Comments by LIRNE*asia* on draft NTP 2011, submitted to Department of Telecommunications, Government of India

LIRNE*asia* appreciates the opportunity to offer comments on the draft and trusts that its research-based comments will contribute to the improvement of the text.

LIRNE*asia* is a regional information and communication technology (ICT) policy and regulation think tank active across the Asia Pacific. It has commented on numerous TRAI consultations and its Chair & CEO, Professor Rohan Samarajiva, is frequent participant in telecom policy and regulatory events in New Delhi. **Annex 1** contains the organizational profile.

The present comments address two lacunae, **international backhaul** and **performance indicators**, and provides suggestions to improve the sections dealing with **taxes** (mission, para 32), **broadband definition** (strategies, 1.4), **FTTH** (strategies, 1.5), **USO Fund** (strategies, 1.13, 1.14), **rights of way** (strategies, 5.3, 5.4), and **disaster related** (strategies, 5.13, 5.14, 5.15).

International backhaul

There is a surprising lacuna on international connectivity in the draft NTP-11. It must be filled if the broadband objectives are to be realized and India's IT and ITES pre-eminence is to be maintained.

It has been documented that broadband performance deteriorates when the Internet cloud is accessed. While a file located within the Internet Service Provider's domain can be downloaded for the most part at advertised speed, the downloading speed is significantly degraded when the file is located in the Internet cloud beyond India's borders. The cause is the inadequate provisioning of international backhaul links from most Asian countries to the United States. The reason is that international backhaul is three to six times more expensive in Asia than in Europe and in North America. In order to provide broadband at budget prices appropriate for the market without losing money, operators are economizing on the costly input of international backhaul.

As 3G networks get built out and smartphones proliferate, the problem will worsen. In 24 months, Hong Kong saw the data traffic generated by its mobile networks increase by nearly 20 times. As the data tsunami arrives, operators will be hard pressed to provide more international backhaul capacity. As demand increases, prices will increase, unless supply increases commensurately.

Simply throwing more submarine cables at the problem will not help. It is true that the Indian Ocean west of Singapore has fewer undersea cables than the North Pacific or the North Atlantic. But there are chokepoints on both ends of the Indian Ocean, which increase the vulnerability of the cables to cuts, natural or otherwise. The pirate menace has dramatically increased the Europe-bound submarine cables' costs of deployment, maintenance and repair. If India is to consolidate and build on its position as a key business and knowledge process outsourcing supplier, it must provide 99.999 (five nines) reliability. The only way this can be achieved is by supplementing the undersea cables with terrestrial cables in mesh configuration (the three terrestrial cables crossing into Tibet across the Na Thula pass prefigure the solution). This will increase reliability and supply of international backhaul. Increased supply will also lead to reduced prices, if supply outstrips demand.

Where should the terrestrial cables be laid, and who should own them? The Asian Highway, an initiative of the UN Economic and Social Commission for the Asia Pacific (UN ESCAP) to improve

intra-Asian transport connectivity, comes to mind. While the dream of recreating the Silk Route of yore has been around for a long time, it was in 2003 that the Intergovernmental Agreement on the Asian Highway Network came into force. The member countries designate national highways as belonging also to the Asian Highway. Those highways remain under the authority of the national road authorities, but must adhere to classification, design and signage standards as set out in the Agreement. A map of the Asian Highway shows that it is a natural mesh. It connects all the large cities and also covers many locations where undersea cables make landfall. All that is required is an additional annex to the Asian Highway Agreement making a conduit to carry a fiber-optic cable one of the design specifications of the Asian Highway.

Actions to bring down the prices and enhance the redundancy of international backhaul should be part of NTP -11 in some form. In this day and age it is not possible to have effective domestic policy without addressing international policy.

Indicators

A policy must be capable of being assessed in terms of progress made. Indicators of performance must be specified in terms of internationally accepted definitions and capable of comparative assessment, especially in the context of a rapidly expanding sector such as telecom/ICT. The present draft uses indicators to describe past achievements and set targets, but it does not appear that much thought has been given to their specification.

LIRNE*asia* recommends the inclusion of an Annex containing relevant indicators and accepted definitions and a paragraph (inserted as Para 19 in Preamble) on the use of indicators and the GoI's commitment to improving internationally accepted ICT indicators:

> NTP-11 recognizes the need to have accurate indicators of performance toward the objectives and targets set out in this document. They will be based on internationally accepted definitions and procedures enabling benchmarking of progress against peers. The Department of Telecommunications will collaborate with the Telecommunications Regulatory Authority of India to ensure that data are collected using the definitions set out in Annex X and that they are published in a timely manner. It will also actively participate in deliberations at the International Telecommunication Union and the Partnership for Measuring ICT for Development to ensure the development of indicators appropriate for the conditions of the Indian ICT sector.

Improved telecom sector performance may be described in terms of improvements in *connectivity, value for money* (i.e., price and quality of service, which are inter-related), and *consumer choice*. **Annex 2** proposes a set of core indicators, based on availability of comparative data from the International Telecommunication Union for benchmarking. The ITU system has shortcomings. For example, given the dominance of mobile as the dominant mode of voice connectivity indicators of quality of service of mobile voice are what would be optimal. Yet all that is available at the ITU is a fixed network quality-of-service indicator; acceptable mobile or broadband quality-of-service indicators do not exist at present. Consumer choice is an important aspect of sector performance, but no indicator is proposed because no formal indicator exists. Consumer choice may be understood as including at minimum a choice among suppliers and, more broadly, a choice among different bundles

of quality-price attributes. While some national jurisdictions have attempted to provide data on the former,[1] no internationally accepted indicators exist on the latter.

The proposed indicators are taken from, or derived from, the Partnership for Measuring ICT for Development's (PMID)[2] *Core list of ICT Indicators*,[3] read in conjunction with ITU's 2010 *Definitions of world telecommunication/ICT indicators*.[4] They are recommended because they permit benchmarking, or assessment of relative progress. One cannot benchmark without using standard definitions supported by international consensus. The PMID and ITU documents represent the current level of international consensus.

Taxes (Mission, para 32)

The current language, namely "Evolve a framework for financing the sector and streamlining taxes and levies for long term sustainability of telecom sector," is far too generic for one of most important issues in the sector, especially in light of the Budget Telecom Network business model that has enabled the provision of electronic connectivity to hitherto unimaginable numbers of citizens at hitherto unimaginable prices. We recommend that the current para 32 be substituted with the following:

> Create a joint task force comprising representatives of the relevant government agencies and representatives of the telecom operators to study the impact of different forms of taxation (including revenue share and universal service levy) on the prevalent business models and devise a plan for a long-term revenue mechanism that will minimize the impact on investment by operators and ensure stable revenue flows to government.

Broadband definition (Strategies, 1.4)

It is noteworthy that the ITU-UNESCO Broadband Commission has declined to define broadband in terms of single quantitative metric. Leaving that aside, there is a wide gap between what are advertised as broadband download speeds and what are actually delivered. It seems rather futile to increase the theoretical definition of broadband without addressing the gap between advertised and delivered. Further, the reduction of broadband to the one metric of download speed is questionable when other aspects such as latency have a powerful effect on the user experience. NTP-11 should contain a commitment to set up a comprehensive system to regularly measure and publish actual delivery across the country in multiple locations. This publicity, combined with robust competition, will deliver better user experiences than the proposed increase in a theoretical definition that has little connection with what users actually experience. LIRNE*asia* research on the subject is at http://lirneasia.net/projects/2010-12-research-program/indicators-continued/benchmarks/.

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[1] E.g., the FCC provides data, though not easily usable indicators, on availability of choice among suppliers by Zip Code: http://www.fcc.gov/wcb/iatd/comp.html.

[2] An international, multi-stakeholder partnership on measuring ICT for development launched in June 2004. This Partnership aims to accommodate and develop further the different initiatives regarding the availability and measurement of ICT indicators at the regional and international levels. It provides an open framework for coordinating ongoing and future activities, and for developing a coherent and structured approach to advancing the development of ICT indicators globally, and in particular in developing countries. Partners include EUROSTAT, ITU, OECD, UNCTAD, UNESCO Institute for Statistics, the UN Regional Commissions (UNECLAC, UNESCWA, UNESCAP, UNECA), UN ICT Task Force, and the World Bank Group. http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/0,,contentMDK:21035482~menuPK:2888302~pagePK:210058~piPK:210062~theSitePK:282823,00.html

[3] http://www.itu.int/ITU-D/ict/partnership/material/CoreICTIndicators_e_rev2.pdf (revised 2009)

[4] http://www.itu.int/ITU-D/ict/handbook.html

FTTH (Strategies, 1.5)

Everyone will be connected to the Internet wirelessly. In developed-market economies and in densely populated centers, the wireless link will be a few meters (WiFi) with the optical fiber coming quite close to the end user; in most of India, especially in rural areas, the wireless link will span several kilometers. If there is adequate competition in the urban areas and there are no legal barriers to the drawing of cables, there should be no need for explicit encouragement. If there is a need to address high-end connectivity issues it would be better to replace the vague assertions of encouragement with a statement that all buildings containing more than x living units, will be mandated to include fiber cabling as part of the construction, and to require TRAI to draw up regulations on non-discriminatory access the built-in cables by different service providers.

Universal Service Obligation Fund (Strategies, 1.13 & 1.14)

There has been little criticism about the methodology of disbursing USO funds, especially after the discriminatory provisions were removed in 2007. The complaints have been that too much money is being collected and that too little is being disbursed in a timely manner. In this light, it is somewhat surprising that a remedy is offered for a non-existent problem, while nothing is said about those that do exist.

The World Bank has been a strong proponent of universal service funds since the 1990s. Yet, here is what its independent evaluation of the World Bank Group's activities in ICT, states:

> Equity and integration of marginalized groups have been more effectively supported by Bank support for ICT policy and sector reform than by operations specifically designed to achieve these goals. ICT operations that supported reforms to introduce competition into the sector, when successful in supporting those reforms, have had significant impact, especially in access to cellular telephony services. This increase in overall access has had a spill-over effect of providing access to the underserved. Lower tariffs (especially in cellular telephony), falling handset prices, and the expansion of prepaid cellular services are all channels that facilitate access by the poor.[5]

In this light, it would behoove the DoT to reconsider the maintenance of mobile-specific taxes called universal service levies that inefficiently hinder the smooth operation of the Budget Telecom Network (BTN) business model which is what has got the poor connected, in India and elsewhere.[6] Given the much larger base on which the percentage tax is levied, a gradual step down by one or two percentage points every year will still leave the government with enough money to disburse, while reducing the negative effects on the BTN model, and thereby on the poor.

Rights of way (Strategies, 5.3 & 5.4)

It is commendable that language has been included on this most important topic. The current language is, however, rather bland and general. LIRNE*asia* recommends greater specificity on the

[5] http://ieg.worldbankgroup.org/content/ieg/en/home/reports/ict.html (para 4.28)

[6] Samarajiva, Rohan (2009). How the developing world may participate in the global Internet economy: Innovation driven by competition, in *ICTs for development: Improving policy coherence*, pp. 75-118. Paris: OECD. http://www.oecd.org/dataoecd/39/15/44003919.pdf

lines of the following paragraphs, the first dealing with access networks and the second with backhaul networks.

In densely populated areas, the freeing up of rights of way for infrastructure poses many difficulties because of the resistance of private land-owners. Therefore, there is a natural tendency for electricity and telecommunications cables, especially for access networks that directly connect to business and residential consumers, to be laid along and under roadways. The issue here is that in the absence of properly dimensioned conduits that are constructed as part of the roadway, the required digging and covering up results in damage to road surfaces. The ideal solution is for all new and rehabilitated roadways to include conduits and for an entity other than the owner of the roadway to set the rules for accessing the conduit. The rules should be based on the principle of non-discrimination among competitive suppliers (especially relevant to telecommunications) and cost-oriented rates.
In the case of telecommunications backhaul networks (optical fiber), synergies exist not only with highways, but also with railways and high-voltage electricity transmission lines. Poor regulatory enforcement has resulted in under-utilization of fiber optic cables laid by the incumbent public-sector telecom operators and the use of less efficient microwave links by competitors. Regulatory action to ensure non-discriminatory and cost-oriented access to the BSNL backbone network is the first-best solution. The embedding of dark fiber within conduits owned by the agencies with authority over highways, railways, and the grid is a second-best solution. The lighting and the operation, on non-discriminatory terms, of the dark fiber can be concessioned out. This concession will have to be supervised by a third party.

Disaster-related (Strategies, 5.13, 5.14 & 5.15)

The three paragraphs deal with three different aspects related to disasters: 5.13 addresses the need to ensure robustness and resilience of the telecom networks;[7] 5.14 deals with early warning or what can be done before a disaster;[8] 5.15 refers to one aspects of what ICTs can contribute in the post-disaster phase. The three aspects are important, but they could be better formulated.

> 5.13. To set in place incentives for resilient telecom infrastructure through the prescription of building standards, redundancy requirements and insurance and prescribe sectoral ***Standard Operating Procedures*** for effective response during disasters and emergencies. To mandate the maintenance of approved contingency plans by Telecom Service Providers for post-disaster recovery.
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> 5.14. To coordinate closely with relevant government authorities to ensure optimal contribution to disaster risk reduction through early warning. The detection and monitoring of rapid-onset, broad-geographical-coverage disasters such as floods, cyclones and tsunamis is the responsibility of specialized agencies. Given the potential of mobile devices to deliver targeted warning messages through always-on devices, special attention will be placed on their use for public warning.

[7] Please see related work: Srivastava, Leena & Samarajiva, Rohan (2003). Regulatory design for disaster preparedness and recovery by infrastructure providers: South Asian experience, in *Critical infrastructures: State of the art in research and application*, eds. W. A. H. Thissen & P. M. Herder, pp. 103-120. Boston: Kluwer Academic Publishers.

[8] Please see related work: Samarajiva, Rohan (2005). Mobilizing information and communications technologies for effective disaster warning: Lessons from the 2004 tsunami, *New Media and Society* (7(6); 731-47. http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN022464.pdf and Samarajiva, Rohan & Waidyanatha, Nuwan (2010). Two complementary mobile technologies for disaster warning, *Info*, 11(2): 58-65.

5.15. To facilitate an institutional framework and standards for Unified Emergency Response Mechanisms at the state level by providing a single access number for emergency services.

LIRNE*asia* is prepared to provide further clarifications, through email, phone or in person in New Delhi, should the Department of Telecommunication so require.

Sincerely,

Rohan Samarajiva, Ph.D.
Chair and CEO of LIRNE*asia*

Annex 1: Organizational profile

LIRNE*asia* is a regional information and communication technology (ICT) policy and regulation think tank active across the Asia Pacific. Its mission is "to improve the lives of the people of the emerging Asia Pacific by facilitating their use of ICTs and related infrastructures; by catalyzing the reform of laws, policies and regulations to enable those uses through the conduct of policy relevant research, training and advocacy with emphasis on building in-situ expertise". The core focus is on conducting in-depth research and analysis of key policy issues, disseminating that research and analysis to policymakers, regulators, managers of the relevant firms, other stakeholders and the media. Capacity building is a core element of our mission. We have a strong record of accomplishment in conducting policy relevant and successful training programs for a range of stakeholders, not limited to government, in several countries.

LIRNE*asia* is incorporated as a company limited by guarantee under the Sri Lanka Companies Act. It has been in operation since September 2004, with an annual budget in the range of USD one million for the past four years, of which about a quarter is spent on India. It has established a reputation as an independent and effective think tank with several significant achievements, such as contributing through timely and targeted dissemination of evidence towards the lowering of leased line prices in Indonesia in 2007, the removal of regressive elements of a mobile-only tax in Sri Lanka also in that year, the reform of universal service policies in India and the improvement of quality-of-service regulation in India and Bangladesh.

Its CEO was recently invited by the OECD to write a report on how the mobile voice success story could be extended to Internet access and also to present these ideas at the Internet Governance Forum. This work drew on two years of work on explicating the new business models emerging in South Asian mobile voice and in studying the use of mobile for more than voice among the poor in the Asian region. It has developed new regulatory tools for price regulation in micro states, developed and articulated evidence-based positions on universal service levies and funds, and has developed software-based diagnostic approaches to broadband quality of service regulation in collaboration with colleagues at IIT Madras.

LIRNE*asia* has a network of researchers spread across South and Southeast Asia. We are also formally connected to research networks in Africa (Research ICT Africa), Latin America (DIRSI) and Europe (European universities of LIRNE.NET), and as such provide geographically comprehensive research coverage on ICT and telecom policies. More information on the organization including fully downloadable annual reports is available at http://lirneasia.net/about/.

Annex 2: Recommended core indicators, with definitional references

Category	Indicators (with PMID and ITU codes)	Comments
Connectivity	Access paths (fixed line + active mobile SIMs) per 100 inhabitants	Composite indicator that is not included in PMID (2009); addition of fixed/100 people and mobile SIMs/100 people equates different things. OECD uses the composite indicator. May be justified in terms of brevity.
	Five-year Compound Annual Growth Rate (CAGR) of access paths	Indicator that is not included in PMID (2009) or in ITU. It is quite easy to derive, based on existing ITU data. Adds a dynamic component to the static indicator of access paths per 100 inhabitants above.
	Fixed telephone line per 100 inhabitants (PMID A1; ITU 112)	Included in PMID (2009). Mostly accurate but incomplete because it does not differentiate between business, residential and payphone lines; first and second lines, etc.
	Mobile cellular subscribers per 100 inhabitants (mobile SIMs/100) (PMID A2; ITU 271)	Included in PMID (2009). Not accurate as an indicator of connectivity because there is no definition of a mobile subscription (ITU definition is not followed). More correct to describe this indicator as Mobile SIMs/100. It is also inaccurate in depicting connectivity because of prevalence of multiple SIMs, incentives to over-count SIMs, etc., but this is the only universally available indicator of mobile connectivity, in the absence of uniform collection of demand-side connectivity data.
	Fixed broadband Internet subscribers per 100 inhabitants (PMID A4; ITU 4213_tfb + 271_twb)	Included in PMID (2009). Defines broadband as an Internet service of at least 256 kbps in one or both directions, but excludes dialup connections that are declining in significance. Lack of adherence to definition by national authorities makes this a problematic indicator.
	Mobile broadband Internet subscribers per 100 inhabitants (PMID A5: ITU 271mb_access)	A new indicator included in PMID (2009). Defines broadband as an Internet service of at least 256 kbps in one or both directions. Definition states that SIMs capable of broadband be reported, not SIMs that actually are used for broadband. Therefore, a highly problematic indicator.
	International Internet bandwidth per inhabitant (PMID A6; ITU 4214)	Included in PMID (2009). Lack of adherence to definition by national authorities and non-reporting makes this a problematic indicator for benchmarking, but is a usable indicator for individual countries.
Price	Total monthly cost of ownership of a fixed connection in USD	Not included in PMID (2009), but could be developed easily even for benchmarking, using ITU data and OECD method. Some definitional work is necessary because OECD fixed baskets are based on number of calls, not minutes.
	Total monthly cost of ownership of a mobile voice connection in USD (excluding	Not included in PMID (2009). ITU now reports the cost of an OECD low-user basket, less the handset element. If used for single country, may include

	handest and connection charges) and as percentage of monthly per capita income (A9)	1/36th of cheapest available handset cost. Triangulation is possible with Nokia's annual reports that are based on OECD low-user basket and 1/36th of cheapest Nokia handset in each of 77 emerging economies.
	Fixed broadband Internet tariff per month in USD and as percentage of monthly per capita income (A8)	Included in PMID (2009). Lack of adherence to definition by national authorities and non-reporting makes this a problematic indicator for benchmarking, but is a usable indicator for individual countries.
	Mobile broadband Internet tariff per month in USD and as percentage of monthly per capita income	Not included in PMID (2009). May be adapted from A8. Lack of adherence to definition by national authorities and non-reporting makes this a problematic indicator for benchmarking, but is a usable indicator for individual countries.
Quality of service	Faults per 100 fixed lines per year (ITU 143)	Not included in PMID (2009). Reliable indicator when reported, but is decreasing in significance as fixed lines decrease in importance.
	Percent of fixed telephone faults cleared by next working day (ITU 141)	Not included in PMID (2009). Reliable indicator when reported, but is decreasing in significance as fixed lines decrease in importance.
	Mobile indicators not yet developed	
	Fixed broadband indicators not included in ITU documentation	For single-country use QoSE (quality of service experience) indicators across six dimensions and three domains have been developed by LIRNEasia.[9]
Choice	No quantitative indicators exist	An indicator based on FCC method may be developed for choice of suppliers in specific locations.
Investment	Fixed telephone service investment (ITU 83)	Not included in PMID (2009). Reliable indicator when reported, but is decreasing in significance as fixed lines decrease in importance.
	Fixed broadband investment (ITU 87)	Not included in PMID (2009). Should be modified to include fixed wireless broadband investment as well.
	Mobile communication investment (ITU 841m)	Not included in PMID (2009). Includes mobile broadband.
	Foreign investment (ITU 841f)	Not included in PMID (2009). Includes all forms if technology. Best to triangulate with Private Participation in Infrastructure database.[10]
Traffic	Fixed voice minutes of use per month per line (ITU 131m and 1313wm)	Not included in PMID (2009). Rarely reported.
	Mobile voice minutes of use per month per SIM (ITU 113wm)	Not included in PMID (2009). Rarely reported.
	Fixed broadband kbps per	Not included in PMID (2009) nor in ITU. Rarely

[9] Available at http://lirneasia.net/projects/2008-2010/indicators-continued/broadband-benchmarking-qos-20/

[10] http://ppi.worldbank.org/

	month per line	reported.
	Mobile broadband kbps per month per SIM (ITU 133i)	Not included in PMID (2009). Rarely reported.
	SMS per month per SIM (ITU 133sms)	Not included in PMID (2009). Rarely reported.