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Date : 20th July, 2010

Advisor (CN &IT)
The Telecom Regulatory Authority Of India
Mahanagar Doorsanchar Bhawan,
Jawaharlal Nehru Marg
(Old Minto Road)
New Delhi 110002
India

Sub.: Consultation Paper (no. 09/2010) on National Broadband Plan dtd. 10th June, 2010

Dear Sir,

With reference to the "Consultation Paper on National Broadband Plan" dtd 10th June 2010, please find attached our comments for your kind consideration. It would be our pleasure to meet you and discuss the above in detail, if required.

Thanking you and assuring you of our best attention always.

Yours sincerely,

Bipul Singh
Corning Cable Systems

Encl.: As above

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I. Introduction and Summary:

Corning Incorporated respectfully submits the following comments on TRAI's Consultation Paper on the National Broadband Plan.

We commend TRAI for undertaking this initiative to "evolve a National Broadband Plan, covering various aspects right from the definition of broadband to the spread of infrastructure and various regulatory and other issues."[1] TRAI has long been an advocate for increasing the growth of broadband as an important factor in economic growth.

Corning Incorporated is a global leader in the production and sale of optical fiber, cable and hardware. As the inventor of the first low-loss single-mode optical fiber and the manufacturing process for fiber, Corning brings a unique perspective concerning the impact of optical fiber networks and regulatory prescriptions on expansion and deployment of current and next generation networks. Corning has a long history of participation in the Indian Telecom market, including the installation of the first optical fiber cables in India, which used Corning fiber.

Accordingly, in this document we explain the need for increased broadband investment, the need for setting aspirational and practical goals for broadband speed and the importance of the regulatory regime to encourage deployment and investment.

II. The importance of a robust infrastructure and speed in India's Broadband Network

a. Establishing the Right Speed

As TRAI has noted, India has "just 8.75 million Broadband connections in the country at the end of March 2010 as against the target of 20 million broadband subscribers by 2010…"[2] TRAI clearly recognizes not only the importance but in fact the need for expansion of network capabilities.

TRAI's own data show that increased convergence of telecom, broadcasting and IT enabled services over the network is leading toward higher bandwidth requirements. TRAI notes that:

"….a household connection is generally used by 3 to 4 persons, the bandwidth requirement per connection is to be minimum 3 to 4 Mbps per household by the end of 2010 to support emerging applications. There will be huge increase in the bandwidth requirement due to increase in demand of bandwidth intensive services. Considering the bandwidth requirement of 3 Mbps per household with a high contention ratio of 1:50, and 5%, 20% and 40% households having broadband by 2010, 2012 and 2014 respectively, the estimated core bandwidth requirement will be gigantic 750 Gbps, 3000 Gbps and 6000 Gbps respectively."[3]

[1] Telecom Regulatory Authority of India, Consultation Paper No. 09/2010, June 10, 2010, p. iii
[2] Ibid., p.2
[3] Ibid, p. 26

As TRAI noted, many governments have set both short term and long goals for their national plan, providing both aspirational and practical goals. These dual track goals are focused on the short term goal of universal access for current generation technologies while simultaneously moving to adoption of greater speeds and capacity for next generation. Corning believes this is an appropriate approach for India as well. The first goal is to bring broadband to the rural villages and increase its adoption rate. The second goal is to bring competitive access to most of India to help spur competition and close international gaps. As indicated in Table 1, many countries have national broadband plans designed to accelerate deployment of next generation capability at 100 Mbps. With Japan offering over 90 Mbps and Malaysia building for 10 Mbps, it is essential that the government take steps to close the gap between India and its Asian counterparts.

Table 1: National Broadband Goals and Speeds

Ambitious National Broadband Targets Drive Policies, Technology and Coverage

Country	Current Broadband Speeds	Nat'l Program Duration	Nat'l Program Future Target Speeds	Nat'l Program Future Target Coverage
Australia	15.5 Mbps	2009-2017	100 Mbps download	90% homes and businesses
France	51 Mbps	2009-2012	NA	~33% homes and businesses
Germany	15.9 Mbps	2009-2014	50 Mbps download	75% homes and businesses
Japan[1]	92.8 Mbps	Late 1990s-2010	100 Mbps download	~66% homes and businesses
Korea	80.8 Mbps	2009-2012	1 Gbps download	100% homes and businesses
Malaysia	N/A	2007-2017	10 Mbps+ download	38% homes and businesses
New Zealand	13.5 Mbps	2009-2019	100 Mbps download	75% homes and businesses
Singapore	N/A	2009-2015	1 Gbps download	100% homes and businesses
UK	10.7 Mbps	2009-2017	24-100 Mbps	75% homes and businesses

Note: 1. Japan – NTT Fiber Build (Private)

Source: SNL Kagan, AFP, New York Times, Australian and New Zealand Government Websites, BSG, FTTH Council, Metro UK, Telekom Malaysia, Infocomm Development Authority of Singapore, Telecompaper, Screendigest, CSMG Analysis

While TRAI has indicated broadband definitions of 3-4 Mbps, we recommend TRAI to consider speeds at 50 Mbps down and 20 Mbps up. Setting a target that is more ambitious than currently envisioned will help drive network deployment that can deliver current and future. In fact, "[t]he California Broadband Task Force (2008) predicts that telemedicine, education distance learning, and digital medicine will require speeds between 10 and 100 Mbps. It furthermore concludes that high definition telemedicine, virtual reality, supercomputing and advanced research applications will require broadband speeds of over 100"[4] As the chart below indicates, a broadband definition of 3-4 Mbps will be sufficient only for basic applications, requiring much great speeds to address needs such as health and education.

[4] An International Look at High-Speed Broadband, Brookings Institution, February 2010; Darrell M. West, p. 6

Top Bandwidth Speed Required for Various Digital Content Applications	
High Definition Television	18 Mbps
Online Games	14
Video on Demand	13.5
Internet Protocol TV	13.5
Video Conferencing	13.4
Virtual Worlds	9
Web Browsing	4
Audio Streaming	1.5
Voice Calls	0.5

Source: An International Look at High-Speed Broadband, Brookings Institution; February 2010; Darrell M. West

b. Developing a Robust Network that Leverages Existing and Emerging Technologies

We agree with TRAI's assertion that "predictive demand of broadband in the near future and required infrastructure necessitates deployment of national wide broadband network"[5] and that this is important for both the core network and access points. To support these requirements in the core network, it is important to maximize the technologies and various network architecture to ensure quality of performance.

TRAI has noted the value of optical networks to handle capacity in both core and access points in ways that maximize existing and emerging wireless technologies.

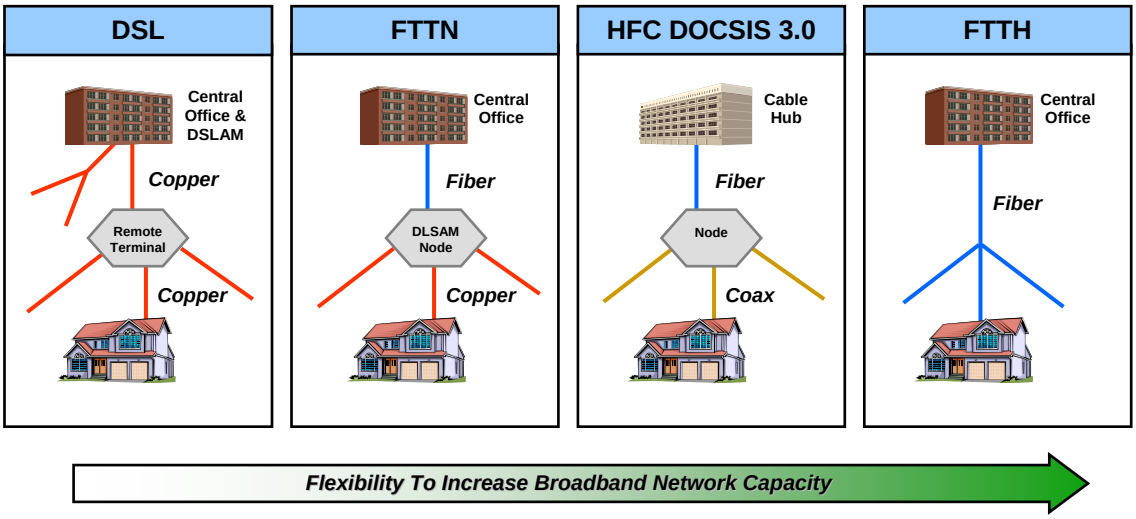
The flexibility of fiber is supported by the Schools, Health and Libraries Broadband (SHLB) Coalition in its submission to the U.S. Federal Communication Commission on its National Broadband Plan, which stated that:

> "Fiber is often described as 'future-proof' because it provides almost unlimited bandwidth. The capacity of fiber is limited only by the speed of light, which is to say that the actual capacity of the fiber is limited only by the electronics placed at either end of the cable. As a result, fiber is a long-term asset (20+ years) that can be used to provide increasing transmission rates without replacing the fiber itself. No other technology can match this transmission capacity and this longevity of use."[6]

As the slide below demonstrates, fiber supports many technologies and network configurations, making it extremely adaptable and cost effective.

[5] Ibid, p. 30
[6] FCC proceeding GN Docket No. 09-51, Comments of the Schools, Health and Libraries Broadband Coalition, p.3

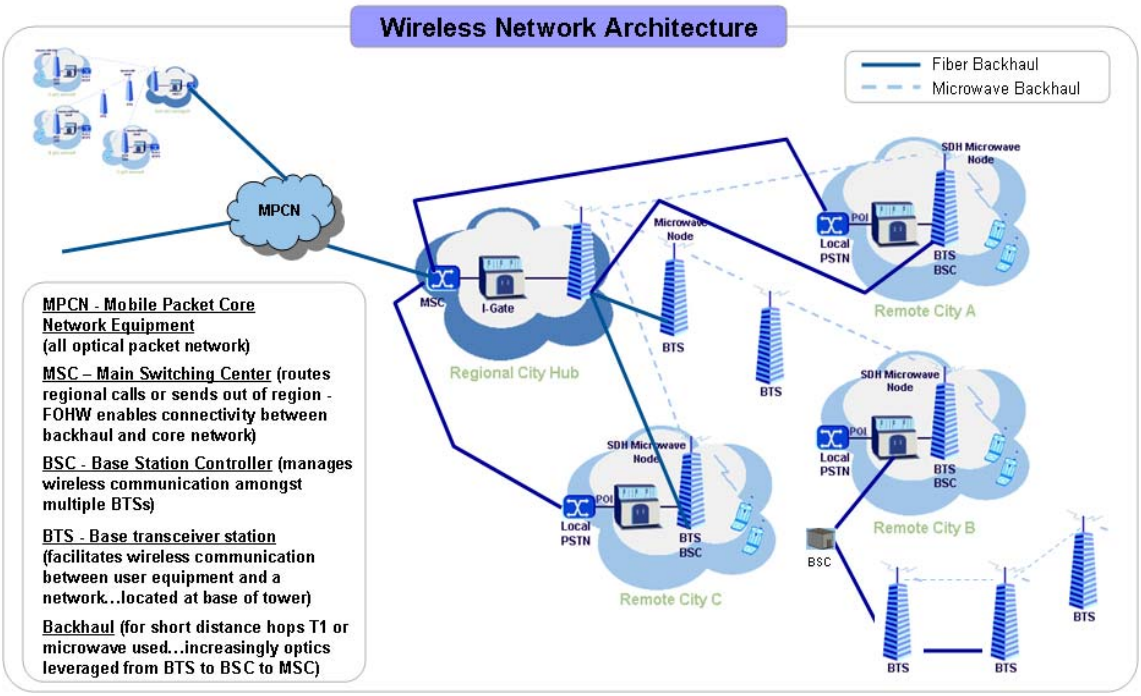
Access Technologies, Next-Generation Access Networks & Technology Neutrality



TRAI specifically asked about network topology to support high speed broadband using evolving wireless technologies. As wireless network demand increases, protocols are upgraded to solve for capacity issues and more cell sites are deployed to solve for resulting coverage issues. This stresses traditional cell site aggregation network design calling for microwave upgrades and/or deeper fiber penetration. As shown in the charts below, optical networks provide flexibility and complement emerging wireless technologies.

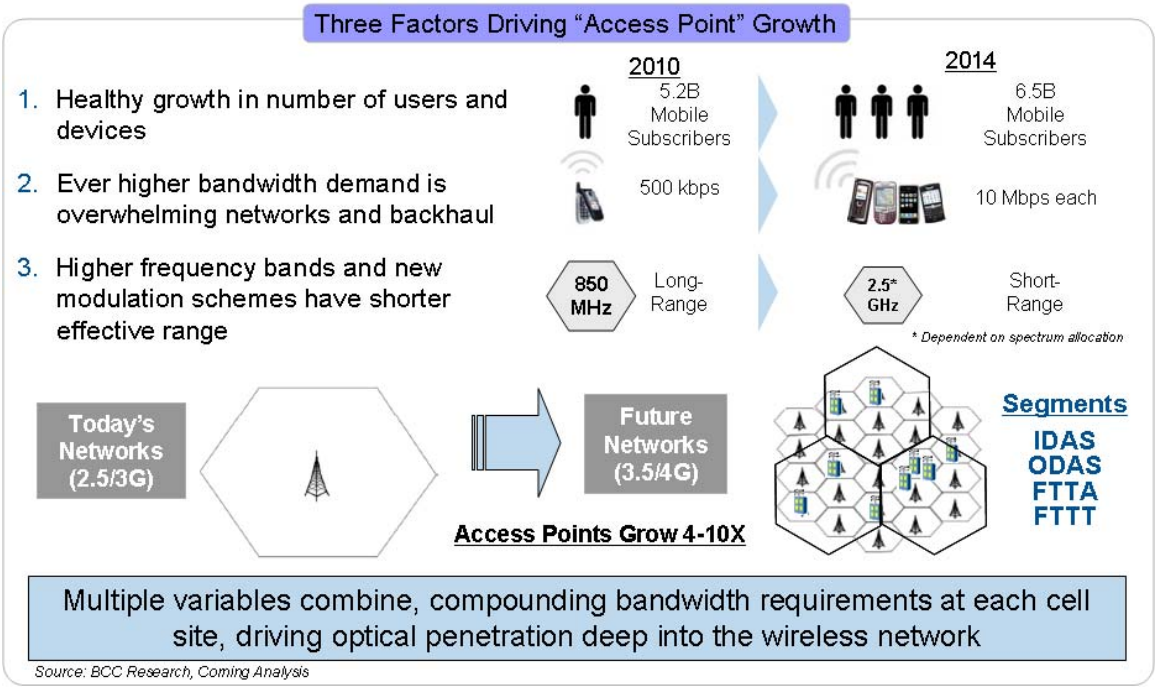
Wireless Network Basics

Optics increasingly pushing out from the backbone



Optical Penetration

The case for fiber → delivering more coverage and extremely high capacity



Source: BCC Research, Coming Analysis

c. Government Investment For Rural Expansion

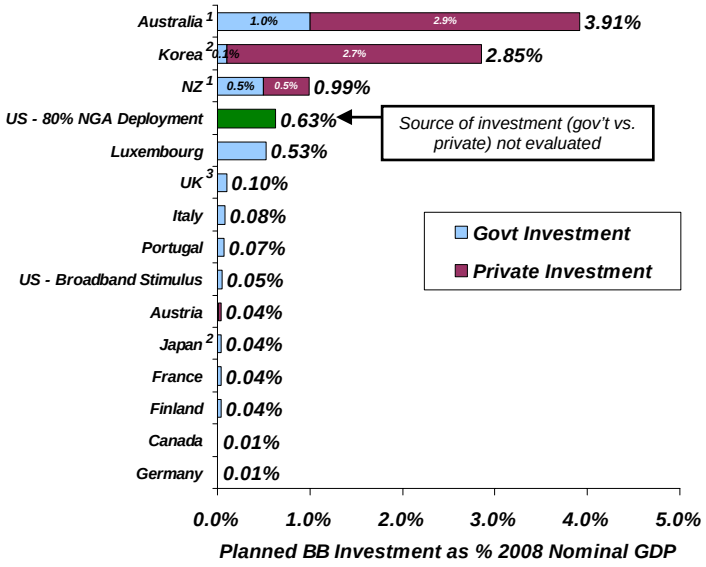
Upgrading and expanding the national broadband network to address short growth and next generation needs will require investment. One proposal under consideration involves the use of Universal Service Funds to support deployment in the villages. As TRAI noted in its consultation paper, there is significant precedent in many countries for government funding to provide broadband access to rural and underserved communities.

International Broadband Initiatives

National NGA build programs constitute a substantial portion of national GDPs

Estimated Future Broadband Initiative Spend as % of 2008 Nominal GDP

(Multi-Year Investment as % of One Year's GDP, not PPP adjusted)



NOTES
1. Australia and New Zealand – Future planned investments announced by the government 2. Korea and Japan – Does not include past government broadband initiatives (e.g. estimated at $85B for Korea historically) 3. UK – Investment calculated based on an estimated initial funding of 200M GBP plus 150-175 Million GBP per year from 2009-2017

Source: The National Broadband Plan, CSMG; The Berkman Center for Internet and Society 2009 Study – Next Generation Connectivity, CIA Factbook

With 70% of India's population living in rural areas, it is important that the government expand bb access to ensure access to information, generate economic development and provide better education and health care access.

A national broadband plan should be designed to balance multiple important policy objectives and consider availability, adoption, and speed of broadband

Illustrative National Broadband Plan Objectives

Objectives	Activities	Illustrative Potential Impact
Rural Broadband Coverage	• Support for broadband in rural communities	• Likely results in a few points of BB penetration on a national scale
Adoption Programs	• Various programs to increase adoption at household level	• **Impact likely scales directly with government resources applied** • However, initiatives will have **little to no impact on speed/quality** of broadband service
Connect Anchor Institutions	• Direct support for anchor institution connectivity	• **Improved access at schools, libraries**, etc. for administrators, users as well as unserved/underserved and lower-income communities • **An important policy goal** which helps communities provide public access to broadband, computers and training,
Accelerate NGA BB Deployment	• Pursue policies that incent deployment of next-generation broadband	• **Significant positive public benefits** • **Significant impact on in internet speeds** • **Competitive dynamic could drive additional adoption** for high-speed BB, as service provider offerings become increasingly attractive

A big vision is required for India's national broadband policy

Source: FCC, CSMG

III. Recommendations

a. Set Ambitious Goals

To realize the benefits of delivering government services such as healthcare and education requires clear vision and leadership. As noted in the ITU Hyderabad Declaration, "broadband access and usage, supported by strong national backbones, are increasingly considered as essential services." As these broadband networks are deployed, "governments are better able to provide e-government services to their citizens, which improve transparency, accountability, utilization of resources and access to governmental services including healthcare and education." With increasing populations, demand will place challenges on transport systems, electricity distribution and healthcare services. Buildout of broadband networks will help meet these increasing needs.

There are numerous factors that have led to successful broadband deployment including incentives and competition. One key issue that has been identified in numerous studies is leadership. The Information Technology Industry Foundation (ITIF) noted that:

"Overall, at the broadest level nations with robust national broadband strategies – that is, those that make broadband a priority, coordinate across agencies, put real resources behind the strategy and promote both supply and demand – fare better than those without."[7]

The global broadband leaders all established ambitious goals of 50 Mbps, 100 Mbps, and I Gbps for their target download speeds and then established policies and incentives to help achieve the vision.

b. Ensure that regulations are streamlined and do not impede investment or deployment

As noted by TRAI, India has a complicated rights of way procedures that hinder broadband deployment. Uniform and streamlined procedures and rationalized costs throughout the States would be a useful first step.

[7] Explaining Broadband Leadership, Atkinson, Correa, Hedlund, p VIII.