



Submission on TRAI Note on ‘Model for Nationwide Interoperable and Scalable Wi-Fi Networks’

December 2016

Introduction

IAMA would like to reiterate its support to the underlying objective of the TRAI's efforts at expanding internet access across the country vis-a-vis their various consultation papers as always. The consultation paper is the extension of the consultation paper on "Proliferation of Broadband through Public Wi-Fi Networks" released in July 2016.

Disruptive technologies and applications have enormous potential to accelerate the internet adoption in next 2-3 years making absolute internet connectivity a reality and any form of regulation would destroy the immense benefit it could bring to the economy.

IAMA suggests that the government should not mandate or prescribe any specific Wi-Fi model instead it should focus on creating conducive regulatory environment which propels innovation. Adoption of any form of public WI-FI models should be left to the businesses and other stakeholders. Monetization and revenue aspects of the models should be left to free market economics.

While interoperability challenges (authentication, payments, etc) are barriers in scaling of Wi-Fi services in India, the fundamental challenges are around creating sustainable business models. The liberalizing and easing of existing regulatory regime including the licensing conditions could be helpful in stimulating the ecosystem, bring in investments, improve internet experience and create jobs.

IAMA Submission

1. Interoperability is the Key and should be left to Market Forces

Issues related to interoperability should be left to market forces. If there are business opportunities, the market forces will work towards eliminating interoperability challenges. Furthermore, interoperability will require substantial technical development and is not sufficiently mature for a regulatory mandate.

The widespread deployment of Wi-Fi hotspots and wide area cellular networks opens up the exciting possibility of interoperability between different types of networks. Interoperability allows a mobile device to dynamically use the multiple network interfaces available to it so as to maximize user satisfaction and system performance.

Wireless LAN offers a much higher bandwidth than the cellular network and is also less expensive (often free) to access. Thus, by switching to the wireless LAN from cellular can result in an enhanced Internet surfing experience for the user as well as in substantial cost savings. Further, vice versa may also take place to offload some of the traffic on the WLAN to the mobile network without breaking internet connectivity. All this switching happens transparent to the user - they enjoy smooth network connectivity at all times in accordance with their requirements.

In this paper we illustrate how both cellular and wireless LAN technologies can be combined to exploit/harness the advantages of both technologies to form a unified system. Careful design of pricing, billing and revenue sharing schemes is necessary to ensure the commercial viability of the multiple service providers involved in an inter-operable network setting. We also undertake to illustrate different freemium models, and revenue sharing schemes that can be explored. The paper also states how load balancing can improve network performance in an inter-operable network.

2. Free Public Wi-Fi Business Models and Monetization Options for Different Markets:

In most of the countries the operators have initiated Wi-Fi hotspots at various locations as there is business clarity. In India operators have recently joined the race to provide Wi-Fi under the concept of freemium [Free Premium]. Most of the business models today are highly successful due to such models. The economic logic behind the freemium model is: when supply of a product increases, the demand for its complimentary products also increase. The Success of such models depends on the number of people it attracts to use it.

To build a Wi-Fi infrastructure is less complex than building traditional telecom infrastructure and is as efficient in terms of performance and cost to the consumers. The existing infrastructure such as electricity poles and bus shelters can be used to mount routers and other equipment. This will reduce the operating cost and required investment for a city wide deployment strategy. It should be noted that the initiatives like smart cities and M2M/IoT proliferation would not be possible with only licensed spectrum. For these models to work in India, major change in outlook is necessary for the policy and regulatory bodies.

Following are some of the best case business models adopted worldwide in well established and emerging markets.

Chart- Best case Business Models adopted Worldwide

Markets	Business Models	Monetization Options	Description
Internationally Well Established	Time-Based Model	Pay -as-you-go Access	The operator offers hourly and daily passes for access to its Wi-Fi network
	Free access driving other services		Wi-Fi as another way to deliver providers' own content, including TV programmes, games and news.
	Wholesale access	B2B2C	TSP/ISP Forming partnerships with venue owners so they could propose Wi-Fi networks with a paid or free model to the end customers. The operator shares the investment costs and revenue with the venue partners
	Bundled Wi-Fi Model	Added value for broadband subscription	Bundles Wi-Fi access in all its mobile data broadband tariffs. Single Account gives millions of connection viz., Roaming packs.
	Advertising and sponsorship	Revenue from ads and sponsors subsidizes the cost of access to consumers	Teaming up with the consumer product brands, where Ads display on the landing page.
	Managed services (venues and outdoor)		Offers managed service for public locations that want to provide Wi-Fi to their customers and employees (e.g., coffee shops, hotels, airports, stadiums, railway stations).
	Cellular offload (user driven)	Cost savings with effective Network management. Free Wi-Fi as a customer	Offloads cellular data traffic to Wi-Fi to help alleviate network congestion, lower network operating costs, and reduce (or defer) 3G and 4G capital

		retention strategy	expense (CapEx) investments.
Growing Rapidly Internationally	Cellular Offload [Carrier Driven]	The amount of data used will be billed with the existing data plan or bill. Customer Retention and reduction in subscriber churn	Sells Wi-Fi network access to mobile operators on a per-user or per-MB basis.
	Community Wi-Fi Hotspots	Heavy offloading strategy in congested areas. This is a partitioning model.	Wi-Fi connections at home hubs by enabling users to share their Wi-Fi signals with others.
	Hotspots managed by Venues and Brands	Freemium Models	
	Wi-Fi Roaming Services	Wi-Fi roaming in partnership with other operators on a bilateral basis. Connecting to Wi-Fi networks while travelling is crucial to enable operators to monetize actual and latent demand for mobile broadband access.	There is a demand for Wi-Fi roaming among a broad base of consumers, including those who don't use data at all while roaming for fear of bill shock.
	TV everywhere	It is driven by high quality video, which is dependent on good bandwidth and QoS for premium customers.	TV Everywhere (also sometimes known as authenticated streaming or authenticated video on-demand) refers to a business model which enables customers to watch TV on mobile devices or laptop when they are not at home.
	Big Data analytics		Availability and use of consumer data in real time for promotion, spot discount and mobile ads is captured with relevance.

SOURCE: WBA 2016

Latest Wi-Fi Hotspots Business Models in India

The chart given below shows how some of the Wi-Fi business models that are currently planned out and how the ISPs can retain their subscriber base by transferring the 3G/4G users to Wi-Fi internet while they are in the hotspot zones and also attract new users.

Service Provider	Partner	Business Model Type	Monetization	Coverage	Speed and technology
Airtel	Uber	Bartering	Uber will have Airtel	In-Transit Wi-Fi	4G Wi-Fi

		Model	Money for payment purpose, and the cabs will be outfitted with Internet connections	Mode already launched in Mumbai. Coverage to be pan-India based soon.	
BSNL	Facebook [Express Wi-Fi]	Still working on various business models with local ISPs and entrepreneurs.	Facebook has purchased bandwidth from BSNL. With low cost connectivity solutions and very minimal data pack rates in rural India FB will partner with local ISPs and entrepreneurs.	125 Rural areas will be covered under this plan by 2020	2 MBPS
Railtel	Google	Bartering Model	Railtel has Pan-India 45,000 km Optic fiber network on railway track which Google will utilize to provide Wi-Fi access points.	This will cover 400 stations in total and 100 stations by 2016 end	3G and 4G speed
Airtel Hangouts	Hotels, Hospitals and CCD outlets	Cellular Offload	The amount of data used will be billed with the existing data plan or bill. Customer Retention	100 Hotspots in Delhi	3G and 4G Wi-Fi
Vodafone Offload	Hotels, Hospitals and CCD outlets	Cellular Offload	The amount of data used will be billed with the existing data plan or bill. Customer Retention and reduction in subscriber churn	100 Zones in major Cities	3G and 4G Wi-Fi
Delhi Wi- Fi	Tenders have been awaiting Cabinet Approval	Bundling Approach	The government will pay for actual usage of up to 1GB per month per SIM on actual usage basis or on OPEX. Ad rights Will be held by the Delhi Government only on the free usage.	Hot zones, private and government colleges. In transit Wi-Fi in DTC buses and other Public Transport	[1 GB Free on each SIM for 1 month] with a minimum speed of 1 MBPS ¹ .

Source: ET, HT and TOI

Response to the Questions

Q1. Is the architecture suggested in the consultation note for creating unified authentication and payment infrastructure will enable nationwide standard for authentication and payment interoperability?

Answer: Yes, the architecture suggested in the consultation note for creating unified authentication and payment infrastructure will enable nationwide standard for

¹ <http://indianexpress.com/article/technology/tech-news-technology/delhi-govt-proposes-free-wifi-upto-1gb-for-a-month/>



authentication and payment interoperability. However, the Wi-Fi platform is evolving rapidly with new best in class technologies emerging and revolutionizing the market [Please refer to the annexure]. Several existing and upcoming technologies will define the scale, range, coverage, capacity and throughput. The key technological trends seen in the Wi-Fi market will create new revenue models and more players in the market providing greater access that can transform the internet economy.

IAMA suggests:

1. The government must not mandate or prescribe any specific Wi-Fi model, instead it should focus on creating conducive regulatory environment which propels innovation.
2. Particularly issues related to interoperability should be left to market forces. Defining any country specific architecture or standard takes away the benefits of global developments and best practices from a technology, product and services perspective.
3. The platform should be based on free market economics and the businesses should be allowed to develop and adopt business models freely. The models should not violate the principles of Net Neutrality.
4. Wi-Fi operates over free/unlicensed spectrum over a limited range and should not be treated as an equivalent to mobile services. Arguments of same-service-same-rules do not apply here because licensed service providers have the privilege of using dedicated spectrum in an interference-free eco-system, they also have permission to create/sell backhaul and permission to buy international bandwidth.

Q2. Would you like to suggest any alternate model?

Answer: Various models have been illustrated in this paper. As already stated, adoption of any form of public WI-FI models should be left to the businesses and the stakeholders. Monetization and revenue aspects of the models should be left to free market economics.

Q3. Can Public Wi-Fi access providers resell capacity and bandwidth to retail users? Is “light touch regulation” using methods such as “registration” instead of “licensing” preferred for them?

Answer: Yes, Public Wi-Fi access providers must be allowed to resell capacity and bandwidth to retail users. It is unnecessary to impose regulatory costs and delays on partners in the value chain. To the extent that security is a possible concern, the provider would eventually be using the backend infrastructure of a licensed ISP/TSP and any illegal activity can be traced through that infrastructure. The KYC of the hotspot provider will be handled by using the underlying facilities of the ISP or TSP from whom bandwidth is purchased.

Q4. What should be the regulatory guidelines on “unbundling” Wi-Fi at access and backhaul level?

Answer: There should be no mandatory unbundling of Public Wi-Fi services. Instead, the regulatory requirements that govern Public Wi-Fi need to be relaxed to allow the ecosystem to grow, and let different models to emerge. The idea of unbundling actually limits the possibilities of vertical integration of disparate systems and the goal should be to provide a consistent, high-quality Wi-Fi experience whenever the user is in coverage. The role of an aggregator in this regard becomes critical to integrate public Wi-Fi networks in terms of authentication, accounting, payment and roaming. Backhaul needs to be robust and continue to be provided by ISPs/TSPs.

Q5. Whether reselling of bandwidth should be allowed to venue owners such as shop keepers through Wi-Fi at premise? In such a scenario please suggest the mechanism for security compliance

Answer: Please refer to the answer No. 3

Q6. What should be the guidelines regarding sharing of costs and revenue across all entities in the public Wi-Fi value chain? Is regulatory intervention required or it should be left to forbearance and individual contracting?

Answer: Monetization and revenue aspects of the models should be left to forbearance and free-market forces. Any regulatory intervention prior to any such collaborations/models take off will have a crippling effect. The market should be allowed to determine the sharing of revenue and costs by offering freemium services, advertisements, and offering mobile data offloading and paid Wi-Fi services without impeding the principles of Net Neutrality.

Annexure

I. Key Wi-Fi Technology Trends and Best Practices Globally

The Wi-Fi platform is evolving rapidly with new best in class technologies emerging and revolutionizing the market. These technologies define the scale, range, coverage, capacity and throughput. The key technological trends seen in the Wi-Fi market are, Hotspot 2.0, 802.11ac, emergence of 11ad and 11ax, White-Fi, VoWi-Fi, 802.11n, Google Fi, Wi-Fi aware, WiGig, Wi-Fi direct etc. These technologies will create new revenue models and more players in the market providing greater access that can transform the internet economy. In India, however as seen in the table below most of these technologies require device that can connect to gigabit rates. Here the one of the key challenges is the device ecosystem. In India more than 30% phones do not support Wi-Fi [phones don't have Wi-Fi Chips] let alone the high speed compatibility.²

In many jurisdictions such as France, Hong Kong, Spain, and Japan, option of PPP (Public Private Partnership) model has worked very well. The government usually builds the underlying infrastructure and leases out the network to private entities to provide services. The major capital expenditure is borne by the government, which is recovered gradually in the form of fee for leasing the infrastructure, whereas the private entity only has to invest in the operating expenditure for the infrastructure.

In most of these instances of jurisdictions with well-developed and successful public Wi-Fi networks, forbearance is the leading regulatory approach. The lessee should be chosen through a transparent process and by way of a well thought out qualification criteria. Such lessee should also be subjected to appropriate QOS standards that should *inter alia* include commitment to the principles of Net Neutrality. There should also be a mechanism to monitor the performance of the lessee and hold the lessee accountable in case of default and transfer the lease to another qualified entity through a transparent process in all such cases of default.

Table 7.1- Snapshot of various Wi-Fi Technologies existing and upcoming [Best Practices]

Technologies	Release Date	Frequency Range	Category	Advantages/Specification	Technology presence/in use in India
802.11u [Hotspot 2.0]	2011	2.4/5 GHz	Sim Based Technology based on the protocols of 802.11u.	Mobile Phones automatically connect to the Wi-Fi network once they are in range.	No
802.11ad	2012	60 GHz ISM Band	Multi-gigabit speed wireless communication technology.	7GBPS speed. Short distance and high volume data transfers.	No
802.11ac	2013	5 GHz	Faster Data Rates [at least 500 Mbps @ 5 GHz on a single link and 1gbps for multi-station operation]	802.11ac is a supercharged version of 802.11n works exclusively in the 5GHz band	Yes

² <http://www.businesstoday.in/opinion/interviews/will-have-500000-to-one-million-hotspots-in-india-by-2020-sarin-of-ozone/story/220672.html>

³ <http://www.bullseyetelecom.com/details.aspx?p=8496B07276EB38BF&ppid=149353&beid=65CB6FCEBB503ED5>

802.11ah	2016	sub-1 GHz	Wireless networking protocol/standard that gives at least 100 Kbps @ sub-1 GHz	Low energy/power consumption. It will allow low rate 802.11 wireless stations to be used in sub-gigahertz spectrum.	This standard is yet to be finalized. [Draft Status]
802.11ax	2019	2.4/5 GHz	Upcoming technologies which can provide a speed of 10gbps and will support technology like MU-MIMO[Multi-user multiple input/multiple output]		
802.11ay	2017	60 GHz			
802.11aj	2016	45/60 GHz			
802.11af/ White-Fi	2014	470-590 MHz	This technology allows WLAN operation in TV whitespace/UHF bands.	It has a better range over the other bands i.e., 2.4 and 5 GHz	
Project Loon	2013-14	2.4 and 5.8 GHz ISM Bands	High altitude balloon network operating in stratosphere aka floating cell towers	It is a reliable and cost effective way to beam internet service from sky to ground antennas. The technology will use solar and wind to power the electronic equipment.	The tests to soon begin.
Project- Fi	2015	-	A new intelligent technology which connects to the fastest Wi-Fi or LTE network in an area.	It can connect to two 4G towers at the same time and allow customers to automatically switch between the networks. This can resolve the call drop issues. Most importantly this technology helps you refund the unused data unlike in the current system where the operators charge you in advance for data packs and do not refund or allow carry forward.	No
Wi-Fi aware	-	-	A new technology that allows multiple Wi-Fi devices to communicate with other nearby devices offline.	-	Not yet launched
Li-Fi	2011 ⁴	Uses light waves from LED light bulbs	The technology is called Optical Wireless Communication [OWC]	OWC which uses visible light communication [VLC] or light waves instead of Radio frequencies [RF]. It is proved capable of sending data at speeds of upto 1GBPS, 100 times faster than most Wi-Fi.	No
Pruthvi (Postage Stamp Chip)	2015	Wi-Fi chip that can use TV White Space		All the advantages of TV whitespace Wi-Fi has been listed in the next section under Key Suggestions [Unused Spectrum and TV Whitespace]	Yes, testing stage.

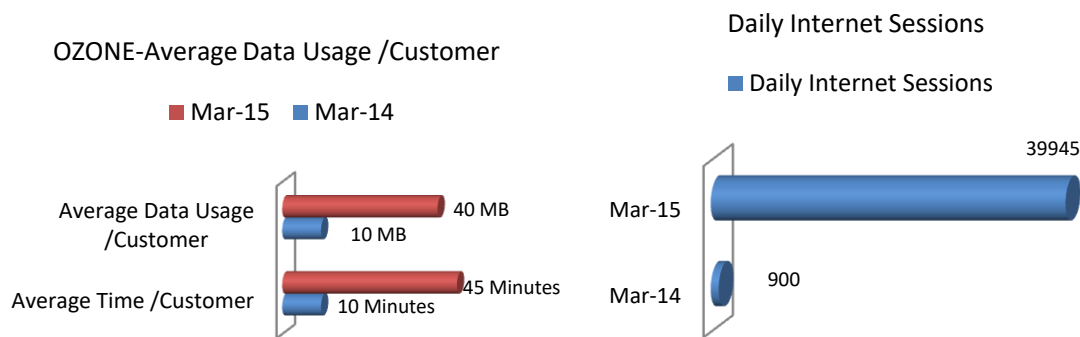
⁴ <http://purelifi.com/wp-content/uploads/2013/09/Shedding-Light-On-LiFi.pdf>

Source: Indian Express, ET and Bulls-eye Telecom

II. Successful Business Cases in India

Ozone Networks

Ozone Networks has been providing free Wi-Fi services at various hotspots from more than a year. The key for successful business model has been based on seamless authentication which has provided ease of access to large number of Wi-Fi users in India. It has over 7000 hotspots⁵ [1400 are Public] located across the country in various restaurants and Airport. With Free Wi-Fi deployment Ozone networks have been able to achieve increase in data usage and tremendous increase in the daily internet session by almost 44 times in one year. The ISP provides the first 30 minutes of usage free to the users and then with pay as you go packages. This allows many users to download the content in the free time period and use it offline.



Source: ET Bureau Feb 2015

Mera Internet Programme⁶

Telxess with support from Ford along with the technical and ISP Partner DVOIS Broadband planned and designed a Wi-Fi Network to provide wireless Internet access, with a coverage target of 1200 marginalised households for all residential, local businesses, SHG's and other establishments that will receive Wi-Fi signals 24x7 in Mahatma Phule Nagar.

The project named 'Mera Internet' (My Internet) is the Wi-Fi network that has the common open areas of turned into a Hot Spot with Internet Access available to the residents Free of Cost. 778 users have been registered till January 2016, using on an average 15 mbps capacity of Internet bandwidth each month. Network performance has been reported at 99.5% uptime.

Knowing that most of the residents have never used computers and will need to be trained, a significant component of the project is dedicated to capacity building. This is being enabled through the setting up of the Swabhiman Internet Kendra, in the vicinity, where computers will be installed and all interested residents will be trained in batches and certified in the use of computer basics, useful applications and Internet. They will be exposed to the information highway and the myriad benefits which Internet can bring to their lives. 730 first time Computer and Internet users have been trained at the center till

⁵ http://articles.economictimes.indiatimes.com/2015-02-26/news/59541473_1_hotspots-rajan-anandan-internet-economy

⁶ http://telxess.in/?page_id=57



end January 2016. Certification is offered after 2 months of classes conducted with a specially designed interactive curriculum offered in three different language choices.

Uniqueness of the Project: The project has been successful in creating first time internet users with the help of Wi-Fi hotspots which enables economically backward 'slum' consisting of 1200 plus households with nearly 4000 residents, who are trained in the use of computers and Internet.