



No: 66-07/CNP/MNGT/09/54

Dt: 22/12/2009

Sub: Connectivity Guidelines for Interconnecting IP TAX Network with 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 broad interconnectivity guidelines between IP TAX network and NIB-II MPLS network along with critical analysis of IP TAX Network. The interconnectivity with NIB-II has been optimized purely from the traffic perspective.

1. **Current status of TAX:**

1.1 Total TAX Circuits	:	8.5 Mn
1.2 Average Loading	:	67%
1.3 Loading of Level 1 TAX	:	90%
1.4 Existing Customer base (as on 31/10/2009)		
1.4.1 TDM PSTN	:	28.327 Mn
1.4.2 GSM	:	53.994 Mn
1.4.3 CDMA	:	5.4 Mn
1.4.4 IP NGN	:	0

2. **Macro Level Planning of IP TAX:**

Parameter	Initially Planned Figure	Revised Plan
Total Connections (Mar ' 12)	150 Mn	131 Mn
Contention ratio	1:10	1:10
No of Active Circuits	15 Mn	13.1 Mn
Local Calls	25%	25%
Active Circuits in TAX	11.25 Mn	9.75 Mn
Existing Capacity	8.5 Mn	
Additional Capacity required	2.75 Mn	1.25 Mn

Note:

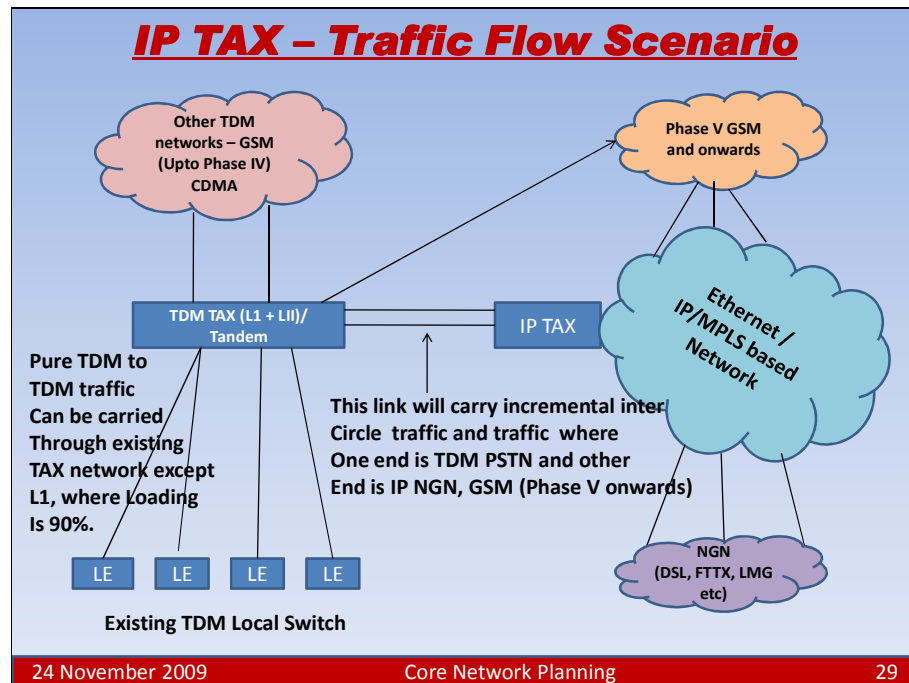
- (i) The above calculation assumes that all the connections are on TDM infrastructure and thus banks on TDM circuits.

- (ii) The scenario has changed with the introduction of IP in GSM in Phase V
 - (iii) Thus the requirement of IP TAX will come down further considering GSM – GSM calls are 70% of the total GSM calls.
3. **Equipment Order Status of IP TAX:** A total of around 3 Mn circuits spanning 260 SSAs are planned to be ordered as part of IPTAX in Phase I. This capacity is meant to take care of additional traffic (PSTN – mobile) expected as a result of increase in mobile customer base. The distributions of the circuits are as follows.
- a. **L1 Order:** Order to M/s ZTE of 2.2 Mn ckt
 - b. **L2 Order:** Order to M/s ITI (OEM M/s Huawei) of 0.9 Mn ckt
4. **IP-TAX Deployment Planned in Phase I:** At the network element level, IP TAX consists of Media Gateway which interfaces with TDM (on multiple of E1s) at one end and on Gigabit Ethernet (GE) towards the packet network. The summary of different capacity of media Gateway planned to be deployed in IP TAX are given below:
- | | | |
|---------------------------------|---|----|
| a. Cities with 4 KC capacity | = | 79 |
| b. Cities with 8 KC capacity | = | 67 |
| c. Cities with 12 KC capacity | = | 37 |
| d. Cities with > 12 KC capacity | = | 77 |
5. **Maximum Traffic expected from IP TAX:**
- a. Thumb rule is 1 circuit = 125 Kbps
 - b. However, this value is when no compression is implemented in the media Gateway
 - c. When compression is implemented, the bandwidth requirement per circuit comes to 70 kbps
 - d. The maximum traffic for 8 KC comes to 1 Gbps, with no compression and 0.56 Gbps with compression.
6. **Traffic Pattern from IP TAX and Analysis:** The different types of traffic along with its flow of pattern are detailed below.
- a. **Intra-Circle Traffic:** Majority of these intra-circle traffic will continue to be transported through the existing TDM TAX network as no additions is happening in the TDM network. Further, the loading of these TDM TAX network is to the tune of 67%. Any increase in traffic can be taken care by the additional capacity available in the existing TDM TAX network. *The IP TAX network will be carrying only the intra-circle traffic generated as a result of Class V NGN deployment (one end NGN and other end TDM)*
 - b. **Inter-Circle Traffic:** The loading of inter-Circle circuits (Level I TAX) are already running at 90%. *The increase in traffic has to be accounted by IP TAX capacity.*
 - c. **PSTN-mobile Traffic:** Expected to be around 25%: With the increase in mobile customer base, the traffic between PSTN – mobile is also expected to increase proportionately.

However, with the migration of TDM based network to Class V NGN, the PSTN-mobile traffic which flows through IP TAX will tend to fall proportionately.

7. **Points for Consideration from Traffic perspective:** Following points need to be kept in mind while working out the ultimate traffic generated from IP TAX network.
 - a. The IP TAX will carry traffic originating / terminating on the TDM landline network at one end and Packet based network at the other end. The Packet based network can be the GSM traffic (Phase V and onwards), Class V NGN traffic, broadband traffic (For VoIP) etc. *The same is depicted in Figure 7A.*

Figure 7A: IP TAX – Traffic Flow Scenario



- b. As the TDM network gets migrated to NGN, the traffic of IP TAX will proportionately come down.
 - c. Because of GSM expansion and landline surrender / migration to NGN, the traffic on IP TAX will come down further.
 - d. Under such a scenario, the utilization of IP TAX in the current scenario will be significant only in top 20 cities (L1 TAX location).
8. **Planned Connectivity for IP TAX:** The IP TAX connectivity will leverage on the existing MPLS Transport network deployed as part of NIB-II and Aggregation network (RPR and Ethernet based) deployed as part of Broadband Multiplay Project. In view of the points explained above, the connectivity planned for IP TAX are:
 - a. **Key Points for Connectivity:** The key points kept in mind for working out the connectivity are:

- i. It is expected that the intra-Circle traffic for TDM network will be catered through existing TAX capacity as these circuits are loaded to the tune of 67%.
 - ii. The IP TAX will predominantly carry the inter-Circle Traffic, PSTN – GSM traffic and PSTN – NGN traffic
- b. **IP TAX at Level I Cities (for Inter-Circle Traffic)**: Total 19 cities. *The list of cities are attached at Annexure I*
- i. In all these cities, the MPLS PE router is already available.
 - ii. To start with, all these cities will be connected to MPLS PE Router in 1+1 GE interface which can be increased with increase in traffic. In A1 and A2 cities, it will be connected to Metro Core Router. With this, the IP TAX in these locations can cater to 30 KC of load (70 kbps per circuit) without redundancy.
 - iii. The GE connectivity in the PE Router will be mapped to IP TAX VRF. *The connectivity diagram is given in Annex II.*
 - iv. In cities, where Soft Switch is also deployed, both MGW and SS will be aggregated through a Ethernet Switch which in turn will be connected to the PE.
- c. **IP TAX at Other A, B1 and B2 cities (For Intra-Circle Traffic)**: Total 81 + 6 = 87
- i. In these cities, the MPLS PE Router is already available.
 - ii. The RPR based aggregation network of 10 Gbps capacity is available in 81 cities. In 6 cities, the Ethernet switch is available.
 - iii. The Media Gateway will be connected to RPR Tier 1 / Ethernet switch on atleast 1+1 GE interface. The IP TAX traffic will share the common physical pipe carrying broadband traffic. However, this traffic will be configured in a different VLAN and mapped to IP TAX VRF in the PE Router. The IP TAX traffic will be mapped to the maximum priority. *The connectivity diagram is given in Annex II*
- d. **IP TAX at Other Cities**: Total 154 cities
- i. These cities will predominantly contain Media Gateway of 4 KC and 8 KC capacity.
 - ii. These cities are equivalent to ‘OC’ type cities in the Broadband category
 - iii. The media gateway in these cities will be connected on 1+1 GE interface to OC LAN Switch which in turn is connected to the nearest RPR Tier 1 switch on STM-1 interface.
 - iv. To start with, this bandwidth shall be sufficient. But provision to be made for the upgradation of the back-haul connectivity from STM-1 to Gigabit uplink to support IP TV and increased IP TAX traffic. **The connectivity diagram is given in Annex II**

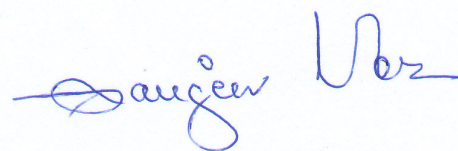
9. **Other Points For Connectivity:**

- a. With the first stage of compression, the bandwidth requirement of IP TAX will come down to 70 kbps (G.729 with 10 ms Packetization interval) per circuit. With the second stage, it is expected to come down to 40 Kbps per circuit (G.729 with 20 ms Packetization interval). ***With this 2 Gbps bandwidth, the MGW can take care of 52 KC*** without redundancy.
- b. The above connectivity plan needs to be reviewed periodically in the wake of changes in the traffic pattern with the passage of time. The circles are requested to forward such observation to this office.

10. **Critical Points Related to IP TAX:**

- a. **Utilization in the Current Scenario will be low:** The planning of IP TAX was done more than three years back. During this period, lot of changes have happened particularly in the landline + GSM. Also the GSM technology has also evolved from TDM to IP. Under such a scenario, the usage of 3 Mn capacity may be significant only in top few cities
- b. **Loading will further come down...:** The utilization will further come down with the migration of TDM to Class V NGN or surrender of landline in favour of GSM or both.
- c. **Explore ways for increasing Loading of IP TAX:** The loading of IP TAX can be increased through replacement of replacement of end of Life / Support TDM TAX Circuits or to be used as a Media Gateway for GSM expansion or for providing whole sale connectivity to other TDM operators.
- d. **Further expansion in Phase II:** The ordering of Phase – II may have to be done after considering the actual loading of circuits deployed in Phase I

Encl: Two Annexures



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Copy To:

- [1] CMD for information please
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List of Cities where L1 TAX is available

Sl No	Circle	City	Type	L1 TAX
1	Andhra Pradesh	Hyderabad	A2	y
2	Assam	Guwahati (J)	A2	y
3	Bihar	Patna	A2	y
4	Chattisgarh	Raipur (J)	A2	y
5	Chennai	Chennai	A1	y
6	UP (W)	<i>Agra</i>	A2	y
7	Gujrat	Ahemdabad	A2	y
8	Gujrat	Rajkot	A2	y
9	Karnataka	Bangalore	A1	y
10	Kerala	Ernakulam	A2	y
11	Kolkatta	Kolkatta	A1	y
12	Maharashtra	Mumbai	A1	y
13	Maharashtra	Nagpur	A1	y
14	MP	Bhopal	A2	y
15	Orissa	Cuttack	A2	y
16	Punjab	Jullundhur	A2	y
17	Rajasthan	Jaipur	A2	y
18	Tamil Nadu	Coimabtore	A2	y
19	UP(E)	Lucknow	A2	y
20	Haryana	Ambala	A2	y
21	New Delhi	Delhi	A1	y

Figure 8C: IP TAX connectivity in 'OC' cities

