidelines for different access network. The discussion for the same has been completed and this note indicates the review of the existing interconnectivity between Broadband Multiplay network and NIB-II MPLS network along with critical analysis of Multiplay Network. The interconnectivity with NIB-II has been optimized purely from the traffic perspective.

1. **Current Status of Broadband (As on 31/10/2009)**: The same is given below:

   a. Capacity Ordered: =   8.5 Mn ports

   b. Provisioned Customers   =   4.52 Mn

   c. Active Customers   =   3.52 Mn

   d. Disabled Customer   =   1 Mn

   e. Concurrent Customers (Peak)   =   0.61 Mn

   f. BNG Planned / deployed till Ph – II   =   175

   g. Total International Bandwidth @ 70% utilization   =   45 Gbps

   h. Average addition per month   =   1.5 lakh

2. **Key Concern Areas**: Following are the key observation made based on the above statistics.

   a. 22% of the provisioned customers are disabled customers

   b. Only 12% of the provisioned customers are concurrent at any instant.

   c. Average used bandwidth per provisioned customer is only 7 kbps

   d. Peak BNG utilization from concurrent session perspective is 18%

   e. Average BNG link utilization between PE – BNG is only 12 – 13%

   f. Current port loading is only 41%. With current provisioning rate of 1.5 lakhs pm it will take around 27 months for network to be loaded 90%

3. **Reasons for low traffic and utilization**: The low traffic and utilization is pre-dominantly due to lack of bandwidth intensive services such as On-demand content. Predominantly, the usage of broadband still hovers around browsing requirement.

4. **Planned Growth**: Around 14 Mn broadband customers (excluding broadband on GSM technology such as 3G) are expected by March ' 2012. with average bandwidth assumed to increase to 21 kbps. *This requires nine times increase in traffic from the current traffic with only three times increase in customer base in the next two and half years, - which in itself is a challenging proposition*.

5. **Major Drivers for Increased Traffic**:

   4.1 **Increase in Concurrency:** Focus on On demand content which has higher simultaneous usage during peak hour.

   4.2 **Bandwidth intensive Service:** Focus on On-demand content. Multicast traffic doesn't generate much traffic. The services other than High Speed internet, VoIP, VPN and broadcast traffic has to be targeted to leverage on FTTX and VDSL2+ infrastructure.

   4.3 **Pre-paid Service**: Will increase number of broadband customers but average traffic per customer is expected to come down further.

   4.4 **IP-TAX / Wi-Max Traffic:** Other than the top few cities, the IP-TAX and Wi-Max traffic from other smaller cities will flow through the broadband network. However, since the loading of existing TAX circuits is around 67% and most of the Wi-Max deployment is happening in the rural areas, the same is not expected to be much. However, periodic monitoring of the traffic flowing in the edge has to be done to take care of any increase in traffic possibly due to transfer of traffic from TDM TAX to IP TAX (in case of replacement) or any other factor.

6. **IP Connectivity Point of Broadband Network**: At the network element level, the IP connectivity point of Broadband network consists of Broadband Network Gateway (BNG) which interfaces with multiple Gigabit Ethernet (GE) interface with the aggregation network (RPR based / Ethernet based) at one end and on multiple Gigabit Ethernet (GE) towards the MPLS Transport network.

7. **Broad Network Dimensioning Figure of Broadband Network**:

   a. Each BNG can handle 48000 concurrent sessions and 10 Gbps of Traffic.

   b. Each RPR ring can handle around 10 Gbps of Traffic.

   c. The Ethernet aggregation network available in smaller cities can handle maximum of 1 Gbps of traffic which can be augmented to 2 Gbps depending on the requirement.

8. **Macro Planning of Broadband Network Gateway for 14 Mn broadband customers**:

   a. With concurrency rate of 40% (On an optimistic side: assuming with the offering of content service, the concurrency factor may increase), one BNG can easily handle around 1.25 lacs customers.

   b. With total targetted broadband customer base of 140 lakhs by March 2012, we require 112 BNGs. Since not all BNGs will be uniformly loaded at any instant, we make over-provision by 25%. Thus total BNGs required is 140.

c. The maximum traffic that may flow from each BNG with average usage bandwidth per customer as 21 kbps (The current rate is 7 kbps) comes to 2.62 Gbps.

d. ***The current BNGs available / planned till Phase II in network is 175. So the current infrastructure can easily take care of projected customer base of 14 Mn and even beyond that also, if the traffic doesn't increase the way it is envisaged.***

e. ***The broad dimensioning criteria is also indicated in the figure below.***

Broad Dimensioning Criteria		
Parameter	**Current**	**Planned**
Customer base	4.5 Mn	14 Mn (Mar '12)
Concurrency	13.5%	40%
Avg BW per cust	7 kbps	21 kbps
Edge Connectivity	2 GE	3 GE*
No of BNGs	128	175
Link Utilization (2GE)	12%**	???

Note:
*: Planned initially in A type cities. Progressively for B type cities
**: This will fall further to 6-8% with the commissioning of balance 47 BNGs (as part of Phase II)
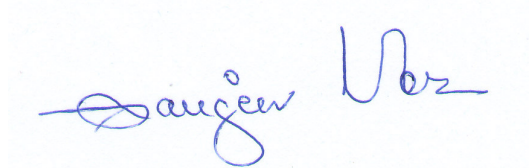
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9. **Summary of the Multiplay Network Connectivity with NIB-II MPLS Network**: The current MPLS connectivity to BNG is loaded to the tune of 12% for the existing 4.5 Mn customers. From the Edge Connectivity perspective, the existing connectivity, for a total of 175 BNGs deployed / planned till Phase II of Broadband Multiplay Network, can easily cater to the requirement of 14 Mn broadband customers. No additional augmentation of the Broadband Network Connectivity with MPLS Network is envisaged. Provision of additional 1GE interface per BNG in A type cities is however kept for On-demand traffic.

10. **Planning of International Internet bandwidth**:

a. With 14 Mn broadband customer base and average bandwidth per active customer base around 10 Kbps, the total international internet bandwidth required by March'2012 will be around 150 Gbps .

b. The logical connectivity of cable landing stations such as Mumbai, Chennai and Bangalore has to be with all the major cities to take care of seamless flow of broadband traffic.

c. This will require the connectivity of Core Router in these cities on n x 10Gbps interface to other cities

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11. **Critical Points For Broadband Network**:

    a. **No more BNG deployment in Phase III**: The current utilization of 175 Nos of BNG is expected to be around 8-10%. *So, no further BNG need to be planned as part of Phase – III expansion. No provision of interfaces are made in the MPLS network for additional BNGs.*

    b. **Focussed Strategy on IP TV Service**:

        i. The low traffic in broadband is predominantly due to slow off take of IP TV service particularly in On-demand Content.

        ii. So a focused strategy has to be there in the existing 98 cities. The services to be strengthened before venturing into new cities.

    c. **Leveraging on RPR based Metro Area Aggregation Network in 98 Cities**: This network shall be used as a metro Area aggregation network for different access networks across business verticals. Also the same network can be used for provisioning of Ethernet connectivity to Enterprise customer

    d. **Project 3 Expansion**: Broadband Multiplay network is acting as a unified broadband network for broadband through other technologies also such as FTTX (GPON, GEPON), Wi-Max. The provisioning of broadband service in multiplay network depends on the OSS / BSS capacity of Project 3 of NIB-II. The capacity of Project 3 shall be in sync with the access capacity deployed through DSL (8.5 Mn capacity till Phase II), Wi-Max (7 Mn capacity in Rural) and FTTX (6.5 lac capacity)

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