

A CASE STUDY by PTA

██████████ on Contention Ratio

(Released to the concerned Licensees only)

1. Agenda:

- a. To determine contention Ratio of Consumer xDSL services currently being offered by the following three Broadband service providers (BSP), namely:
 - i. PTCL
 - ii. Micronet (MBL)
 - iii. Linkdotnet (LDN)

2. Background:

- a. The Authority has nominated DG ████████ to investigate and report the contention ratio of PTCL Broadband.

3. Definition

- a. Over subscription of bandwidth is often used interchangeably by contention Ratio which results not in the compromise of the BW, rather the utilization of the un-utilized BW due to inactive customers.
- b. It becomes very important to define 'Contention Ratio' using a criterion which fits all, meets current needs of all service providers judiciously, can be proven empirically, and is good enough for keeping competition alive.
- c. As mentioned above, a definition had to be coined for our own domestic applications such that it may be calculated empirically and should be judicious to the extent that the industry litigation could easily be resolved.

Definition of 'Contention Ratio' (CR):

- d. Ratio of the total acquired Internet bandwidth by an BSP, at the Internet exchange just before entering the landing station, for provisioning of services to Residential Consumers to the total Internet Broadband Bandwidth it has sold to its Residential customers, at any point in time'.
 - i. Note: It is assumed that corporate customers paying a higher price will be guaranteed a much better service with lower 'contention Ratio' will not be terminated at consumer BRAS(s). Therefore All the BSPs who guarantee 100% of

the sold BW, 100% of the time to their corporate customers, they should be excluded. However, Business DSL customers cannot be segregated (at least among the three BSP networks studied) and will be lumped with the consumers.

e. CR for Residential Customers = $\frac{\sum \text{BW Acquired}}{\sum \text{BW Sold}}$

f. **Alternate Definition:**

- i. In case the total acquired BB BW of the service is not fixed or long durations and changes are implemented on short notices (say hours) or in case the bandwidth is shared with other services and not extractable separately then: The Peak bandwidth utilization during a span of 30 days, during the known peak hours excluding any un-expected spike, is used instead of "Acquired Bandwidth" by adding MRTG Graphs (The Multi Router Traffic Grapher) from all the BRAS(s) within the network of the service provider.

g. **Alternate CR Residential** = $\frac{\sum \text{BW}_{peak} \text{ Utilized}}{\sum \text{BW Sold}}$

4. Benefits of Contention

- a. The advantage of contention is the lower cost of providing service through better bandwidth utilization.
- b. Operators increase their Int'l BW within 24 Hrs if demand graph shows increasing trend beyond threshold, due to their business relations with the providers.

5. Bottlenecks

- a. There are several places which could contribute to slower file download namely:
- i. A bad last mile connectivity
 - ii. Contention due to limited links between DSLAMs and centrally located BRAS(s)
 - iii. Contention linking the local BRAS through nationwide domestic telecom grid to International Internet Routers on IP.
 - iv. Limited acquired Internet bandwidth at landing station
 - v. Slower server responses

- vi. Torrent application has increased the trends of bandwidth sharing that result in increased shared of one user at the cost of reduced share of received bytes to others at a particular instant.
 1. The Policy Controlled DSLAM technology being introduced by PTCL will enable it to limit subscriber access to bandwidth, speed and/ or capacity, on the fly in case of abuse.
 2. In the absence of such innovative gadgets or monitoring tools, such applications would be difficult to control. However, volume based billing is an alternative and applied by some operators e.g. Micronet.

6. Business Planning Considerations

Categories based on Service Type and Population Density

- a. Corporate & Corporate Customers (Low or no-contention at specific times)
- b. Residential customers (Best Effort)
 - i. Big Cities
 - ii. Small Telecom Regions
 - iii. SOHO / Students
 - iv. Rural customers
- c. An average of 40% xDSL customers is observed inactive at peak times.
- d. Over subscription is possible due to different utilization patterns of different categories of the subscribers.
- e. The contention Ratio increases with increasing the number of subscribers. i.e. More the subscriber base, more varied the utilization pattern is, hence more the margin to sell it to more and more users. This trend is changing with torrent applications.

7. Incumbent Specific

- a. BSP (Broadband Service Providers) use consumer behavior of their subscribed businesses, residential users, rural and institutions etc to plan the acquiring and distribution of Internet bandwidth.
- b. Case of incumbent acting as a BSP is very different when compared against CVAS BSPs. BSPs like PTCL have the following edge:
 - i. Access to good quality last mile,
 - ii. Larger xDSL subscriber base,
 - iii. Bigger variety of consumer behavior

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Lower Contention Ratio may translate to a better Quality of Service

- iv. Variant regional behavior
- v. Bandwidth Sharing due to converged integrated service offerings
 - 1. Lack of appropriate Monitoring tools
- vi. Un-accounted DPLC resources between DSLAMs and BRAS(s)
- vii. Un-accounted Internet bandwidth availability at landing stations

8. Approach:

- a. ██████████ conducted face-to-face meetings with the senior management of PTCL, Micronet Boradband Ltd (MBL) and Linkdotnet on 16th & 17th of March, 2011.
- b. ██████████ visited Micronet & PTCL on 21st & 22nd of March 2011. The Visit to PTCL was lead by Member(T).
- c. Later, PTA team visited PTA NOC center at H-8 and had a detailed face-to-face meeting with PTCL officers.. A telephonic conversation also took place with Karachi PIE officers.
- d. In addition to the information collected during meetings, documented data was requested from all the concerned, including TWA for verification.
 - i. The MBL has provided most of the requested data on the matter to determine contention. They could not segregate Business DSL customers from their BRAS(s)
 - ii. Most of LDN data has been received from their BRAS(s).
 - iii. PTCL has provided most of the data requested. As more information is gathered, more complexity pops up on their network due to a host of services being offered at various stages. It is still to be known if their B-DSL data has been included in the BRAS(s) info provided.

9. Micronet Broadband Limited (MBL):

After the last meeting held at PTA, with the Authority in place, it came as a recommendation from the BSPs not to segregate among business DSL customers and residential customers.

a. CR Analysis of MBL by PTA

Using 'Alternate CR Approach' $CR = \frac{\sum BW_{peak} Utilized}{\sum BW Sold}$

Using data of two different days:

<p>MBL₁ CR = [REDACTED]</p> <p>MBL₂ CR = [REDACTED]</p>

10.LinkdotNet:

Due to their OMC in Lahore, no visits could be planned to LinkdotNet. Based on only face-to-face meeting the following is concluded:

i. CR Analysis of LDN by PTA

1. Using 'Alternate CR Approach' $CR = \frac{\sum BW_{peak} Utilized}{\sum BW Sold}$ is

Using data of two different days:

<p>LDN₁ CR = [REDACTED]</p> <p>LDN₂ CR = [REDACTED]</p>

11. PTCL

Three visits were made to PTCL. First visit to PTCL was headed by M(T). The rough PTCL estimate of contention ratios according to PTCL is as follows:

- i. Corporate Customers [REDACTED]
- ii. Big Cities [REDACTED]
- iii. Residential [REDACTED]
- iv. Rural [REDACTED]

b. CR Analysis of PTCL by PTA

Two methods have been employed to detect PTCL's CR. One of these is further divided into two. All methods use 'Alternate CR Approach' $CR = \frac{\sum BW_{peak} Utilized}{\sum BW Sold}$.

Our opinion is that only the following method be considered for contention evaluation purposes:

Method₁₂

Taking Gateway Caches into consideration:

At Gateway, Cache Method₁₂ PTCL CR = [REDACTED]

12. Contention Ratio Calculation Table

S #	Broadband Service Provider	Calculated Contention Ratio
1	Micronet	[REDACTED]
2	[REDACTED]	[REDACTED]
3	[REDACTED]	[REDACTED]

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