Telecom Regulatory Authority of India

(TRAI)

Status Paper

on

Broadband Speed

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Preface

Broadband policy 2004 defines broadband connection as an always-on Internet access with a minimum speed of 256 Kbps from the POP of service provider to the customer premises equipment. There is worldwide trend to set minimum speed for broadband connection. The speed defined by various countries and International organizations differs according to the parameters being considered while finalizing such benchmarks.

Recently, some expressions have been made for raising the minimum speed for broadband connection from its present level of 256 Kbps so as to bring it at par with the international Standards. There is some impression that large number of countries are having minimum broadband connection speed more than or equal to 2 Mbps.

TRAI in this status paper has analyzed broadband speed defined in various countries, the prevailing environment and impact on the growth. This will help to set future roadmap for defining broadband in the country. The status paper is available on TRAI website (www.trai.gov.in). Stakeholders are requested to forward their comments to Mr. S. K. Gupta, Advisor (Converged Network), Tel.No. +91 11 23217914, Fax: +91 11 23211998 or email at guptask@trai.gov.in or guptask61@gmail.com.

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1. Introduction

High speed Internet is commonly known as Broadband. The minimum speed above which a connection will be termed as broadband varies from country to country. There is no uniform standard for the minimum speed. While some of the countries prefer not to define broadband at all, most of the countries define broadband speed around 256 Kbps/ sec. The important issue here is to identify the parameters which derive definition of broadband and whether there is a need to modify broadband definition existing in our country today.

While no clear indication is available on parameters in different countries scenario determining the broadband speed, it seems that the prime driver to define "broadband" is minimum average speed, which can support popular applications. It is due to this fact that broadband definition is different in different regions. The definition of broadband followed by various countries is given in Annexure I.

Broadband speed is a relative concept. The popular contents and their bandwidth requirements are different. Table 1 summaries various applications in Indian scenario and bandwidth required to support such applications. From this, It is observed that tentative bandwidth requirements to run various applications ranges from 64 Kbps to 8 Mbps.

Application	Min. Bandwidth Required
Internet surfing	Upto 256 Kbps
E-mail	64 kbps
Voice chatting	64 Kbps
Voice & Video chatting	256 – 512 Kbps
Video clips	256 – 512 Kbps
Tele-education	256 – 512 Kbps
Tele-medicine	256 Kbps
Video streaming	2 Mbps (approx.)
Video Gaming	256 – 512 Kbps (high precision games may require higher bandwidth)
High definition video	4-8 Mbps

Table 1: Bandwidth requirement of different applications

While certain application like Email, Voice and video chatting can be supported by a bandwidth of 256 Kbps, real-time applications involving video and multi-media applications will require much higher bandwidth. Certain application like VoIP and Tele-education can be better served with a symmetric broadband connection.

2. Broadband Definition in India

In India, Internet Services were launched on 15th August 1995 by Videsh Sanchar Nigam Limited (VSNL). In November 1998 the Government opened the sector to Private Operators for provisioning of Internet Services. More than 95% subscribers were using dialup access at that time.

In a bid to encourage high speed Internet growth in the country and to address the demand of application requiring more bandwidth, TRAI came up with its consultation on "Accelerating Growth of Internet and Broadband Penetration" in November 2003 and submitted its recommendations to DoT on 29th April 2004. Department of Telecom issued Broadband Policy thereafter.

As per Broadband policy broadband is defined as *"An `always-on' data connection that is able to support interactive services including Internet access and has the capability of the* ***minimum download speed of 256 kilo bits per second (kbps) to an individual subscriber*** *from the Point of Presence (POP) of the service provider intending to provide Broadband service where multiple such individual Broadband connections are aggregated and the subscriber is able to access these interactive services including the Internet through this POP. The interactive services will exclude any services for which a separate license is specifically required, for example, real-time voice transmission, except to the extent that it is presently permitted under ISP license with Internet Telephony".*

Broadband policy also stipulated the growth path of broadband in India by fixing the targets to be achieved till 2010 keeping in view broadband definition. The targets are given at table 2. At present we are far from achieving these targets as we are still with the meager broadband subscriber base of 2.67 Million at the end of Sep 2007 as against target of 9 Million subscribers by 2007.

Year Ending	Internet Subscribers	Broadband Subscribers
2005	6 million	3 million
2007	18 million	9 million
2010	40 million	20 million

Table 2: Broadband Targets

If we analyze the present broadband subscriber base in India on the basis of committed connection speed, the results indicate that majority of subscribers are using Broadband plans which define minimum speed as 256 Kbps (Refer Table 3).

Connection Speed	% of Broadband Subscriber
256 Kbps	**96 %**
512 Kbps	**< 3%**
> 1 Mbps	**< 1%**

Table 3: Broadband users as per connection speed

Here it is important to note that higher broadband speed options (Atleast 2Mbps) are available to the subscribers but very limited subscribers have opted for higher broadband speed.

A typical startup broadband plan with 256 Kbps in country is available at monthly charge of Rs. 250/- as against monthly charge of Rs. 3300/- for a connection with min. 2 Mbps connection speed. Many subscribers do not perceive any higher utility attached with such a higher cost value plans. Broadband connection with higher speed say 2 Mbps, is therefore less favored due to higher tariff structure and more importantly due to its lower perceived utility at present.

TRAI has also observed that many service providers use the word 'up to' while advertising their broadband plans and do not indicate any committed minimum speed. This has led to rise in subscriber complaints. TRAI instructed the ISPs to remove the word 'up to' from the tariff plans and to clearly mention the associated minimum download speed of the plan. All service providers have agreed to remove the term 'up to' from their plan to avoid any confusion. Therefore while defining broadband speed we should only consider minimum guaranteed speed under the plan.

The broadband speed is also deeply related to the availability of Network access Infrastructure in the country. In India the broadband is presently provided mainly by DSL technology. The main problem associated with DSL is the limited availability of Copper loop in local

network. Presently majority of available copper local loops are also not suitable enough to support high bandwidth broadband connections due to long length of cable local loop, quality of cable and maintenance constraint. Optical fibers in local loop, which can be instrumental in providing higher bandwidth in broadband, are quite less. Unless optical fiber cable networks are laid on large scale, it will be difficult to provide high speed Internet access. India is a vast country and geographically it is not very easy to deploy the access network to support higher bandwidth with affordable prices.

With the opening of access network to the wireless access technologies such as 3G, WiMAX etc it is anticipated that wireless broadband will provide wider coverage but not very high speed as possible with optical fiber networks. However these networks have not been operationalised in Indian network. Therefore present networks may not support very high speed broadband unless they are suitably upgraded.

At International level the infrastructure in access side is quite robust and in countries like Japan, Korea etc more and more broadband connection are being now provided over Fiber to the Home (FTTH) network which has been laid extensively. This has been possible primarily due to the smaller geographical areas of these countries. Similarly the penetration of copper loops is high in these countries enabling them to support various higher variant of xDSL technologies such as SDSL, VDSL ADSL 2+ etc, in order to support high upload/download bandwidth.

Considering high speed Internet availability in countries like Japan, S. Korea, some Indian stakeholders are of the view that present broadband speed definition in India is too conservative as compared to other countries and there is a need for its upward revision. They feel that

higher broadband speed definition will facilitate launch of content rich services and application and will boost broadband penetration.

Let us now examine the International scenario in more detail.

3. International Experience

TRAI has compiled broadband definitions available in some of the countries and International organizations. These definitions are attached in Annexure-I.

In most of the cases minimum speed for broadband is either 128 Kbps or 256 Kbps. International Telecommunication Union (ITU) and Organization for Economic Co-operation and Development (OECD) has defined broadband as minimum 256 Kbps connections.

As per ARCEP, the Telecom regulator in France, a minimum speed of 512 Kbps is defined as Broadband connection. Similarly South Africa and United State of America has fixed a minimum speed of 256 & 200 Kbps respectively for the purpose of defining the broadband connection.

Countries like Malaysia, United Kingdom and Pakistan have defined a minimum speed of 128 Kbps as broadband. In Korea & Japan, although no definition of broadband is available, however various broadband plans available in these two countries start from a minimum of 2 Mbps connection. For Singapore also the starting plans available have a speed of 512 Kbps. In China, no speed is defined for this purpose. However, all Internet users other than Dialup & wireless are considered as Broadband users.

In some countries like Australia & Canada; no minimum speed for Broadband is defined. However, it has been mentioned that speed of

broadband should be capable of supporting genuinely new and innovative interactive content, applications and services and the delivery of enhanced public services.

4. Analysis of broadband definition in India

Although the speed fixed by International Organizations such as ITU & OECD can be a guiding factor for all the member states, different minimum speeds of broadband are being practiced. It basically depends on the type and availability of content in that region. Contents in developed countries have higher composition of video and interactive multi-media. Perceived Utility of the Internet applications and their availability to subscribers in particular country also impacts broadband definition.

It is clear that broadband minimum speed in any country is closely related with the popularity of the bandwidth hungry applications and perceived utility of the higher speed of Internet to the customers.

In respect to India, the contents requiring high speed are very limited. The existing networks are not in position to support high speed Internet and up-gradation for these networks. Introduction of new networks supporting high speed are also likely to take some more time. Further, The definition of broadband clearly says "*An `always-on' data connection that is able to support interactive services including Internet access and has the capability of the* ***minimum download speed of 256 kilo bits per second (kbps) to an individual subscriber.....***". Thus there is no bar for any service provider to offer broadband connections with speed higher than 256 kbps if their network supports and market demand exists.

Annexure-I

Definitions of Broadband by International Organisations and Major Countries

a. International Telecommunication Union (ITU)

- Recommendation I.113 (06/97): "Qualifying a service or system requiring transmission channels capable of supporting rates greater than the primary rate."
- ITU Internet Report: The Portable Internet (2004) Broadband may be defined as transmission capacity with sufficient bandwidth to permit combined provision of voice, data and video, with no lower limit.
- ITU Trends in Telecommunication Reform: Regulating in the Broadband World (2006) generally networks with bandwidth capacities of 256 kbps or more can be termed "broadband," although that threshold may well shift higher as new technologies push the envelope on throughput.
- ITU World Telecommunication/ICT Indicators (August 2007): Broadband may be defined as sufficient bandwidth to permit combined provision of voice, data and video. Speed should be greater than 256 kbps, as the sum of capacity in both directions.

b. United Nation Core ICT indicator:

A Broadband Internet subscriber is someone who pays for high-speed access to the public Internet (a TCP/IP connection). High-speed access is defined as being equal to, or greater than 256 k bits/s, as the sum of the capacity in both directions.

c. ARCEP (France):

As defined by ARCEP the Telecom regulator in France, high speed or broadband refer to Internet access capacities which exceed those of analogue access via modem or that of ISDN digital access, at least equal to 512 Kbps as is the case currently on ADSL.

d. ICASA (South Africa):

"Broadband means an always-on data connection that is able to support various interactive services, and has the ability of a minimum download speed of 256 Kilo bits per second".

e. FCC (United State of America):

FCC defined "broadband" as the capability of supporting, in both the provider-to-consumer (downstream) and the consumer-to-provider (upstream) directions, a speed (in technical terms, "bandwidth") in excess of 200 Kbps in the last mile. This rate is approximately four times faster than the Internet access received through a standard phone line at 56 Kbps. A consultation process have been started to consider modification in broadband definition therefore this definition may get modified in due course.

f. TIA (United States of America) :

The US Telecommunications Industry Association (TIA) argues that much of the newer services being offered today, while providing improvements over the standard dial-up access at a maximum speed of 56 k bits/s, are not quite broadband and therefore should be deemed to be "high-speed Internet access services" rather than broadband. If the term 'broadband' is used generically to include essentially any capability beyond dial-up Internet access, the TIA suggests that today's high-speed access services be referred to as "current generation broadband". The TIA professes that what it suggests be referred to as "next generation broadband" is more

than experiencing somewhat quicker downloading of web page images and a slight improvement in rudimentary video streaming. Rather, it is an entirely new experience of connectivity that will enable yet to be seen content-rich applications and completely new functionalities.

g. Canada

Taking a more functional approach to definition, the Canadian National Broadband Task Force (CNBTF) decided not to define broadband in terms of information transmission rates, but instead defined it as "a high capacity, two-way link between end users and access network suppliers capable of supporting full-motion interactive video applications to all Canadians on terms comparable to those available in urban markets." A minimum symmetrical speed of 1.5 megabits per second per individual user is currently required to support these applications

h. Pakistan:

As per Broadband policy of Pakistan broadband is defined "an always on Internet connection with a download speed of at least 128 kbps connectivity"

i. Malaysia: Malaysia defines broadband as speeds above 128 Kbps.

j. Hungary: According to 2005 Hungarian broadband infrastructure subsidy programs, broadband transmission shall meet the following criteria:

- Minimum speed from the service provider to residential subscribers: 256 kbps (512 kbps also being possible).

- Minimum speed from the residential subscriber to the service provider: 64 kbps;
- Monthly service availability to residential subscribers: at least 98 percent.

k. Australia:

As per National Broadband Strategy of Australia "Broadband allows users fast, 'always-on' online access to digital content, applications and a range of services, some or all of which can occur simultaneously".

l. Scotland:

Broadband is "a very high speed 'always-on' service connection allowing large amounts of information to be conveyed quickly, such as data, graphics files or video generally defined as a bandwidth more than 512 Kbits/s."

m. Free Online Dictionary of Computing (http://foldoc.doc.ic.ac.uk/):

The term has come to be used for any kind of Internet connection with a download speed of more than 56 kbps, usually some kind of Digital Subscriber Line, e.g. ADSL. A broadband connection is typically always connected, in contrast to a dial-up connection, and a fixed monthly rate is charged, often with a cap on the total amount of data that can be transferred.

n. Broadband Stakeholder Group (BSG) UK:

The BSG is the industry-government forum tackling strategic issues across the converging broadband value chain in United Kingdom. It defines Broadband as 'Always on access, at work, at home or on the move provided by a range of fixed line, wireless and satellite technologies to progressively higher bandwidths capable of

supporting genuinely new and innovative interactive content, applications and services and the delivery of enhanced public services.'

o. Organization for Economic Co-operation and Development (OECD):

The OECD defines broadband as an Internet connection that is capable of sustaining download speeds to individual users greater than or equal to 256 k bits/s. The Broadband speed definitions by country in OECD are shown in Diagram below. It is observed that broadband speed defined by most of the countries is less than or equal to 256 Kbps. ARCEP (France) has defined Broadband speed as 512 Kbps as discussed above; however Fig.1 show broadband speed in France as 64 Kbps. Definition for Hungary is also discussed above.

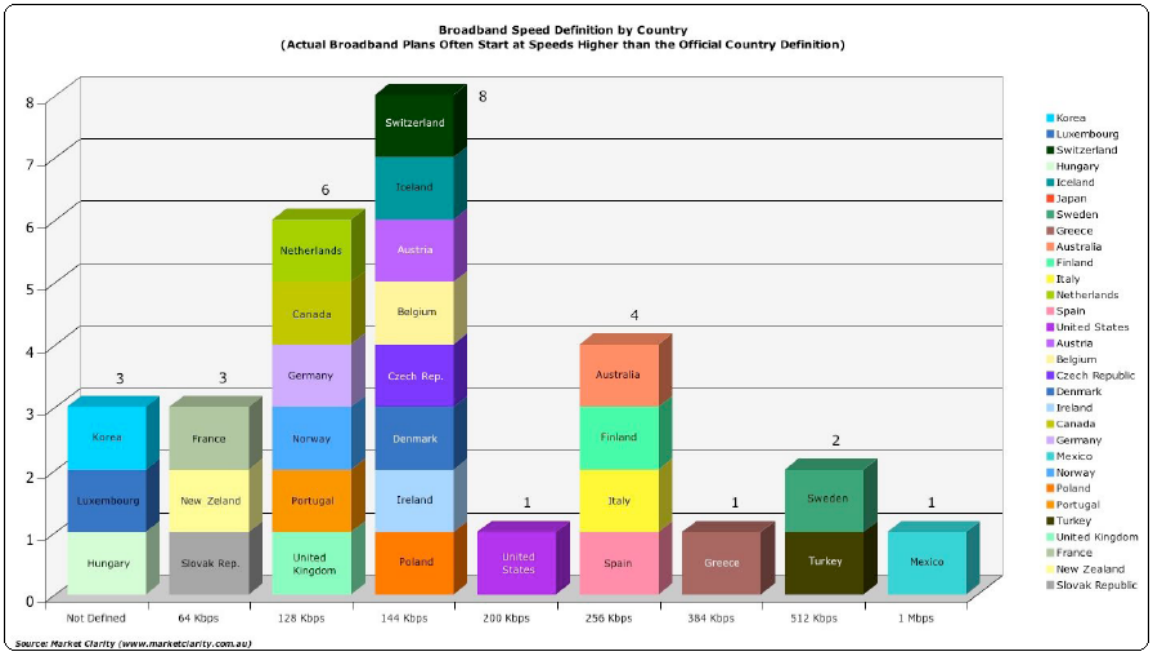

Fig .2 Broadband speed definition by country in OECD