Before I delve into the questions, let me give you a brief intro about myself and why I am writing this. When I started my company - MobStac along with my co-founder Ravi in 2009, we set out with a simple mission - to connect the digital and physical worlds through the use of innovative technology. In the first few years, we focused on helping publishers build adaptive mobile sites that would work seamlessly across multiple devices.

Little did I know then, that a small start in this direction would lead me to be ranked among 'India's Hottest Young Entrepreneurs' by BusinessWorld in 2011. In 2014, we shifted our focus to the emerging field of proximity-based marketing and analytics as a new way to bridge online and offline experiences.

We recently launched our latest product - the [Wifire app](#) that aims to make Wi-Fi as reliable and ubiquitous as bottled water. In our endeavour to do so, we enable users to connect to the best public Wi-Fi hotspots around them with a single tap — automatically filling out web forms and OTPs. Using WiFire users can stay connected to public Wi-Fi in their city and save on 3G bills!

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

Ans 1. One of the most important issues faced currently is that the overall infrastructure for Wi-Fi services is not great. Wi-Fi networks are often unreliable in terms of speed. And despite there being a latent need for internet access across the country, even the most basic need of Wi-Fi discoverability is not met.

Lack of consumer awareness is another challenge. Very few consumers know that the tariff for data access via Wi-Fi is much lower than that using 2G/3G/4G. If consumers are made aware of this, there will be greater demand (and hence greater supply) of Wi-Fi networks.

Another problem is that currently, the task of setting up a Wi-Fi infrastructure is handled majorly by a handful of Internet Service Providers. For Wi-Fi access to be ubiquitous, it's important that small businesses participate in the process. Tax breaks and other incentives should be offered to small businesses so they can come in the realm of providing Wi-Fi access. Ample scope should be provided to these SMBs to resell data and monetize it in a way that is convenient for the end user.

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?

Ans 2. The best way to do this is to encourage SMBs to become resellers of Wi-Fi without the need of becoming ISPs. Monetization of such services needs to made consistent and easy. This will help several entrepreneurs and SMB owners to become resellers or providers of Wi-Fi.

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

Ans 3. There is no doubt that users can benefit greatly from seamless connectivity across Wi-Fi networks and interoperability between different service providers providing broadband services through Wi-Fi. Afterall, how long should users tolerate the inconvenience of having to use a variety of log-in and billing procedures when moving from one hotspot to another in the same city?

The best solution for this is that there be 3rd party providers or rather aggregators of Wi-Fi networks/hotspots. Users can directly access Wi-Fi via these aggregators, making the whole process of accessing data across networks of various service providers seamless and convenient. Aggregators can hence pay the owners of these networks accordingly.

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

Ans 4. A great way to do this is to use the EAP-SIM mechanism. This mechanism is used for authentication and session key distribution using the Subscriber Identity Module (SIM) card.

GSM cellular networks use a subscriber identity module (SIM) card to carry out user authentication. EAP-SIM use a SIM authentication algorithm between the client and an Authentication, Authorization and Accounting (AAA) server providing mutual authentication between the client and the network.

In EAP-SIM the communication between the SIM card and the Authentication Centre (AuC) replaces the need for a pre-established password between the client and the AAA server.

This method is widely used in Singapore for connecting to public Wi-Fi hotspots (Wireless@SG hotspots for example).

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.

Ans 5. In India, Wi-Fi is deployed within the unlicensed spectrum over 2.4 and 5 GHz frequency bands. In my opinion, this spectrum is more than sufficient to meet the current needs. We are not facing any congestion on these bands due to excess consumption of data/traffic, so currently there is no need to de-license any additional bands.

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?

Ans 6. Though, the number of Wi-Fi hotspots is growing steadily, logging into these hotspots remains as cumbersome as ever! The login/authentication procedure is often quite baffling, some of the most common issues being:

a) Non-standard landing pages that are non-optimized for mobile. Lot of latency - most of these pages never open/open quite late
b) Confusing UX
c) OTP arrives very late/never arrives
d) Lengthy forms asking for unnecessary details
e) Web-based forms, in the age of apps

To add some context WiFire aims to ease out these very pain points. Using the WiFire app, users can log into any public hotspot without filling out cumbersome web forms or entering OTPs. WiFire does all the heavy lifting! Using its Chrome-like autofill feature, the app fills all the details in these web forms. In case of Android devices, it also reads the SMS to automatically fill in the OTP. Users can thus, connect to Wi-Fi at public hotspots in a matter of seconds! Here's how:
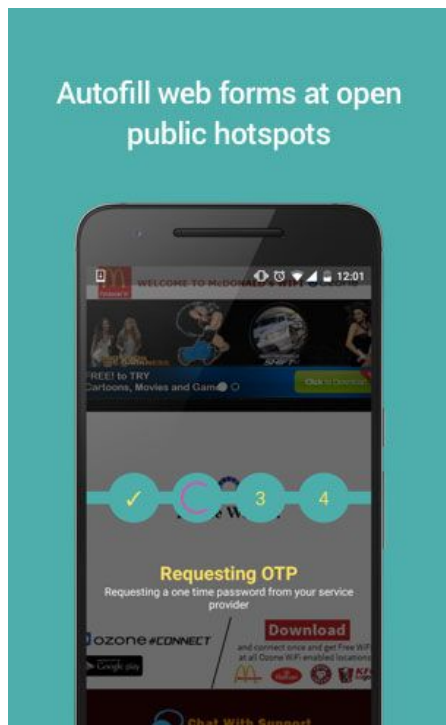
A great alternative is to enable an API-based login procedure instead of the current web-based login. Another way to simplify the process is to use the WPA-Enterprise mode for secure logins. Using the EAP-SIM protocol, as used in Singapore, the login procedure can be made extremely simple. Each user can have a specific username and password, that can be used across various hotspots.

In case of foreign nationals, a simple way to do this is to provide every foreign national entering the country a unique username that can be used to access Wi-Fi hotspots. Whenever the need arises to identify a such a user, the immigration department (or whoever issues the username for Wi-Fi access) can identify the person by the username assigned to him/her.

Q7. **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.**

Ans 7. Payment for access to Wi-Fi is a major problem due to various reasons. Firstly, there are very limited sellers of Wi-Fi. It is thus important to have resellers in the system to make Wi-Fi ubiquitous. Another problem is that in many cases the payment doesn't go through. Users, too are hesitant of using their credit cards on not so professional looking landing pages - to make a purchase of say, a Rs 50 data pack. Following are a few ways to solve this issue:

a) Encourage the presence of Wi-Fi aggregators who aggregate the networks from all providers - users buy data from these aggregators and the aggregators pay the respective providers.

b) Enable payments through mobile wallets.

c) Any Wi-Fi usage from the same provider as say, a user's mobile data (SIM card from same provider) gets billed with other things such as talk time, mobile data pack etc.

d) Enable payments through Universal Payment Interface (UPI) of the National Payments Corporation of India (NPCI). A number of banks are registered in this system and it offers a safe payment option to make payments through the user's bank account, without exposing the bank account. It is possible for ISPs to register on this platform, users therefore can avail the services of ISPs by linking the payment to their bank accounts.

The vision for WiFire is that we enable all the above i.e provide one-tap payment solutions using either digital wallets, UPIs etc., to buy data, by simply clicking on a button.

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?

Ans 8. According to me, there is no need for a hub-based model. Just as in the case of telecom operators where there is no central authority, there needn't be a central authority in this case too.

ISPs can provide data just the way they do, but all user data collected by them could be pushed to a central server, where any information could be retrieved from as and when required. Similarly for authentication too, I feel each provider or aggregator can take care of the authentication process.

I strongly recommend that this process should not be centralized, as a third party with no vested interest in the whole process might not do enough justice to it.

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.

Ans 9. There is definitely a need for adoption of UPIs/digital wallets etc., for easy subscription to Wi-Fi access. Users should be provided a wide array of payment options to choose from according to their convenience.

Q 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?

Ans 10. Reselling of data should definitely be allowed as that will enable wider reach among masses. Enabling SMBs or even home networks to monetize any unused data/bandwidth will provide enough incentive for sharing of Wi-Fi networks and enhance awareness/ access to Wi-Fi among masses.

WiFire already provides a feature that enables users to share their Wi-Fi with friends and family in a single click. In future we can easily enable the possibility of sharing their Wi-Fi network with the public if we enable the right incentive structure.

Q 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 ubiquitous presence of Wi-Fi Network and allow innovation in the market?

Ans 11. I strongly don't recommend any licensing for this. The best example to follow would be the mobile prepaid market, where any SMB can sell talk time/ data packs or any mobile user can share their talk time with friends and family. Similarly, in this case, enabling home networks

and offices to sell their unused data will go a long way in making Wi-Fi access ubiquitous, and I believe the right time for this is actually now.

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

Ans 12. I feel each and every citizen of this country should have direct access to the internet. Creating a local server with local information cannot compare with the vast knowledge one can attain on the internet.

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

Ans 13. Reiterating what I discussed already, there is a tremendous need to make Wi-Fi ubiquitous. In order of priority here is how this can be done:

#1 increasing the density of Wi-Fi providers by bringing resellers who can reach more people
#2 Enabling frictionless discoverability
#3 Ability to connect and pay for data seamlessly by consumers