



Reliance Jio

Infocomm Limited

RJIL/TRAI/2016-17/487
24th August 2016

To,

**Shri Arvind Kumar,
Advisor (Broadband & Policy Analysis),
Telecom Regulatory Authority of India,
Mahanagar Doorsanchar Bhawan,
Jawaharlal Nehru Marg,
New Delhi - 110002**

Subject: Comments on TRAI's Consultation Paper on 'Proliferation of Broadband through Public Wi-Fi Networks' (Consultation Paper No. 14/2016 dated 13.07.2016).

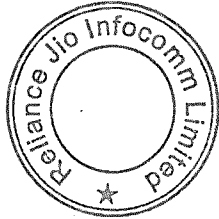
Dear Sir,

Please find attached comments of Reliance Jio Infocomm Limited on the issues raised in the Consultation Paper on 'Proliferation of Broadband through Public Wi-Fi Networks' (Consultation Paper No. 14/2016 dated 13.07.2016).

Thanking You,

Yours sincerely,
For **Reliance Jio Infocomm Limited,**


Kapoor Singh Guliani
Authorised Signatory



Encl.: As above.

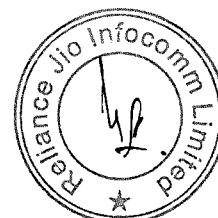
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RJIL Response to the TRAI Consultation paper on
“Proliferation of Broadband through Public Wi-Fi Networks”

General Comments:

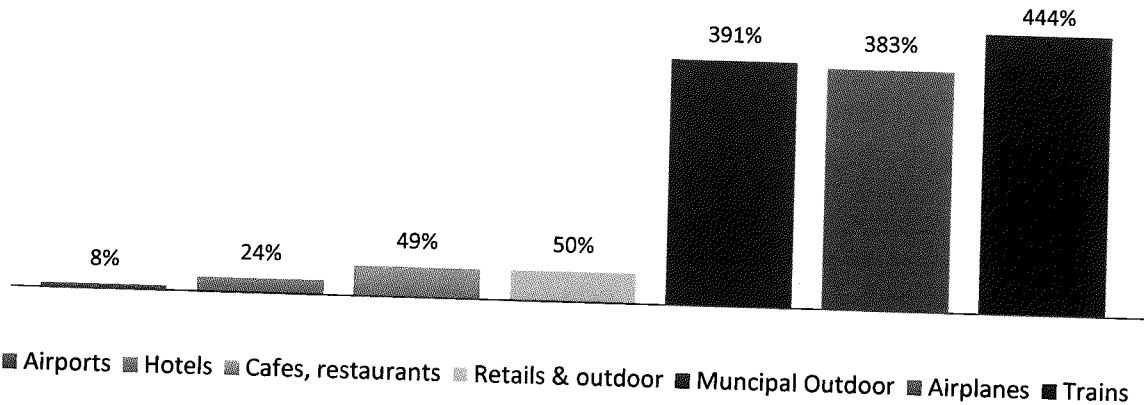
1. At the outset, we thank TRAI for issuing this consultation paper to discuss the possibilities and role of Wi-Fi in proliferation of broadband. The Consultation paper rightly covers all the relevant issues pertaining to Wi-Fi Networks and has discussed and sought solutions of various challenges faced by Wi-Fi service providers impacting its growth and proliferation. We appreciate the Authority’s continued efforts in seeking to explore possibilities for proliferation of broadband in line with the national goals.
2. We believe that mobile internet is redefining and impacting all aspects of human life, with adoption across sectors including government, healthcare, education, entertainment and trade and Wi-Fi is an integral enabler in the scheme of things. Wi-Fi networks are unique because of ubiquitous nature, cost effectiveness, connectivity with multiple devices, and creation of WLANs.
3. Wi-Fi networks are widely used to connect a variety of devices, not only between themselves but also to the Internet. Almost all modern laptops, tablets, and mobile phones are Wi-Fi capable. It is very convenient and allows you to connect to the internet almost anywhere thus Wi-Fi is in fact the bed rock for development of Internet of Things.
4. The dismal stats of Internet and especially broadband penetration in India implies that all means of provisioning broadband need to be supported by the Government. Further the success of Government programs like Digital India and Smart Cities depends on broadband proliferation and considering the role Wi-Fi is capable of playing in that regards, the Government should come out with enabling policies to facilitate Wi-Fi networks at the earliest.
5. The vision areas of Digital India program include digital empowerment of citizens, which will inter-alia include universal digital literacy, universally accessible digital resources, all documents/ certificates to be available on cloud, availability of digital resources/ services in Indian languages, collaborative digital platforms for participative governance and portability of all entitlements through cloud. By the virtue of simplicity and ubiquitous reach, Wi-Fi will play a major role in achieving the vision of Digital India.
6. Internationally, Public Wi-Fi hotspots are playing a stellar role in delivering broadband to people. The demand for public Wi-Fi is increasing at a great pace. The need for ubiquity and demand for high quality from users is likely to further drive the growth of public Wi-Fi hotspots, as per Maravedis Rethink report. The number of Wi-Fi Hotspots are set to



increase at a CAGR of 63.4% from 2014 to 2018. The density of Wi-Fi Hotspots will also increase from 1 hotspot for 150 people to 1 hotspot for 20 people.

7. International experiences tell us that the location plays a critical role in development of Wi-Fi hotspots and the consequent proliferation of broadband. Large venue such as stadiums and shopping malls, Airports and other travel hubs, Connectivity on board transportation, Cafes, bars and restaurants have generally seen larger growth of Wi-Fi hotspots on their own.

%age Increase of Hotspot Venues from 2013 - 2018



8. Various challenges are being faced in proliferating Wi-Fi in less dense and preferred locations. For covering such locations, appropriate policies enabling monetization should be put in place. The main monetizing strategies and trends observed internationally are detailed below:

- a. **Leveraging Voice over Wi-Fi:** The role of voice over Wi-Fi (VoWi-Fi) cannot be lost in monetizing Wi-Fi zones. This reduces the cost and provides better quality of service to customers. In fact, Netherlands became a Wi-Fi-first and Wi-Fi-only telephony services country. Internationally there is increased focus on VoWi-Fi services, organizations like Liberty Global subsidiary UPC and Ziggo have developed and launched free downloadable apps to use a growing number of Wi-Fi spots for voice.
- b. **Leveraging bundled services:** Another aspect is the monetizing Wi-Fi services by offering these as a bundle offer with other services. Time Warner Cable is offering bundled access of public Wi-Fi service along with their broadband or mobile services in U.S.A
- c. **Leveraging cellular/LTE data offload:** Cellular/LTE Data offload is another major source of revenue for Wi-Fi services. Interoperability with Cellular/LTE networks ensures that the subscribers can use the cheaper Wi-Fi data service while reducing the congestion at the Cellular/LTE networks.

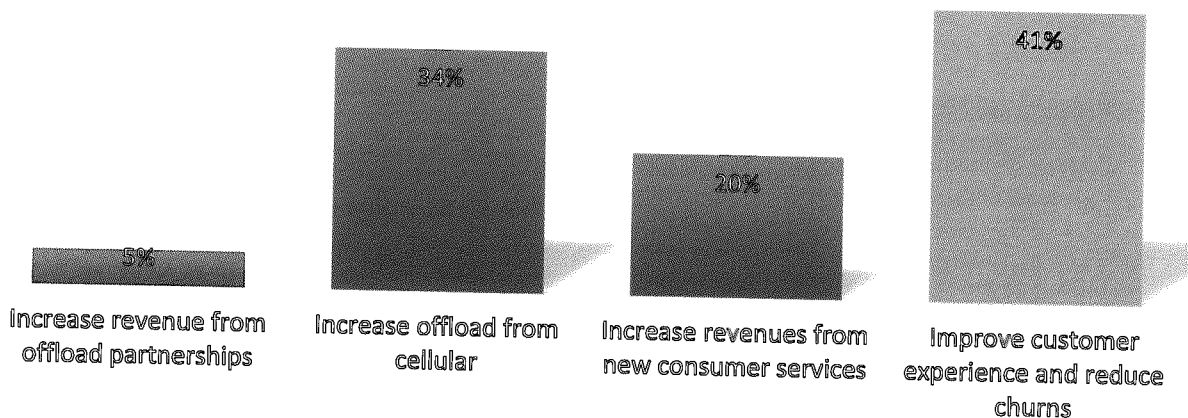


- d. **Location based services (LBS) & Personalization:** Geo-Targeting and Geo-Fencing the users allows to push personalized communication to the users. This channel of highly personalized advertisements, promotions, tariffs and services can be sold to OTT players. For Example: Btwifi, Boingo and Purple WiFi (as used by Telstra-Australia).
- e. **Data Analytics:** The analytics and insights reports can be sold to merchants looking forward to do very targeted communication for their customer base, on the basis of the data consumption habits and other demographic and psychographic behavior.

Interoperability of the LTE/Cellular networks to ensure seamless data offload and to ensure seamless transition from VoLTE to VoWi-Fi, bundling of traditional services with Wi-Fi, permission to sell data analytic with consumer consent, are the major factors behind the success of Wi-Fi hotspots internationally and same needs to be replicated in India.

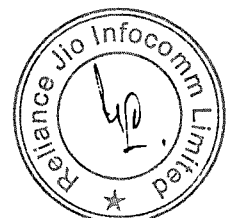
- 9. The primary business drivers for the adoption of Wi-Fi networks and increasing investment in deploying Wi-Fi hotspots are, Improve customer experience and reduce churn; Improve offload from cellular; increased revenues from new consumer services; and increased revenues from offload partnerships.

Top business drivers



Source: iPass/Maravedis-Rethink

- 10. Another globally successful concept which needs quick adoption in India is the city-wide models of public Wi-Fi. Internationally it is finding high adoption. These models can take various shapes, however on the basis of funding and financing these can be categorized into 3 type of models:



- a. **Complete Public Funding:** These projects are completely funded by municipal or state governments. Examples are Taiwan, Barcelona Macau, Tel Aviv, Perth and Adelaide.
 - b. **Public Private Partnership:** Municipalities partner with network providers, ISPs and/or advertisers to help fund Wi-Fi. Freemium' model is deployed, allowing users to upgrade to a paid account and receive increased access is most prevalent. Here the ISP has an incentive to offer a certain amount of free access in exchange of new paying customers. Examples are Hong Kong, Amsterdam
 - c. **Complete Private Funding:** Private Service Provider funds the complete project in lieu of use of city owned assets , spaces and rights of way to provide a for profit service. Advertisements in public places is the most common way of monetization. Examples are Seoul, New York.
11. In Indian context there are many other issues hampering the growth of Public Wi-Fi, which needs to be addressed, including the issues related with consumer experience while authentication, the issues related to payment mechanisms, Issues relating to absence of standards to promote interoperability in Cellular/LTE and Wi-Fi. Our suggestions with respect to these issues are detailed in the **issue-wise comments**. In conclusion we are summarizing the areas needing Authority's intervention.

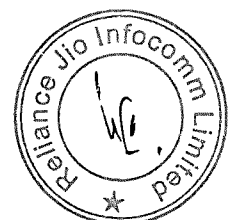
Conclusion:

The success and proliferation of public Wi-Fi networks is critical for proliferation of Broadband. The Authority may facilitate the same by means of following interventions.

1. Promote seamless interoperability of Cellular/LTE and Wi-Fi.
2. Simplify the customer authentication issues.
3. Promote the concept of City wide Wi-Fi networks.
4. Facilitate suitable payment mechanisms.

Issue wise comments:

Keeping above in view, our response to the various questions raised in the consultation paper are provided seriatim in this paper



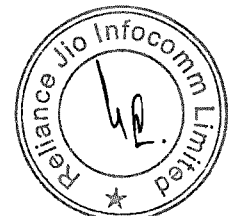
Q1. Are there any regulatory issues, licensing restrictions or other factors that are hampering the growth of public Wi-Fi services in the country?

RJIL Response:

1. RJIL believes that, per se, there are no licensing restriction in provisioning the Wi-Fi services. The Wi-Fi services are provisioned over unlicensed spectrum bands and therefore there are no additional cost implications.
2. However there are certain basic issues hampering the proliferation of broadband, which also impact the rollout of Wi-Fi service. For instance, the ROW policy is major bottleneck, which is hampering all aspects of broadband proliferation, we understand that the Government is working out on a uniform ROW policy, however the sooner it gets implemented, the better it will be. Rollout of Wi-Fi Service requires both deployment of Wi-Fi Access Points and related equipments as well as the "last mile" connectivity of the Hotspot location to the service provider core network. Rollout of Last Mile is expensive due to the expenses required to obtain Right of Way, and is also time consuming due to delays in permissions and approvals. This can only be addressed by the uniform ROW policy across the country/state.
3. Additionally, there are certain regulatory factors in the realm of consumer experience which are hampering the growth of public Wi-Fi services in India.

The Indian consumer, at least in cities, is well versed with the features and benefits of Wi-Fi and how to access Wi-Fi. However the Wi-Fi experience is hampered by the archaic instructions on provision of Wi Fi services under delicensed frequency bands dated 2009. Taking into account the subsequent developments, the clauses which need to be amended are as follows:

- i. Clause I (a) (iii) of the DoT instructions dated 23.02.2009 states that Licensee shall ensure that unique user ID and password do not have provisions for simultaneous multiple logins. We wish to bring to Authority and Government's notice that this instruction in its current form has become subscriber unfriendly. For instance a user desirous of using Wi Fi on both his laptop and smartphone would be constrained to use only one device as he can generate only one username password using his mobile number. Currently more and more users are using multiple devices and are consequently hampered by this instruction. Thus this restriction needs to be removed.
- ii. Clause I (b) of the aforementioned DoT instructions states that the Licensee of Franchisee shall register the subscribers for providing temporary login ID and password for the use of public Wi Fi spot through either of the two methods detailed below.



- a. Retaining a copy of photo identity of the subscriber with Licensee which shall be preserved by the Licensee for a year
- b. Provisioning of Login-ID and password through SMS on subscriber's mobile phone through automated process and keeping mobile number of subscriber as the identity of the internet subscriber with reference to Login – ID for a period of one year. In such case photo identity may not be necessary.

However, the instructions do not specify the validity of "Temporary Log-in password". The time period for the temporary log in credentials has been implemented differently by various service providers in practice with large variations. We request the Authority to clearly define the time period under the temporary log-in. **We understand that as the Licensor has mandated to maintain the CAF and POA/POI documents of the subscribers for a period of three years post his mobile number deactivation, the temporary log in password may be allowed for a period of three or 6 months and post that the subscriber may be asked to re- verify his/her credentials.**

- iii. Clause I (b) (ii) of the aforementioned DoT instructions provides the second method of registering the subscriber by provisioning of Log-in ID and password through SMS on subscriber's mobile phone through automated process.

However, it is not specified whether this method of registration is to be used for international mobile numbers as well. As per our understanding there is no risk in allowing this for international numbers as the subscriber would be already latched on an Indian network under international roaming to receive the SMS and the license agreement provides that the Indian Company shall endeavor to obtain traceable identity of roaming subscribers from the foreign company as a part of its roaming agreement.

4. Other key factors in the Regulatory/licensing domain that are hampering the growth of public Wi-Fi in India are as follows:
 - i. **Absence of Regulatory support: AGR fee Waiver on Wi Fi Related Revenues, Incentives for deployment**

Public Wi-Fi is often perceived as a free service by end customers in India and hence very few upgrade to a paid service. Due to which Internet Service providers are invariably under pressure to price the paid service at levels which don't support profitability. Moreover, they are not able to generate requisite scale to generate returns. Owing to this lack of direct monetization potential of services in the present market structure, Service providers need to develop alternate sources of revenues



riding on Public Wi-Fi hotspot services (e.g. Mobile Advertising, Location based analytics etc.) to make the business case profitable. Hence, in order to develop a viable business case for Public Wi-Fi, there is an immediate need for differential treatment of revenue generated from Telecom/Internet services and Wi-Fi hotspot services, and License fee waiver on the Income generated through Public Wi-Fi networks.

ii. **Lack of Licensing regime enforcement**

While the WiFi services should be provided only by licensed telecom service providers, there have been cases where it can be seen that some non-Telecom players set up Hotspots and offer Wi-Fi as a complimentary service. Such practice should be discouraged with effective licensing regime enforcement.

Addressing of these issues will help improve the ease of using Wi-Fi and consequently increase proliferation of broadband through Wi-Fi.

Q2. What regulatory/licensing or policy measures are required to encourage the deployment of commercial models for ubiquitous city-wide Wi-Fi networks as well as expansion of Wi-Fi networks in remote or rural areas?

RJIL Response:

1. One of the primary issues hampering the development of a commercial model is the mindset issue. There is a strong perception in the Indian context that Wi-Fi Hotspot services are always free. This is a great barrier to be crossed if Wi-Fi Hotspot are to be made commercially viable. There is little or no take off for "paid" Wi-Fi due this 'Free Wi Fi' mindset. Most of the times the consumers are oblivious of the fact that the Wi Fi is sponsored by someone due to which the service is free for use. This awareness needs to get created.
2. To directly monetize from the subscriber will always remain a challenge in India, and the indirect monetization as discussed in the Consultation Paper will always be insufficient to support the ubiquitous city-wide Wi-Fi networks, owing to the size and population density of our cities. Thus the deployment of a ubiquitous city wide Wi-Fi network by a Service provider in urban/rural areas will not take place until and unless the business case becomes attractive. This is analogous to Telecom Towers industry.
3. A faster approach would be to encourage the deployment of such networks through private sector participation and treat every city/regions network as 'Infrastructure projects'. The framework for the same can be based on the very successful 'B-O-O-M' and 'B-O-T' models employed by NHA for Road projects in the country. This design will be a sure success in top Metros and Tier-1 cities. Under this model, DoT/TRAI can be the nodal agency which will run the Bidding process and define the governance framework, with local Municipal Corporations/State Governments and private player (Service



provider/Telecom Infra player) as the joint stakeholders. The private player will deploy capital and take responsibility for network creation and O&M, local government body can pool in 'Right-of-way/Access' providers. The private players will be selected on the basis of quoted tariff to be charged from end users (just like in the case of Toll Road projects/Metro rail projects), and they will earn returns from the same.

4. In case of Tier-II and Tier-III cities and semi urban/rural areas which will have lower attractiveness for private network developers, the above model can be deployed with a tweak wherein with Union/State Government supports the private player in the form of 'Viability gap funding (VGF)' – which can be derived from the USOF.
5. In order to have a sustainable long-term Wi-Fi offering, Service Providers have to start charging beyond a certain limit of Complimentary Usage. One major challenge is availability or lack of payment options to customers. Current available payment modes like online recharge or through physical voucher distribution are commercially not viable because of the inherent disadvantages like security, inventory management, etc. Hence, it is recommended that a common payment platform be created by which the Service Providers can use all Payment Bank / Mobile Wallets and enable customers to make "small ticket" payments and consume Wi-Fi services on the go.
6. Another alternative could be to allow Service Provider sell high-speed services (over and above the basic free Wi-Fi) at a premium when compared to usual Wi-Fi speeds but at price lower than Cellular data charges. Several Government Tenders are either silent in this regard or do not provide this option. Need clarity on such offerings so that the Service Provider can provide Quality Service to customers and generate revenues to make Hotspot Rollout viable.
7. Service Providers can also monetize the Wi-Fi Real Estate like Portal Pages and earn revenues through advertisements and sponsorships. But since the Service Providers are governed by AGR rules, even these revenues from non-connectivity services are also being taxed at the same rate. We need to create transparent policy guidelines on taxation of these type of revenues so that Wi-Fi hotspot rollout can be made commercially viable

Q3. What measures are required to encourage interoperability between the Wi-Fi networks of different service providers, both within the country and internationally?

RJIL Response:

1. Interoperability in the context of Wi-Fi services has two aspects. One is the interoperability between different Wi-Fi networks so that the subscribers of one network can seamlessly move to another network, this is presently taken care of by the roaming arrangements between the Wi-Fi service providers. These are commercial arrangements on reciprocal basis. As the proliferation of Wi-Fi is the primary concern,

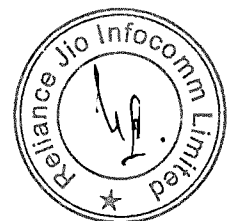


the Authority shall focus on increasing the number of hot-spots and the number of frequent users of Wi-Fi and let the market forces take care of the interoperability between Wi-Fi networks. However, if required the following measures can be implemented to encourage interoperability in between different Wi-Fi networks:

- i. Standards based Wi-Fi interoperability may be implemented, wherein authentication can be done with the end user's incumbent/home operators' HLR/AAA while the Wi-Fi service may be provided by visited/guest network. (On the same lines as cellular roaming).
 - ii. Open SSID roaming across operators may be encouraged similarly. (Using Hotspot 2.0 or a new Indian standard)
 - iii. Use of a standardized app may be encouraged for secure, frictionless authentication across public Wi-Fi service providers, which can be downloaded and users can register with their identity. This app will be handy for International users also.
 - iv. All the Wi-Fi Network Operators should be mandated to periodically upgrade their network to the latest releases and standards and there by support inter-operability between the network elements. This up gradation to support the latest 3GPP/IEEE standards can be monitored by Regulatory authorities, if required.
 - v. Considering the requirements of location based service using standard operating procedures and to have low cost, carrier grade location based service, standard need to update the legacy radius and diameters attributes now with additional information like AP-group-name and SSID information in called station ID in standard format. This will not only give low cost infrastructure by avoiding triangulation methodologies but also ease regulatory to track subscribers. Further, with mentioned changes in standards, Multiple Vendors can work and provide low cost LBS services to other Wi-fi operators.
2. The other aspect is the interoperability of devices, this is already taken care of by the Wi-Fi alliance, while issuing certification under their trademark Wi-Fi certified. The website of the Wi-Fi alliance states that

"Wi-Fi CERTIFIED™ is an internationally-recognized seal of approval for products indicating that they have met industry-agreed standards for interoperability, security, and a range of application specific protocols.

Wi-Fi CERTIFIED products have undergone rigorous testing by one of our independent Authorized Test Laboratories. When a product successfully passes testing, the manufacturer or vendor is granted the right to use the Wi-Fi CERTIFIED logo. Certification means that a product has been tested in numerous configurations with a



diverse sampling of other devices to validate interoperability with other Wi-Fi CERTIFIED equipment operating in the same frequency band.”¹

Q4. What measures are required to encourage interoperability between cellular and Wi-Fi networks?

RJIL Response:

1. Interoperability in Cellular/LTE and Wi-Fi is extremely important and relevant in view of the tremendous expansion in data being transmitted over the Cellular/LTE networks. The interoperability will allow the mobile devices to dynamically use the multiple network interfaces available to it so as to maximize user satisfaction and system performance.
2. This will also provide the consumers access to the innovative and new technologies like seamless data offload, Wi-Fi calling, Fixed-Mobile convergence. The networks of the future are the IP networks which will facilitate the interoperability. Wi-Fi being the predominant wireless Internet access technology, and its ubiquity and accessibility will make it a critical part of mobile service provider’s strategy to extend the user experience of VoLTE into areas where cellular coverage is poor or capacity is limited, especially indoors. According to the Wireless Broadband Association, an estimated 60 percent of carrier network traffic will be offloaded to Wi-Fi networks by 2017. And with over 1 billion VoLTE subscriptions expected by 2019, the importance of interoperability in Wi-Fi and LTE is that much more significant.
3. In view of the above the interoperability in LTE/Cellular and Wi-Fi networks needs to be promoted and in order to facilitate the interoperability, following measures may be mandated:
 - i. Suitable co-existence mechanisms such as Listen-Before-Talk (LBT) should be mandated for any technology using unlicensed spectrum. Also, arrangements need to be built where billing mechanisms for cellular and Wi-Fi providers can be made to talk to each other, which can eventually translate into customers being billed for Wi-Fi usage through their mobile phone bills, this will also increase the adoption of Wi-Fi, as explained in the subsequent responses.
 - ii. Provisions should be made to perform Voice Offload from cellular radio to third party Wi-Fi using technologies like Voice over Wi-Fi

¹ <http://www.wi-fi.org/certification>



- iii. It should be mandatory to upgrade all the cellular network elements to support the latest 3gpp standards 29.274, 24.302
- iv. It should be mandatory to upgrade all the Wi-Fi network elements to support the latest 802.11 standards like 802.11ac
- v. As discussed earlier the Voice over WiFi is new technology which is driving the WiFi consumption internationally, and suitable measures should be taken to promote this technology in India.

Q5. Apart from frequency bands already recommended by TRAI to DoT, are there additional bands which need to be de-licensed in order to expedite the penetration of broadband using Wi-Fi technology? Please provide international examples, if any, in support of your answer.

RJIL Response:

1. The untapped benefits and potential of Wi-Fi as elaborated in the previous responses, makes the unlicensed spectrum for Wi-Fi a critical important and valuable resources. Internationally, the effective utilization of the unlicensed 2.4 GHz and the 5 GHz bands has helped deliver significant benefits and economic value. The Wi-Fi Alliance believes that the innovation in Wi-Fi has led to it delivering higher-performance connectivity and carrying more data traffic than cellular networks. Wi-Fi data rates have advanced from 11 Mbps to exceed 1 Gbps – and continued innovation will deliver Wi-Fi data rates exceeding 5 Gbps within a few years. The fact is that the growing worldwide demand for connectivity cannot be supported without Wi-Fi.
2. However, to support all that sufficient unlicensed spectrum is a basic requirement. In India, as of now only two channels (i.e. Ch. 169 & 173) are available for outdoor use in 5 GHZ band. There is a need to allow other channels as well which can be used for indoor purposes. Another strong reason that supports the case for opening other channels is that there are no/few client devices supporting Ch. 169 & 173.
3. Other channels that can be delicensed such as UNII-2C & UNII-3 (Ch. 100 to Ch. 144) bands, which are delicensed in countries such as the US. Spectrum for new technologies such as 802.11ad may be made unlicensed.
4. Further, considering the important development in the Internet of Things (IOT), many machine-to-machine sensor applications require extremely low-cost devices with long battery life, wide area communications range and low-cost network platforms. To help support these devices and applications the Authority can also think of identifying additional low Frequency Wi-Fi bands to cover large area in lower cost per bit. These unlicensed bands will help support IOT in field of Defence, Agriculture, Industries and Education by leveraging the inherent advantages of lower frequencies i.e. better a long penetration and in-building access.



5. TRAI had earlier recommended that more unlicensed frequency bands may be released to augment the Wi-Fi services however no action has been taken so far. TRAI had also recommended for light touch regulation of E-band and V-and frequencies. Both these frequencies can be deployed to support the deployment of Wi-Fi services.
- i. The V band is the range of radio frequencies from 57 to 64 GHz. The V band is not heavily used, except for scientific research. The Wi-Fi standard IEEE 802.11ad will run on the 60 GHz (EHF microwave) spectrum with data transfer rates of up to 7 Gbit/s.
 - ii. E band is the range of radio frequencies from 71-76 GHz and 81-86 GHz in the electromagnetic spectrum, E-Band works in high frequency microwave band (80GHz); it provides large spectrum to support over 2.5Gbps ultra high capacity. It can be deployed as the complement to fiber or as kind of LTE high density backhaul network.

As we understand, in the modern high speed 4G networks the role of Wi-Fi will be huge in addition to tremendous backhaul requirements. Therefore a non-onerous licensing framework for the allocation of spectrum in V and E band is the need of the hour. We request that a light touch regulatory framework for E band and V band may be promulgated taking into consideration the complementary nature of these bands to WI FI, FIBRE and LTE and their backhaul capabilities.

Q6. Are there any challenges being faced in the login/authentication procedure for access to Wi-Fi hotspots? In what ways can the process be simplified to provide frictionless access to public Wi-Fi hotspots, for domestic users as well as foreign tourists?

RJIL Response:

1. There are many challenges that are faced by users while authenticating at a Wi Fi hotspot. Most of these have been noted in the Consultation paper as well.
 - a. Unavailability of permanent log-in credentials
 - b. Delays/ non delivery of OTP for authentications
 - c. Login issues faced by foreign tourists due to international mobile phone numbers etc.
2. As discussed in the response to previous questions, the login/authentication modes for access for public Wi-Fi networks is not consumer friendly. For any service provider planning for a ubiquitous public Wi-Fi networks, the temporary log-in credentials will not be effective to help proliferate the use of Wi-Fi and consequently that of



Broadband. The Authority should endeavor to ease the access to Wi-Fi Hotspot services with a single click login. This can be done through enablement of online creation of permanent user ID for Wi-Fi Hotspot access using Aadhaar, PAN Card and Passport for foreign nationals or other approved KYC products like Banking or Payment / Wallet App. There should be a possibility of auto-login with a single click on entering a Wi-Fi zone of your preferred service provider. A Wi-Fi App can also be developed over a period of time which can be operator agnostic and can act as a common resource across Wi Fi providers. This will increase Wi-Fi usage and reduce the burden on already too congested licensed mobile networks.

3. In order to remove the unnecessary inconveniences in log-in/authentication, we suggest the following measures.
 - a. **CAF/Digital CAF based authentication:** For this the Wi-Fi services provided can be split into two categories, viz. Wi-Fi service provider is a Access Service Provider (ASP), Wi-Fi service provider is a non-Access Service Provider (non-ASP).
 - i. **Wi-Fi service provider is a ASP:** For the log-in/authentication in Wi-Fi zones provided by such ASP, its own mobile subscribers may be required to create a one-time online login credentials using the mobile number of the subscriber. Post that the login credentials created shall remain valid till the time the TSP retains his/her customer application form (CAF) documents and is able to produce the same for any lawful requirement.
 - ii. **Wi-Fi service provider is a non-ASP:** For Log-in log-in/authentication in Wi-Fi zones provided by different ASP and non-ASP the Wi-Fi subscriber should be allowed to create a permanent log-in credentials by filling a digital online verified Wi-Fi CAF. The validity of this login credentials shall also remain till the service provider retains the CAF details and is able to produce the same for any lawful requirement.
 - b. The current practice of provisioning a temporary log-in created using a mobile number and password sent to that mobile number shall also be continued with. However the validity of such log-in credential shall be kept at 3 or 6 months.
4. On the similar lines of Google /Android device mapping with google account , a central database mapping of devices with SSN number in US or Aadhaar in India, can ease roaming and provide seamless authentication.
5. One Log in credential shall have the facility of multiple log-ins however, it should be incumbent on the service providers to clearly and unambiguously spell out to the subscriber his responsibility to ensure only bonafide use and possible security risks in sharing credentials along with the list of prohibited activities.



6. The international travelers using international mobile numbers shall also be allowed to generate temporary log-in credentials to use Wi-Fi, while travelling to India. These credentials may be of temporary nature only and in case of requirement of longer duration log-in credentials, the maximum validity should be co-terminus with Visa expiry.
7. Adoption of EAP-AKA at Access Points - In this the roaming user gets automatically authenticated when he /she selects the SSID.
8. Hot Spot 2.0 - Hot Spot 2.0 (HS 2.0), also called Wi-Fi Certified Pass point, is a new standard for public-access Wi-Fi that enables seamless roaming among WiFi networks and between Wi Fi and cellular networks. HS 2.0 was developed by the Wi-Fi Alliance and the Wireless Broadband Association.
Upgrading to Access Points to support EAP-AKA and Hot Spot 2.0 technologies This is also required

Q7. Are there any challenges being faced in making payments for access to Wi-Fi hotspots? Please elaborate and suggest arrangement which will offer frictionless and secured payment for the access of Wi-Fi services.

RJIL Response:

1. The development of a successful and trustworthy payment mechanism is a prerequisite for take-off of Wi-Fi networks. However, as cited in the consultation paper the proportion of customers willing to pay for public Wi-Fi is negligible when compared to the free users. The key challenges with the current payments systems are as follows:
 - a. Low penetration of online payment options such as credit cards, net banking and mobile wallets.
 - b. Users are not very comfortable using their credentials on public networks causing a further bottleneck for online payments due to security concerns and fears of Eavesdropping and hacking of PIN
 - c. Availability and logistical issues with physical vouchers
2. There are certain measures can help address the payment issues.
 - a. The Wi-Fi data charges can be billed/debited along with mobile/fixed line charges from a CAF customer.
 - b. For Non-CAF customers with log-in credentials generated using OTP. When a customer uses a certain amount of data it gets included in his cell phone bills, however this will require a rather complex arrangement where the Wi Fi providers will have to make arrangements with TSPs, and majority of mobile subscribers being prepaid, real time



deductions will be required. The TSPs can be paid a percentage of the revenues/ a fixed fee for facilitating this arrangement.

- c. Introduction of a Wi-Fi Usage Points/Credit Wallet- This method would be dependent on an arrangement among Wi Fi providers. An agency can be created that would allow users to create wallets that can be charged online and will hold units called "Credits" or "Points". Customers can charge their wallets online from personal internet connections or from physical kiosks/ establishments created for facilitating this. Such kiosks can be created across high usage spots, usually airports, malls, railway stations etc. Customers will then be able to use Wi Fi across empanelled providers. However, this again being an online payment method will have limited adoption.
- d. Payment Arrangement with mobile wallets which will offer frictionless and secured payment for the access of Wi-Fi services

Q8. Is there a need to adopt a hub-based model along the lines suggested by the WBA, where a central third party AAA (Authentication, Authorization and Accounting) hub will facilitate interconnection, authentication and payments? Who should own and control the hub? Should the hub operator be subject to any regulations to ensure service standards, data protection, etc?

RJIL Response:

1. A hub-based model is not the advisable approach. Instead, the Authority should focus on developing an independent system where the end user authentication is at the host Service provider level while the system also facilitates the exchange of information and verification of the authentication details of customers of different service providers while ensuring no security breaches.
2. The working of the proposed mechanism is detailed below:
 - a. A customer subscribes to public Wi Fi hotspot services through his/her primary/Incumbent telecom service provider.
 - b. At the time of service activation and later, the customer can identify the other service providers with whom s/he should be allowed to latch on in case the primary service provider is not available at a location, under Roaming connection service.
 - c. When a customer tries to login from a public Wi-Fi hotspot location where his primary service provider is not present, the available/host service provider will seek the authentication details, transmit the same on real time basis to the primary service provider, who will in turn confirm the same in real time.



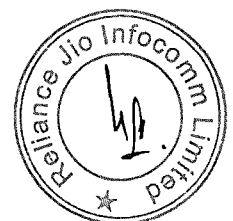
- d. If details match, the customer gets latched on to the available service provider network
- e. The customer will be billed/ charged on the basis of subscription that s/he has signed up with his primary service provider.
- f. The Service providers on the other hand will have to enter Wi-Fi hotspot roaming arrangements to split revenues/ subscription fees with each other for allowing this seamless experience to the users. Another point of consideration here is, that the service providers must have clear QoS benchmarks to ensure best experience for the end users.

To sum up, the arrangement will have to replicate the ATM sharing model in the Banking sector. The customers get the same experience across ATMs irrespective of who their primary banker is. Same authentication (PIN) is used across ATMs of various banks, whereas at the back end, the banks verify these PINs and validate in real time.

Q9. Is there a need for ISPs/ the proposed hub operator to adopt the Unified Payment Interface (UPI) or other similar payment platforms for easy subscription of Wi-Fi access? Who should own and control such payment platforms? Please give full details in support of your answer.

RJIL Response:

1. We understand that UPI is an improved version of IMPS, which is much more convenient and is bank account linked payment mechanism, where all that subscriber needs is a smartphone and once the subscriber is registered for UPI with his/her bank, a unique 'virtual address' is created and that unique address is mapped with subscriber mobile phone. Virtual ID and approval of payment through mobile is the essence of UPI. A subscriber can have many virtual IDs. The payment is initiated by invoking the virtual identity of the beneficiary and money is transferred in real-time. It works on single-click 2-factor authentication. Further to ensure privacy of customer's data, there is no account number mapped anywhere other than the customer's own bank. This allows the customer to freely share the financial address with others. A customer can also decide to use the mobile number or Aadhaar number as the name instead of the short name for the virtual address. Ten major banks SBI, Canara Bank, BOI, ICICI Bank, HDFC Bank, Punjab National Bank, Bank of Baroda, HSBC, and Citi Bank are already integrating the interface with their mobile apps and 29 banks had concurred to provide UPI service to their customers, as per the news reports.
2. The UPI is a simple, innovative, easily adaptable, secure and cost effective online payment mechanism, which should increase the cashless transactions and therefore Wi-



Fi operators have everything to gain from this. However, its adoption by public and proliferation also needs to be evaluated, in addition we propose the following models for easy subscription to Public Wi-Fi service:

Customers with availability and preference for online payment: All Service providers can link their log-in / payment link to avail Public Wi-Fi service to the payment gateway of UPI and other empanelled mobile wallets through third party payment aggregators. Post payment, the user session can be initiated. The customer's wallet account will be deducted for the payment amount in real time basis. This needs a seamless integration between of customer's wallet account and usage. Alternately, pulse based charging can be configured in the system, wherein, per MB or per minute charging can be enabled.

Customers with limited/no access/no preference for online payment: The end customer's mobile phone account can be directly linked to usage on the Public Wi-Fi network, subject to his/her consent. In this case, the Wi-Fi voucher/recharge amount can be directly debited from end customer's mobile account (prepaid / postpaid). Wi-Fi hotspot operator can then collect the payment from end customer's respective mobile operator. Mobile operator can charge a certain commission for this transaction.

3. Another option can be to integrate usage of Public Wi-Fi hotspot services with Bharat Bill Payment System (BBPS), wherein it is treated as a Utility bill.

Regulatory intervention: Service providers will support this solution only if the revenue collected under this framework gets exempted from AGR linked License fees.

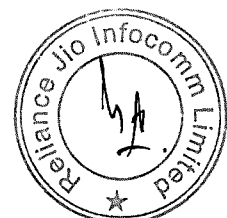
Q10. Is it feasible to have an architecture wherein a common grid can be created through which any small entity can become a data service provider and able to share its available data to any consumer or user?

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Q11. What regulatory/licensing measures are required to develop such architecture? Is this a right time to allow such reselling of data to ensure affordable data tariff to public, ensure ubiquitous presence of Wi-Fi Network and allow innovation in the market?

RJIL Response:

1. The creation of common grid is not feasible at this time due to insufficient proliferation of Wi-Fi hotspots and the service providers should be encouraged to bring more and more areas under the Wi-Fi zones and cover the uncovered areas. They shall be provided support in the form of payment mechanisms, interoperability with Cellular/LTE networks etc., however creating a common grid may kill the entrepreneurial spirit and halt the proliferation of broadband.



2. Presently, there are no prohibitive restrictions on the entry and provision of service by small entities. A small entity can get the data pipe from different Internet Service provider and provide service and value to its niche subscribers. Further, smaller cable operators etc. can become providers of last mile connectivity.
3. Reselling of data, is a concept whose time has come, as we wish to proliferate broadband through Wi-Fi, reselling of data will help build niche hotspots with innovative and designed tariffs. The reselling of data will bring healthy competition in market, this will not only bring higher penetration like the cable TV industry, but also bring the specialization expertise like last mile connectivity, distribution and core decentralization.

Q12. What measures are required to promote hosting of data of community interest at local level to reduce cost of data to the consumers?

RJIL Response:

1. In order to implement this concept, it is recommended to have an 'Open Hosting Infrastructure (OPH)' setup across Public Wi-Fi hotspots. This will allow any end user, after proper registration and authentication, to access, add and review content stored therein. However this will have to be integrated with backend and access networks of multiple network operators and service providers to host community interest information. The hierarchy that can be built for the community level hosting can be (from smallest unit to largest one): Society >> Locality >> Area >> City >> State
2. The OPH could also act as an engine for notifications and alerts related to areas of interest (for example, education, health, entertainment etc.), for the users. This will also provide revenue monetization opportunities through localized ads and classified content delivering information around the areas of interest. This will help provide consumer access to community data through seamless Wi Fi access from other locations.
3. Additionally, NFV (Network Function Virtualization) can be one of the methods that can be used at local level to reduce the cost of data to the consumers.

Q13. Any other issue related to the matter of Consultation.

RJIL Response: None

