AIRMESH'S RESPONSE TO TRAI CONSULTATION PAPER ON "PROLIFERATION OF BROADBAND THROUGH PUBLIC WI-FI NETWORKS"

Submitted by:

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AIRMESH COMMUNICATIONS LIMITED ('AIRMESH') RESPONSE TO TRAI CONSULTATION PAPER ON "PROLIFERATION OF BROADBAND THROUGH PUBLIC WI-FI NETWORKS" DATED 13TH JULY, 2016

We would first like to express our gratitude towards the authority for initiating debate on this important topic which play a pivotal role for achieving national objectives of '**Digital India'** and help **'Connecting the Unconnected'**. Public Wi-Fi may also be linked with Skill India initiative to train and develop skill and expertise regarding various trades amongst the Indian Youth and help make them employable which is essential for overall development of the Indian economy.

India has already witnessed the success story of telecommunication sector through cellular network penetration. Now, it's time to ride on the next success wave by enacting enabling regulations and changing the rules of the game to enable proliferation of public Wi-Fi networks. Public Wi-Fi must be promoted and facilitated in order to penetrate in rural parts, connect the urban unconnected and provide them access to internet/broadband services and connecting them with rest of the world. Also, broadband services may enable services like e-commerce, e-learning, e-health, e-governance, and telephony services through Voice over Internet Protocol (VoIP) at a much lower cost, thus bring affordable connectivity to majority of the population living in rural India and is still lacks basic connectivity.

Penetration of broadband services can be achieved vide cellular networks, wire line broadband or Wi-Fi. In the present scenario, majority of internet users access internet through cellular network using their smart phones or feature phones but cost of access is much expensive in comparison with Wi-Fi. Internet usage using cellular networks is not very affordable for most of the people who resides in rural areas. Whereas, wire line broadband services is expensive to rollout and requires heavy capital investments. Setting up wire line network is time consuming and maintenance costs too are high.

Wi-Fi is considered as an economical alternative to the wireline as well as cellular networks since cost of network deployment is fractional. India is a developing economy and has a lower per capita income as compared to developed nations, thus cost of services or affordability plays a critical role. As stated in the consultation paper, estimated cost of access could be less than 2 paisa per MB whereas currently internet users in cellular network are paying around 23 paisa per MB. Therefore, if the with proliferation of public Wi-Fi in India, there can be a significant increase in connected population in India assuming services will be available at almost 1/10th the cost as compared to cellular networks. This would help make internet both accessible and affordable thus help achieve our national objectives of **"Digital India"** and **"Connecting the Unconnected".**

As mentioned in consultation paper top ranking countries such as France, United States and United Kingdom have 13 million, 9.8 million and 5.6 million hotspots whereas in India there are only 31,518. This itself shows the deprived state of Wi-Fi in India whereas other countries like Spain, France, United State have various operators which provide Wi-Fi access to foreign nationals travelling for various purposes like business, tourism but in India the foreign nationals face the heat to get internet access due to lack of public hotspots and stringent verification norms. Further, carrier grade Wi-Fi network can also be used for data offload from existing cellular networks and would help enable a better user experience by balancing the congestion in the networks. For deployment of such networks there are numerous issues which need to be addressed like interoperability. Interoperability will play crucial role in development of Wi-Fi in India since it directly relates to user experience. **We look forward to the authority to ease existing regulation or frame enabling regulations which would help in proliferation of public Wi-Fi.**

We hereby give our issue wise response to the said consultation paper:

Question 1: Are there any regulatory issue, licensing restrictions or other factors that are hampering the growth of public Wi-Fi services in the country?

India has come a long way from opening up the telecom sector for private participation to coming up with many supportive regulations. The various steps taken by the Indian Government have helped this industry grow and become one of the major contributors to the Indian economy. India is gradually emerging as a hub for technology innovation and disruption. To enable the vision of digital India, affordable and seamless connectivity with Wi-Fi occupying a pivotal position will play an important role.

Earlier authority has issued various directives for implementation of Public Wi-Fi, since there have been significant changes in the technology and innovation taking place in the industry; it's the time that authority re-considers previous regulations and come-up with a frame work to encourage innovation and development of industry.

In current regime, the existing authentication process is inconvenient which discourages the use of public Wi-Fi networks. e-KYC can emerge as a viable alternative. Authority shall bring in enabling regulations so that the documents submitted through e-KYC shall be treated at par with the physical documents. We do understand that the identity of the user is matter of national security and it's validation cannot be compromised with. Guidelines shall be framed for e-KYC as well as one time authentication of casual users wherein post one-time authentication if user returns to the Wi-Fi network of same service provider, the verification process need not be repeated and the user connects to the network automatically. To enhance security MAC binding or digital authentication certificates may help post first time verification either by e-KYC or OTP delivered over a mobile network. This will enable seamless connectivity post initial verification is done with in order to enhance user experience and making it more user friendly. Alternatively, the service provider may allow user to create permanent user Id and password post initial verification which the user may use anytime, anywhere in network of same service provider and avail the services.

To encourage proliferation of public Wi-Fi, in India additional spectrum shall be de-licensed in addition to existing de-licensed spectrum. There are certain frequency bands which are de-licensed in many countries enabling the growth of Wi-Fi along with telecom industry as a whole and the authority has already made its recommendations on the subject. Apart from the frequency band recommended by TRAI the frequency bands mentioned herein including but not limited to 2400 -2483.5 MHz, 5150- 5875 MHz, unused TV white space spectrum shall be

de-licensed; 3550-3700 MHz should also be opened up to wireless broadband service providers or ISPs either as shared/coordinated band within a light licensing framework.

Backhaul connectivity is one of the major issue which shall be dealt with by framing policy in this regard by allowing ISP's to use microwave and millimeter waves, Further, de-licensing of 24GHz & 60 GHz (WiGIG) bands and enabling a light licensing regime for 10.5 GHz, 11GHz, 26-28 GHz, 71-86 GHz E-band and 57-64 GHz V-band shall be done for both TSP's and ISP's at par.

In the existing notifications, the guidelines with respect to SACFA procedures are unclear and allows a lot of ambiguity pertaining to the operation under de-licensed frequency bands, request the respective authorities to issue comprehensive guidelines, thus enabling service provider operating in de-licensed frequency bands to have a clear understanding of the different parameters as well as compliances with respect to the same.

Data sharing is one of the innovative concept developed in the industry recently which may help cementing the growth of industry, authority therefore is requested to examine the issues and restriction shall removed in order to make room for more innovation in this regard.

Question 2: What regulatory/licensing or policy measures are required to encourage the deployment of commercial models for ubiquitous city-wide Wi-Fi networks in remote or rural areas?

Citywide Wi-Fi networks have seen many experiments globally, whether these deployments were successful or not, the basics of these deployments revolve around city governments facilitating service providers and providing access to municipal/government assets for network deployment. India at present lacks the policy framework to effectively enable citywide W-Fi deployments; there are lot of procedural as well as policy issues that still need to be addressed and these take a lot of time and resources which in turn de-motivates service providers. To add to complexities local/municipal bodies which govern/maintain/regulate the public places are still trying to understand the benefits of Public Wi-Fi. Therefore requirement is of a central policy framework enabling Public Wi-Fi and implemented through local bodies. This will help create awareness regarding benefits of public Wi-Fi and to enable support to service providers.

Communication is one of the basic necessities today. We are witnessing a shift from voice to data. At present, there is no policy for usage of assets owned by Central Government, State Government, Municipalities governing the assets distributed in length and breadth of the country. Since broadband has emerged as a utility, the government shall consider framing right of way and right of access guidelines for all the assets owned/maintained/regulated by

government or its affiliated bodies including but not limited to street furniture, public parks to enable proliferation of public Wi-Fi. Policy framework shall be brought in to enable easy access to the public places for the ISP's, prospective rentals shall also be advised, power issue shall also be deal with in this policy. One of the prime factors behind proliferation of public Wi-Fi is power, authority shall cast responsibility on municipality/local bodies whoever own/maintain/regulate such place to provide uninterrupted power supply to the equipment of the service providers.

Authority shall also consider to develop of common network infrastructure policy wherein framework shall be created to install optical fibre or other necessary equipment's to be used for proliferation of Wi-Fi. This infrastructure shall be kept open for all service provider and may be availed by payment of requisite fees in accordance with capacity utilisation.

Developing a standardised approach in utilising citywide/state wide real property assets will hold the key. Regulator may also come up with a single window clearance system wherein post meeting the basic eligibility criteria by the service provider, applications for use of such infrastructure shall be processed within defined time frames and separate approval from various Government as well as local bodies shall not be required for deployment of public Wi-Fi networks. Such policy will act as catalyser for the growth of public Wi-Fi in India.

Currently, in India there is no advisory/policy/regulation/rules pertaining to sharing of optical fibre map (both aerial and burial)by service providers in a public platform. Authority shall look into the matter wherein it may frame and issue advisory for encouraging of TSPs and ISPs for sharing their optical fibre map on their website. This would enable to other service providers to get information pertaining to optical fibre availability, for which the service providers may enter into formal commercial agreement for sharing such infrastructure which would enable growth of the industry.

Finally, in accordance with the License Agreement, Annual Gross Revenue (AGR) includes almost every revenue generated by the operator irrespective of its sources. On the basis of AGR the service provider is required to pay revenue fees to the authority. There is need to modify the definition of AGR wherein indirect sources of revenue shall be excluded. Revenue generated from sources other than services for which license has been granted shall not be included in the definition of AGR. The service provider shall only be liable to pay revenue fees on the revenue generated vide provision of services for which the services provider has been licensed.

Question 3: What measures are required to encourage interoperability between the Wi-Fi networks of different service providers, both within the country and internationally?

Interoperability on Wi-Fi networks relates more to subscribers roaming between networks of different service providers. This should be enabled in such a way that the user remains unaware of the dynamic switching taking place between the multiple network interfaces. It involves various factors which are to be consider while interoperability like when to switch, smooth handoffs, billing and revenue sharing, security and authentication, load balancing, implementation, quality of service etc.

To achieve goal of interoperability, deployment of carrier grade Wi-Fi networks shall be important because they can deliver a consistent user experience. Devices should be able to automatically manage network selection and authentication to support specific applications such as streaming video and particularly VOIP. They can provide full end-to-end integration and interconnection. Carrier grade Wi-Fi may be able to provide seamless access to network services, and should support interoperability via fast and seamless roaming between intra-network Wi-Fi access points (APs), Wi-Fi roaming partners, and even 3G/4G networks. This interoperability should be supported across a wide selection of roaming partners and devices. Authority shall consider the same frame such policies/regulations which promote Wi-Fi in long run.

In order to promote interoperability, the authority may frame guidelines and roaming framework based on WRIX (Wireless Roaming Intermediary Exchange) framework as developed by WBA which may help enable interoperability. Further, authority shall frame regulation in this regard which shall promote direct interconnection and subscriber roaming shall be allowed by and between service providers/different connectivity platforms and the measures taken in this regard should help the industry flourish and innovate and not lay foundations for any kind of monopoly to be created by any of stakeholders.

Question 4: What measures are required to encourage interoperability between cellular and Wi-Fi networks?

As stated in the previous reply, Interoperability requires that the user remains unaware of the dynamic switching taking place between the multiple network interfaces and also the importance of interoperability among various service providers. Interoperability among cellular and Wi-Fi networks will help redefine the future of connectivity and telecom industry as a whole.

User behaviour shall play one of the crucial role for implementation of interoperability. Telecom operators will need to become more responsive to the needs of their customers thus addressing various class of customers with varied needs. To cite a few examples, a cost conscious customer will connect to that cellular network or Wi-Fi network which offer them economical services; a second set of customers who will like to connect to network providing high quality of services irrespective of the charges; alternatively there can be consumption oriented subscribers for whom the selection criteria will be throughputs and data limits and will choose to connect to the cellular or Wi-Fi network which offers the maximum.

To enable interoperability/roaming across cellular and Wi-Fi networks, the first roadblock is regulatory since direct interconnectivity between cellular operators and internet service providers is not allowed, VoIP is restricted and active number portability/roaming across networks is not allowed. To facilitate interoperability between Wi-Fi networks and Cellular networks, government should come up with guidelines/framework for roaming and interoperability based on 3GPP standards and enact necessary amendments in the licence agreements of respective service providers.

Recently, Department of Telecommunications (DoT) has allowed entry of Virtual Network Operators (VNO) in the industry which should help in the growth of the industry and in emergence of newer business models; if we look into the issue of interoperability and try to address it that will further help in service innovation. We reiterate that Carrier grade Wi-Fi may play crucial role in resolving issue of interoperability between service provider of cellular network and Wi-Fi operators. Also, authority shall remove VOIP restriction for seamless handover of calls between Wi-Fi network & cellular network and portability among Wi-Fi network and cellular network shall also be allowed.

Question 5: **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.**

India lacks necessary infrastructure required for data connectivity and communications thus keeping major part of our population deprived of the vast economic and social benefits of Information and Communication technologies. To effectively bridge the digital divide, many communities and service providers have opted for wireless network systems based on licence-exempt spectrum such as Wi-Fi. They have the potential to provide marginalized communities with low cost and accessible connectivity thus help them connect to the information super highway. These networks can also facilitate initiatives like e-commerce, e-learning, e-health,

e-governance, and telephony service through Voice over Internet Protocol (VoIP) at a much lower cost.

There is in compelling need for de-licensing of more frequency band in order to expedite the penetration of broadband using Wi-Fi network. Apart from the frequency band already recommended by the authority, we hereby request to de-license following frequency bands:

- 2483 -2500 MHz which may be used for broadband access.
- 5150- 5875 MHz which may be used for broadband access.
- 24 GHz for use in backhaul networks
- 60 GHz for WiGIG Applications
- 71-86 GHz (E-band) for use in backhaul networks.
- 57-64 GHz (V-band) for in backhaul networks.

Apart from the bands suggested for de-licensing, the authority can consider shared/coordinated spectrum within a light licencing regime for licensed service providers, these include:

- 3.550-3.700 GHz for use in Broadband Access Networks of ISPs
- 10.5 GHz for use in backhaul networks.
- 11GHz for use in backhaul networks
- 26-28 GHz for use in backhaul networks

In its Recommendations on "Allocation and Pricing of Microwave Access (MWA) and Microwave Backbone (MWB) RF carriers" dated 29 August 2014, the Authority recommended allocation of E-band and V-band. There was lack of clarity in the industry, whether the usage of E-band and V-band is specifically for TSP's or it is also open for usage by ISP's at par. Since E-band and V-band are important pertaining to the proliferation of Wi-Fi, authority shall issue a clarification in this regard and allow usage of said band for ISP's at par with TSP's.

Further, TV white space which operates in 470 to 585 MHz in India. The said is frequency band is quite large and in accordance with various studies across the country show that 85-95% of TV white space spectrum area is unused. Authority may also consider to de-license this band for proliferation of Wi-Fi in India.

Question 6: 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?

As stated earlier, authentication process is inconvenient, which further restricts the growth of public Wi-Fi; the mean taken to login and authenticate the user each time he tries to connect the Wi-Fi network is discouraging.

One time e-KYC can emerge as a viable alternative. Authority shall bring in enabling regulations so that the documents submitted through e-KYC shall be treated at par with the physical documents. We do understand that the identity of the user is matter of national security and it's validation cannot be compromised with. Guidelines shall be framed for e-KYC as well as one time authentication of casual users wherein post one-time authentication if user returns to the Wi-Fi network of same service provider, the verification process need not be repeated and the user connects to the network automatically. To enhance security MAC binding or digital authentication certificates may help post first time verification either by e-KYC or OTP delivered over a mobile network. This will enable seamless connectivity post initial verification is done with in order to enhance user experience and making it more user friendly. Alternatively, the service provider may allow user to create permanent user Id and password post initial verification which the user may use anytime, anywhere in network of same service provider and avail the services.

The authority shall also frame guidelines to enable seamless integration of SMS gateway with the services of the operator. The norms pertaining to the SMS gateway shall be relaxed for provision of services form international SMS gateway by foreign operators so that the market shall be driven by competition.

As per The World Travel & Tourism Council information, 8.02 million tourists travelled to India in 2015 and number is growing each year. It has been observed that the most frequent users of public Wi-Fi hotspots have been tourists trying to avoid expensive roaming tariffs. Therefore, authority shall also frame rules to accept e-KYC of non-resident. The authority shall notify copy of passport (including In stamping) and visa shall suffice for e-KYC in case of tourists.

Question 7: Are there any challenges being faced in making payments for access to Wi-Fi hotspots? Please elaborate and suggest a payment arrangement which will offer frictionless and secured payment for the access of Wi-Fi services.

Slow adoption of e-payment mechanisms and preference for cash payments is one of the major deterrents to development of online transactions business. Payment for the Wi-Fi at public hotspots is no different and mostly discourages users to signup for these services thus obstructing growth of the industry in India. Online payment industry is in early phases of its growth and therefore the number of people using debit card/credit card/net banking are still very low. Also, still there are lot of security concern regarding transacting any financial

transaction via public Wi-Fi. On contrary, physical availability of recharge coupons has their own logistic issues is OPEX intensive.

To enable the growth of public Wi-Fi, it is essential to build secured payment solution which shall be available to everyone and easy to use as well as secure. Innovation and collaboration with the growing Fintech sector might play a very important role. Integration with Bharat Bill Payment System will help solve the problem since this might be used at large in India and also add security comfort for the payee. Authority shall also promote mobile wallet which can be used an alternative mode of payment structure.

Question 8: **Is there a need to adopt a hub-based model along the lines suggested by the WBA, where a central third party AAA (Authentications, 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?**

Public Wi-Fi is still at a nascent stage in India and has an important role to play in the growth of broadband sector, it therefore should not over regulated. Wi-Fi may emerge as a game changer in the telecom industry and enable the national objectives of Digital India and Skill India by connecting the unconnected Indians residing in the rural parts of the country. Service Providers prefer to own and keep control over their operation and business support systems as well as subscriber information. A single third party hub operator may lead to the monopoly in the industry and may discourage technological innovations. Instead, authority shall make necessary amendments to the licencing framework to enable innovation and grant flexibility to service providers to experiment with different business models and service delivery frameworks. Authority shall play role of facilitator and encourage innovation and disruption which may create value for the end customers, industry and for the country as a whole. Further, WBA may advise authority to put forward best practices which may enable improvement in quality of service, protect user privacy, and make networks more secure.

In comparison to a Hub based model we suggest setting up of Interconnect and Roaming exchange based on WRIX framework as suggested by WBA where service providers can interconnect, this will help facilitate subscriber roaming between service providers and also facilitate inter service provider settlements. These exchanges can either be run like an autonomous institution like NIXI, but we strongly suggest keeping this open to multiple operators. This will create an open ecosystem and mutual competition between multiple exchanges will help in technology innovation and emergence of disruptive business models.

Question 9: 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.

Payment procedures and availability of desired payment options are one of the major roadblocks for users opting in to access public Wi-Fi networks for a subscription. Adoption of online payment option is low and most of the people still prefer to pay in cash. Ordinary Indian still hesitates making payments online or even using credit cards or debit cards on PoS terminals offline, apart from other reasons, transaction security is a major concern. Further the number of debit card/credit card/net banking users are still quite low as compared to developed nation. India has witnessed a growth in Fintech sector with companies offering various cashless payment solutions in form of online or mobile wallets. The momentum and innovation in this sector is very critical for the growth of online space in India and Wi-Fi too will benefit.

Apart from the technology innovation happening in the Fintech space, service providers should be encouraged to adopt NPCI's Unified Payment Interface (UPI). This will enable new payment options for service providers and enable user confidence as well since transaction medium is a smartphone and they don't need to share their critical banking information with the service provider or public Wi-Fi operator; this is further made more secure with a two factor authentication process. Integration with the UPI will play an important role in adoption of paid Wi-Fi services.

UPI has already been established by the NPCI, thus there is no need for creation of a separate UPI for Wi-Fi access; service providers should be encouraged to adopt the UPI. There is need to encourage collaboration between growing finance technology sector and the telecom sector to come up with some innovative idea which would actually resolve the payment issue of the industry. Bharat Bill Payments System shall also be promoted as one of the options to strengthen the payment process as this may address credibility concerns among the users who otherwise are adverse to online payments. Mobile wallets are also a reliable option which may be adopted by service providers.

Question 10: 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?

The Idea of creating a common grid to enable data sharing sounds exciting, this will help improve broadband penetration and enable seamless connectivity across the country. With

Wi-Fi as the enabling technology, the impact can be considerable. Crowd sourced Wi-FI network "FON" can be a classical example. This can act as a catalyst and add fuel to the growth of the industry but at the same it may make edge of the networks vulnerable to cyber threats, lead to breach of security, impact user privacy and poor quality of service. Individuals or smaller entities will not be able to bear the burden of managing quality, ensuring cyber security as well as fighting cyber threats as the same requires considerable CAPEX investments, OPEX as well as specialised manpower. The model can be effectively implemented through individuals or small entities who can act as extended network access points either for a service provider or a connectivity platform. The provisions in the licence agreement with respect to service franchisees can be explored to enable this from the service provider perspective. Majority of Indian population resides in rural areas and for connecting the unconnected this architecture can be pivotal. This may generate employment opportunities and help in economic growth in underserved areas.

Question 11: 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 affordable data tariff to public, ensure ubiquitous presence of Wi-Fi Network and allow innovation in the market?

The success of model discussed in the previous question depends on innovation in business models and service architecture. Service Providers should be allowed flexibility within the framework of existing licensing regime to innovate and experiment with different business models as well as service architectures thus help create a platform that can further act as a grid for reselling and sharing of data either by individuals or small entities; service providers can further based on their business models choose to interconnect or interoperate with platforms operated by other service providers thus enabling data sharing across networks.

WiFi is a standalone radio access technology like GSM or CDMA or LTE, thus innovation in business models should be left open to licenced service providers. However, regulator may issue guidelines on security, service delivery, quality of service and user validation for service providers. Also amendments in terms of licence can be brought in to enable service providers to create network agnostic connectivity platforms.

Question 12: What measures are required to promote hosting of data of community interest at local level to reduce cost of data to the consumers?

Distributed Data Centre architecture can be promoted for hosting of data of community interest in addition to exploring the possibility for content caching at the edge, this will help

reduce traffic on long distance data circuits thus help in reducing bandwidth costs and reducing network latency.

Question 13: Any other issue related to the matter of Consultation.

No comments