QuadGen WiFi Operations Pvt Ltd

Response containing written comments

In response to

TRAI Consultation Paper on

Proliferation of Broadband through Public WiFi Networks

23rd August 2016

Q1. Are there any <u>regulatory issues</u>, <u>licensing restrictions</u> or <u>other factors</u> that are <u>hampering the growth of public WiFi services</u> in the country?

Response:

There are numerous stakeholders involved in the rollout of public WiFi services in India as listed below:

- Licensor (DoT)
- Licensee (WISP)
- Central / State Governments
- Municipalities
- Technology / Solution Providers
- Consumers

Each of the stakeholder related dependencies and issues need to be addressed to enable the growth of public WiFi service in the country.

It is imperative that a level playing field is enforced amongst Wireless Internet Service Providers by mandating uniform guidelines for public WiFi hotspot deployment especially with regard to grade of equipment to be inducted, equipment compatibility to IEEE / 3GPP / WiFi Alliance standards like Wave 1/2/3 certification etc, installation and safety standards, QoS norms, Security Standards and LIM Compliance apart from MDO support.

A wide range of issues which are acting as inhibitors to the growth of WiFi services are highlighted below with suggestions for the kind consideration of Regulatory Authority.

<u>Licensor-related issues</u>

<u>2.4 / 5 GHz Limited RF Spectrum Availability:</u>

<u>Comments :</u>

- Spectrum assignment in 2.4/5 GHz with reference to number of channels and total quantum of spectrum in the respective bands are not uniform worldwide
- Similarly, RF power levels at which the radiation is permitted in 2.4 / 5 GHz are also not uniform worldwide
- Indian WiFi adoption potential in dense urban / suburban / rural India requires adequate spectrum for serving the scalability of usage. Hence, availability of as much spectrum as possible with adequate number of channels is a critical need.

<u>Suggestions:</u>

- It is suggested that additional channels in the 2.4/5 GHz band are included in the unlicensed band as per globally harmonized standards considering the potential, scalability of adoption of WiFi services meeting the aspirations of billions of internet users.

Licensing Restrictions:

Comments :

- The cost of ISP Category A/B license along with the associated Performance Bank Guarantee / Financial Bank Guarantee is prohibitively expensive for new players looking to enter the WiFi business
- License fee of 8% of the Adjusted Gross Revenue of the ISP will increase tariffs which will have an adverse impact on the adoption of the WiFi service by the public.

Suggestions :

- It is suggested that the WiFi Service Providers are classified separately from regular ISPs and a new category of license for WiFi Service Providers be categorized and notified at reduced cost which will make it easier for SME segment to offer public WiFi services in different category of ISP licenses namely Class A/B/C.
- Also the license fee of 8% be reduced considerably or may not be made applicable for WiFi based ISP licensees as the WiFi services are provided using unlicensed spectrum and often services are also allowed for first 15 to 30 minutes free for potential users visiting the hotspots.

Import Clearance and WPC Type Approval :

Comments:

- Import license and WPC type approval process is unduly complicated and taking between 2 to 6 months for according Type approval and issue of Import licenses. This is considerably delaying the entry of new WiFi vendors and thus restricting the choice of equipment vendors to the potential WiFi Service Providers
- Currently available WiFi equipment from existing vendors with established presence in India is found to be more expensive when compared to equipment from potential vendors interested to enter the Indian market.

Suggestions:

- It is recommended that the import clearance and WPC type approval process be significantly simplified and bureaucracy reduced to expedite the entry of new and potential Next Generation of WiFi vendors into India which will accelerate the proliferation of public WiFi hotspots in the country.

LIM Compliance:

Comments:

- Potential users at hotspots will be accessing the internet through WiFi service involving voice, data and video services for upload/download.
- Hence, the service usage is similar to any 2G/3G/4G service and thus it is imperative that WiFi technology based internet services to be brought mandatorily under LIM Compliance

- The response times to LEA for LIM request is quite demanding and this puts burden on operational cost of WiFi Service Providers

Suggestions :

- WiFi Service Provider should thus be mandated to comply to Carrier-grade WiFi service norms especially for consumer usage and tracking of service with reference to mobile number, time, Access Point from which the service is taken, IP Address used for accessing internet, MAC address of the device used, and the volume of data consumed.
- It is recommended that the response time for LIM request response be increased

IPDR Storage duration :

Comments :

- It is mandatory for all ISPs to store the IP Detail Records (IPDRs) for all the end users for a period of at least 1 year
- This requires an expensive set up to store the IPDR data and facilitate the easy retrieval of the same within a specified response time upon request by a Law Enforcement Agency (LEA)

Recommendation:

- It is recommended that the mandatory duration of IPDR retention by WiFi Service Providers be reduced to 3 months decrease the Operational cost of WiFi services

Licensee-related issues

Technology :

Comments :

- WiFi infrastructure equipment deployed by different Service Providers are having different WiFi standards compliance
- Also, majority of the equipment being deployed by WiFi Service Providers are not conforming to Carrier-grade standards namely maximum availability, high reliability, and centralized maintainability for Fault, Configuration, Accounting, Performance and Security (FCAPS).
- Also, the WiFi Access Points and Core WiFi Controllers are not conforming to Carrier-grade with reference to global standards of RF performance, RF TX power levels, Antenna configurations , IP certification like (IP65,IP66,IP67 etc) and Cyber Security Standards etc.
- It is also observed that some Service Providers are deploying WiFi Access Points in 2.4 / 5 GHz bands at higher power levels than 36 dBm EIRP in outdoor and 26 dBm EIRP for indoor deployments. This poses significant interference issues apart from environmental / radiation hazards.
- It is observed that WiFi Core Network deployment by some players is cloud-based and

hosted outside the country. This poses a serious non-compliance to mandatory licensing and regulatory norms.

- WiFi has become a defacto integral facility in various types of end user devices namely smartphones, tablets, laptops, cameras, fitness tracking devices, medical equipment, video surveillance cameras etc. Thus it is imperative for these devices with built in WiFi to conform to relevant WiFi standards applicable for interoperability of such devices with WiFi Access Point infrastructure. However, due to the non-compliance to the applicable standards, consumer complaints tend to be significantly high on WiFi Service Providers.

Suggestions:

- All WiFi Access equipment deployed should be mandatorily made compliant to the relevant IEEE / 3GPP / WiFi Alliance standards to ensure the best QoS to the end users for standalone WiFi access as well as Mobile Data Offload (MDO) and Hotspot 2.0 requirements
- All public WiFi hotspot deployments should conform to Carrier grade and not consumer grade standard.
- Centralized E2E management of WiFi infrastructure is to be recommended to ensure compliance to FCAPS as WiFi infrastructure is considered as public service infrastructure.
- WiFi Controllers, EMS/NMS and OSS/BSS systems on virtual platform based software applications should be mandated for compulsory hosting of such virtual applications on physical servers located within India WiFi Network Operations Centres (NOCs).
- All WiFi radio equipments namely WiFi Access Points (WAPs) should be mandated to conform to global RF emission standards namely 36 dBm EIRP outdoor and 26 dBm EIRP indoor.
- All consumer devices with built-in WiFi should be mandated to comply to the applicable relevant standards namely IEEE / 3GPP / WiFi Alliance etc.

WiFi Infrastructure Towers:

Comments :

- 5 GHz and 2.4 GHz WiFi radios are often observed to be mounted on poles with guy wires support, triangular masts and lattice structures of varying heights far above 10 meters and upto 35 meters both from ground and on rooftops.
- These WiFi infra mounting structures are observed to be non-conformant to any applicable Structural Engineering Research Institute standards
- Typically these structures weigh between 1.5 to 2 tonnes if not more and are found to be non-compliant to any environmental and safety standards thus posing a threat to public safety

Suggestions :

- Towers deployed especially for 5 GHz Access / Wireless BH should be mandated to conform to wind velocity and loading standards imposed by SERC so that it does not pose a public hazard issue (for >10 m height)

IP Address Availability :

Comments :

- IPv4 is the defacto standard for WiFi Service Providers with user devices being assigned a IPv4 address for the duration of the WiFi session
- Because of the exhaustion of IPv4 address space, WISPs are required to make a significant investment in NAT infrastructure

Recommendation:

- It is recommended that IPv6 addressing be adopted by the ISPs providing WiFi service

Other Suggestions:

Support of government / municipal authorities is required for accelerating the deployment of public WiFi hotspots.

This support should include, but not limited to:

- Permissions for the deployment of WiFi equipment at the identified hotspot premises on neutral host basis.
- Providing uninterrupted and free power to the WiFi Access Point equipment which consume very little power i.e. less than 15 W. This is considered a critical need as few Outdoor Access Points in public places cannot be provided with metering support especially when such infrastructure is also offering certain free time usage for the consumers.
- Right of way permissions should be given for WiFi Service Providers at nominal rentals for extending the backhaul connectivity as required
- Waiver of rentals at public locations.

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

Comments:

- WiFi coverage cannot be considered as ubiquitous city-wide coverage as 2G/3G/4G due to the very nature of the technology being a hotspot centric technology with very low power (less than 1 W) transmission on an unlicensed spectrum. WiFi deployments face high density of Access Points with ability to manage interference effectively within a hotspot zone. Also, wider coverage and ubiquitous coverage leads to multiple hops and multiple mesh links resulting in significant degradation in the effective throughputs.
- Handovers between the Access Points in multi WAP zone would be restricted to pedestrian movement speeds only and not vehicle movement speeds in the range of 60+ kmph. Thus ubiquitous citywide WiFi network is a misnomer.
- Leased Circuit bandwidth pricing for BackHaul and Internet access at 2 Mbps, n*2 Mbps, 10 Mbps, n*10 Mbps, 100 Mbps, n*100 Mbps as notified by TRAI in the past and as applicable to the ISPs and Telcos are considered high, thus impacting the cost of WiFi service delivery

significantly.

- WiFi service is considered an unlicensed spectrum based service extension in the last mile to the leased internet circuit bandwidth and hence the impact of leased circuit cost is directly proportional to the WiFi service delivery costs

- WiFi service coverage area is restricted to a limited geographic area on a hotspot basis not exceeding 150 meters radius of coverage per Wireless Access Point (WAP). The radius of coverage can only be increased by extension of the WAP links through multiple hops in a linear mesh mode or a closed loop mesh mode. The internet backhaul circuit is often expected to be terminated at the root WAP location or multiple WAP locations depending on the area of coverage in a campus location, market area, mall, multi-storied complex, gardens etc.

- Thus multiple Internet Bandwidth circuits may have to be geographically terminated at multiple locations in a large hotspot area depending on the type of WiFi Hotspot Coverage area. This in turn involves high cost of bandwidth to be adequately dimensioned to serve a large user base involved in that particular hotspot area.

- Non-availability of omnipresent and ubiquitous fiber based backhaul / internet bandwidth is inhibiting the growth of WiFi networks in all the geographies irrespective of urban, suburban and rural areas

- Right of Way costs to extend the backhaul / internet bandwidth to the hotspot location are found to be prohibitively high in Tier-1/Tier-II/Tier-III cities and towns as notified by the respective State Governments and Municipalities.

- The premise / public area permissions and rentals for establishing WAPs for adequate coverage in the building / campus / enterprise premises are found to be the biggest inhibitors in the deployment of ubiquitous city-wide WiFi networks

- Non-availability of power in remote / rural / suburban / urban areas leads to the necessity of deploying high capacity UPS power backup thus impacting the deployment of WiFi network with proper ROI based commercial model

- The customs duties on WiFi infrastructure equipment is acting as yet another inhibitor leading to the high cost of CAPEX of the WiFi network infrastructure.

Suggestions :

- Ubiquitous city-wide WiFi therefore needs to be interpreted rightly as the availability of WiFi in as many public areas with high footfall as possible. These potential WiFi areas in a city / town / remote and rural areas include – Educational Institutions, Banks, Post Offices, Hospitals, Hotels, Courts, Police Stations, Bus Stands, Railway Stations, Airports, Tourist Attractions, Parks, Gardens, Malls, Market areas etc.

- Leased circuit tariffs for backhaul and internet bandwidth need to be considerably reduced. TRAI should consider to revise the earlier notification of backhaul and internet bandwidth pricing to encourage the deployment of WiFi networks with attractive bankable business commercial models around parameters like ROCE, IRR etc.

- State Governments, Municipal Corporations etc should be encouraged through the mandate of new policy measures to reduce the complexities involved in obtaining the permissions for WiFi access infrastructure establishment

- Also the rentals payable for establishing the WiFi Access Points and the associated wiring in public places, public complexes, gardens, parks, tourist attractions, bus stations etc should be

considerably brought down by mandated policies through regulatory Suggestions.

- Special tariffs for electrical utility charges toward WiFi infrastructure equipment in public places may be notified by the Governments to encourage the growth of WiFi networks with better commercial models.
- Customs duties applicable for WiFi Access Point equipment and WiFi Access Controllers and WiFi OSS/BSS systems needs to be waived for a period of next 3 years to encourage the proliferation of WiFi networks in all zones i.e. urban, suburban and rural. Such duty waiver would help better commercially viable models in the WiFi service delivery operations.

Comments on commercial model indicated in the consultation paper :

The 2 paise per MB cost of download on WiFi projected by the Authority is factually incorrect because of the below main reasons :

- The cost of leased circuits for BackHaul and Internet Bandwidth considered in the estimation are extremely low and far from market reality in the country leaving alone the fact of the leased circuit tariffs considered are at complete variance with the ceiling tariffs as notified by TRAI. Please note that the market rates in India for a 10 Mbps leased circuit are in the range of INR 3.5 Lakhs to 4 Lakhs per annum whereas the Authority has considered INR 0.8 Lakhs for a 10 Mbps circuit for bandwidth costs.
- WiFi technology based internet access service packs are predominantly considered on a per session basis involving time of usage or volume of data downloaded and both. WiFi service usage at public hotspots is always on impulsive consumer need based and not driven by regular periodic plans as in 2G/3G/4G service packs spread over daily, weekly and monthly basis .
- Typical popular service packs on WiFi are hourly or daily packs not exceeding 1 GB per day
- Thus the considered pattern of usage by Regulatory Authority on a per month per subscriber based consumption of service packs is a small percentage of the current usage patterns and representation of the market reality for such WiFi service uptake by the prospective consumers. Considering such low percentage packs for estimation of price per MB leads to most unrealistic, unviable business commercial models of WiFi technology based service delivery.
- The assumption of considering high number of regular subscribers (40,000) with monthly plan based service uptake for a 20 hotspot deployment in a Tier-II City is most unrealistic and not in sync with the market reality
- Market reality experienced in India and other global markets in business modeling of WiFi based internet access service indicate an average and peak loading of subscriber sessions on a hotspot basis (300*300 m area of coverage in a public place) is in the range of 40 and 80 sessions respectively.
- The data consumption per month per subscriber (taken by Authority as 10 GB) on WiFi service in a public hotspot is considered quite high and at variance even with majority usage of 2G/3G/4G service packs hitherto offered to and consumed by the citizens. Based on our experience, the average data consumption per month per subscriber on wifi services is observed to be around 3GB in Tier-II cities.
- Tower costs taken by the Authority seems considerably low and not qualified the type of tower taken into account in the estimate of price per MB calculation
- A cost estimation table of Wi-Fi usage for 20 hotspots in Tier-II city for a Cat C ISP is

provided below

Broadband through Wi-Fi Hotspot for 20 Hotspots in Tier-II City for a Cat C ISP	
Assumptions	
Each Hotspot coverage area (in mts)	700
3 Nos of towers of 5 mts / 8 mts are assumed for each hotspot	
Cost per Lattice mast tower (in INR)	50000
Distributed WAC architecture	
Number of Subscribers per HotSpot / day	800
Total number of subscribers per city / day	16000
Average DL per subscriber per day (in MB)	300
Total Consumption per day per hotspot (in GB)	240
Total Consumption per day per City (in TB)	5
No of concurrent users per HotSpot per day	120
No of concurrent users per City per day	2400
Bandwidth per hotspot (in Mbps)	3*155 Mbps
Total Bandwidth per city (in Gbps)	8.00
Cost of BW for 155 Mbps (200 KM and 50% discount) with reference to TRAI ceiling tariffs	1,980,166.50

CAPEX for ISP (approx)	
Details	**Cost (in Rupees)**
License Fee	20,000
Tower Cost	3,000,000
Access Point Equipment	11,200,000
AP Controller	2,400,000
EMS/NMS	600,000
AAA and BRAS	7,000,000
Servers (DNS, Syslog, MRTG)	250,000
Switch (Core+ distribution)	1,000,000
Routers	250,000
UPS/Generator	2,000,000
Total	27,720,000

OPEX for ISP (approx)	
Details	**Cost (in Rupees)**
Bandwidth Cost + BackHaul Circuit cost	118,809,990
Tower Installation Rent	3,600,000
Server Software Charges AAA NAS	700,000
Operation & Maintenance Charges	2,400,000
Staff Cost	18,000,000
Total	143,509,990

Total Bandwidth (Gbps)	8
Per subscriber per month data use (GB)	10
Depreciation over 3 years	9,240,000
ROCE @20%	5,544,000
Total Annualized cost (in Rs) (RoCE+Depreciation+OPEX)	158,293,990

Per MB cost (Re)	0.082445 ₹

Suggestions :

- The assumptions with reference to the leased BackHaul circuit and internet bandwidth pricing, number of subscribers using the hotspot service at the 20 hotspots, monthly data

consumption and tower costs need to be revised to reflect the market reality

- Also the commercial models should be qualified with the deployment of total number of outdoor and indoor Access Points conforming to Carrier-grade deployments as the service is expected to be conformant with public service around a reliable and maintainable infrastructure
- It is suggested to qualify the commercial model with the geographic area of coverage in a Tier-II City around 20 hotspots
- The commercial model further needs to be qualified with the quantum of Backhaul / Internet Bandwidth terminated on a per hotspot basis
- The commercial model should comprehensively consider the amortized cost of WiFi Core Network to be distributed amongst Tier-II City based Hotspot zones
- 5 GHz BackHaul WiFi links with corresponding tower infrastructure rentals / costs need to be considered in the commercial model as this would become a compulsive deployment need in a Tier-II City involving multiple hotspots to enable the distribution of Internet / BackHaul bandwidth
- WiFi service based popular internet access packs may be taken as the reference in true reflection of the average consumption of user per session per day basis
- There is a compulsive need to correct the price per MB indication reflected in the consultation paper. Properly modeled techno commercial business plan with a 3 year outlook for bankable ROI/IRR norms indicate the price per MB for a hotspot based internet access service packs to be in the range of 7-8 paise per MB at a minimum of 3 times the speed of 2G/3G QoS norms.

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

Comments :

- WiFi network deployments by various Service Providers are not conforming to industry standards namely IEEE/3GPP/WiFi Alliance Wave-1/2 certification etc.
- OSS/BSS systems deployed for service Authentication, Authorization and Accounting also differ in service invocation procedures at the respective hotspot locations
- Payment Gateway systems deployed by WiFi Service Providers also differ in compliance to standards with highly customized payment and receipt process
- Mobile Data Offload implementations from 2G/3G/4G networks to WiFi hotspot zones also differ significantly not conforming to industry standards
- Neutral Hotspot evolution supporting sharing of active WiFi infrastructure is not a reality
- SSID leasing concept amongst different Service Providers is also not a practical reality yet with wide adoption anywhere in the world leave alone India
- Hotspot roaming with Hotspot 2.0 standards has just become an industry standard an year ago and industry needs to embrace this standard for wider adoption in their products, systems and solutions.
- International interoperability with iPass and Boingo with their willingness to enter into techno-commercial arrangements with Indian WiFi Service Providers is in infancy stage

Suggestions for measures required to encourage interoperability between WiFi networks of different service providers :

Within the country :

- Standardized technical and commercial frameworks for WiFi roaming needs to be supported by the WiFi Service Providers (Conformance to WBA Interoperability Compliance Program)
- Roaming agreements between different domestic WiFi Service Providers
- Deployment of neutral hotspots
- WiFi infrastructure sharing between WiFi Service Providers in high footfall areas

Internationally :

- Sign up with International Aggregators such as iPass and Boingo which allows end users of a WiFi Service Provider to access WiFi networks of other international WiFi Service Providers who have similar agreement in place.

Q4. What measures are required to encourage interoperability between cellular and WiFi networks?

Comments :

- WiFi infrastructure equipment vendors need to supply equipment conforming to 3GPP/MDO standards
- BSS and WiFi Core Network elements should support interoperability on industry identified interfaces namely Gx/Gy/STP/HLR
- Devices conforming to EAP-SIM authentication standard are not available widely
- ANDSF implementations are not yet done by the Cellular Operators

Suggestions to encourage interoperability between Cellular and WiFi networks:

- Mobile device Support for EAP-SIM /AKA is considered mandatory for authentication with HLR / HSS of cellular networks and this may be notified as a pre requisite for supporting interoperability with cellular networks in seamless mode.
- Similarly, it is imperative to mandate the deployment of 802.11u / Hotspot 2.0 / NGH compatible WiFi access and Wifi core network infrastructure for seamless interoperability for MDO mode with cellular operators
- Use of GPRS Tunneling Protocol (GTP) or Proxy Mobile IP (PMIP) standard interface based approach is considered mandatory for IP mobility across cellular and Wifi access technologies.
- Adoption and deployment of Access Network Discovery Selection Function (ANDSF) infrastructure by Telcos is an essential requirement for seamless interoperability between the cellular and Wifi networks by auto detection of hotspot corresponding to the concerned cellular operator.

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 WiFi technology? Please provide international examples, if any, in support of your answer.

Comments :

Indian WiFi spectrum is having limited bandwidth in the unlicensed 2.4 / 5 GHz frequency, thus proving to be a constraint in a society having a billion potential users in high subscriber density environments invoking high speed WiFi service at 3X compared to 2G/3G speeds. This requirement calls for globally harmonized 2.4 Ghz and 5Ghz bands to be declared for unlicensed Wifi operation to the scalability requirements of the potential users.

60 GHz, mmWave has been recognized as a potential alternative by Wifi alliance and IEEE to provide Gigabit speed throughputs at public hotspots in high density residential /commercial locations.US, Europe, Australia, Japan and South Korea have already delicensed the 60 GHz band and considered as a recognized Wifi band

Availability of unlicensed 60GHz channels will facilitate rapid penetration and proliferation of Wifi access to high density residential/commercial locations where fiber deployment is difficult due to logistical complexities.

Suggestions :

- Mandate additional number of channels to be notified for use covering the full band of 2.4 and 5Ghz for potential use by WiFi technology in conformance with global standards. This is a critical requirement for adoption of internet access by Wifi. Availability of additional channels will exponentially increase capacity, further increase throughputs and provide improved QoS and thus provide the much needed scalability of WiFi in high subscriber density requirements.

- Mandate Delicensing of Millimeter wave spectrum (60 GHz frequency) which offers 7 GHz of radio bandwidth is considered essential to provide gigabit throughputs.

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

- Current login/authentication procedures for access to WiFi hotspots typically involve SSID selection by the user, registration on a Captive Portal and subsequent authentication through an OTP sent by SMS for authentication and is a requirement from the Law enforcement agencies. There is thus a dependency on the cellular network of the end user.
- This is a hindrance for WiFi in both rural and urban areas. In the rural areas, cellular coverage can be unreliable and the users may not be able to receive their OTPs. In the dense urban areas, due to congestion of mobile networks, the SMS containing the OTP may not

always be received on time resulting in the end user not being able to connect to the WiFi network.

- Foreign visitors without an active roaming plan will not receive the OTP for authentication and cannot connect to the domestic WiFi network. There is no mechanism in place to authenticate such users
- Users having non sim devices such as tablets, laptops etc. are extensively being used in Wifi hotspot zones for internet access. Such users with non sim devices would find it difficult to use Wifi service if they have to depend on OTP receipt on the phone.

- OTP has become an essential from LIM perspective for trackability of the user from a public hotspot zone.
- In the case of a Greenfield user to a hotspot, LIM compliance for trackability is forcing the OTP to become essential as a second factor authentication.
- For a MDO user invoking WiFi hotspot usage, implementation of NGH / Hostspot 2.0 would result in seamless authentication which would streamline the end user WiFi experience.

Suggestions:

- It is suggested to explore login procedures to authenticate and validate users having no active mobile plan/connection and foreign tourists/visitors who may not have an active roaming plan.
- It is suggested to look at alternatives to LIM compliance without needing mobile numbers as KYC data and hence reduce dependence on OTP through SMS.

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

Comments:

- Consumers and wifi service providers have enough choice of adopting different payment gateway support mechanisms today and there are no challenges faced.
- Wifi service is based on session, time duration and volume of data used. Such service packs are of low value in the range of Rs.10 to Rs.50. Users at a public hotspot are reluctant to use their credit or debit cards for such low value transactions.
- Wifi service provider needs to have retailer network as part of the commercial model of business with the ability to support revenue share arrangements with retailer over and above payment gateway charges.
- Their preferred mode to use such WiFi service packs is through a local reseller to offer e-vouchers or a physical hard coupon for usage.
- For transactions above, Rs.50 up to Rs.300, for daily weekly and monthly wifi service packs, users may prefer to make credit/debit card/mobile wallet based payments

- Wifi Service provider at the core network is expected to support payment gateways corresponding to the mode of payment resulting in technical integration complexities and additional investments thereof to support multiple payment gateways.

Suggestions:

- Payment gateway aggregators to be mandated to charge only between 0.5 to 1% of the transaction amount
- WISPs should be mandated to support at least 3 popular payment gateways at their core network to provide a choice to the WiFi consumer.

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?

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 WiFi access? Who should own and control such payment platforms? Please give full details in support of your answer.

Comments for Q8 and Q9

- Business scale of WiFi operations by a WISP dictate the need to adopt a hub based model. In such scenarios, WISP of categories B and C may find it easier to have a centralized third party hub model for AAA and payment gateway.

Recommendation for Q8 and Q9

- An independent 3rd party WiFi OSS/BSS platform hub operator could evolve a business model with central hosting of such a platform situated within the country.
- Such a hub operator maybe having even the internet gateway facility.
- Such an independent hub operator should be mandated to conform to all applicable QoS standards to the end consumer with reference to service delivery attributes for time and volume packs including LIM compliance and data protection requirements.

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?

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 WiFi Network and allow innovation in the market?

Comments for Q10 and Q11:

- Wifi Service delivery business models by operators involve the deployment of access network architecture, backhaul, and core network layers.
- For a common grid to evolve, the authorities seem to suggest another intermediary centralized core network with OSS/BSS and WAG with corresponding EMS/NMS.
- Today, in the industry, there is no standardized and truly open CAPWAP protocol implementation with interoperability support by any leading or other smaller WiFi infrastructure equipment vendors. The choice of equipment to WISP is quite large and at the same time it is imperative for this equipment to conform to air interface standards with corresponding interoperability toward WAC/WAG etc.
- WiFi services delivery business is similar to any other ISP business related to internet bandwidth and extending the reach through Wireless Access Points in a hotspot zone. Business economics drive the scale of operations to support such buy and resale of internet bandwidth/backhaul bandwidth core infrastructure.
- WISPs today have a choice of multiple suppliers of backhaul bandwidth, internet bandwidth and establish their own core network. Core network investments are not considered high. In fact, WiFi access infrastructure costs far outweigh the investments toward the core network. Capex per session, per subscriber, for core network is significantly lower compared to capex per subscriber for Wifi radio access network.
- Backhaul bandwidth and internet bandwidth are considered opex and it is expected that such costs will go down over a period of time as fiber penetration expands and large internet bandwidth is available through submarine infrastructure.

Suggestions:

- There is no requirement for a common grid evolution to support consolidated backhaul bandwidth delivery, internet bandwidth delivery and aggregated core network facilities.
- Evolving a common grid leads to the emergence of large players dominating and dictating terms to access providers. Indirectly, such a common grid evolution leads to anti-competitive business environment. The regulator should not encourage such evolution mechanisms.
- Market forces and business models should be allowed to drive the evolution of any innovative network architectures.

Q12. What measures are required to promote hosting of data of community

interest at local level to reduce cost of data to the consumers?

Comments:

- Education, entertainment and e-commerce are the most commonly invoked applications driving the use of internet access at public hotspot zones
- Such content delivery if localized and adapted to suit community interests can be then hosted locally in a tier2 town/rural area etc at the hotspot zone itself through hotspot based content delivery platform utilizing the vastly available air interface bandwidth and not using the internet backhaul. This will reduce the cost of content delivery to the consumer.

Suggestions:

- Local content delivery appliances with DRM rights could be mandated to be deployed with seamless integration capabilities to the WiFi access points in the hotspot zone with suitable accounting metrics for volume of content delivered with transparent indication to the consumer
- Such air interface based content delivery tariffs should be left open to market forces and business economics involving the stakeholders like content providers, content distributors, WISPs and consumers.