Wifi Dabba - Own a piece of the internet
A model for community owned low cost internet access in emerging markets

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2021 - Draft 1

Abstract

The rise of DeFi and a breakthrough in laser technology now allows for the creation of community owned broadband networks. DeFi allows for consumers globally to participate in the ownership of a large project which was previously untenable with fiat currencies due to high taxes and service fees. Lasers meanwhile have dramatically lowered the cost needed to power broadband networks. The combination of these two technologies allows a more efficient model to deploy internet access for the next billion users.

Introduction

The deployment of broadband internet infrastructure has historically been expensive due to the limitations of the technology itself. Installation of the underground core fiber networks that broadband systems rely on necessitate the digging of thousands of miles of trenches that are extremely expensive and time consuming. Furthermore, installation of physical infrastructure at this scale is always accompanied by massive bureaucracy and red tape. This naturally leads to long deployment cycles which in turn leads to long payback periods which require large amounts of capital up front. As a result, the deployment of broadband networks has been largely limited to Nation-states and large corporations.

The high costs and timelines associated with traditional broadband networks has resulted in uneven distribution of access around the world. Developed countries have broadband penetration rates higher than 70% on average, but even in these saturated markets, there are significant pockets of lower-income and rural populations that have little to no access. In developing countries, the situation is worse, broadband penetration rates are in single digits, India for example, has less than 7% broadband penetration.

The technical, financial and bureaucratic structure of the current industry standard has served the middle and upper classes of most countries fairly well, but this same structure has failed miserably to provide access to low income as well as rural populations. Long payback periods and large deployments usually target premium long term customers as is evidenced by the average plan price for fiber broadband in most markets across the world.

Regulatory capture is an unfortunate by-product of the traditional system as well. If a broadband network were to be deployed by a private institution, it would require the creation of or existing relationships with local and national government bodies in order to obtain the necessary permits required to deploy said system. This relationship strengthens over time and prevents newer

players from being able to enter into the system - having the effect of further raising the costs of new networks and stymieing any innovation before maturity.

It has taken India roughly 20 telecom companies, more than 15 of which failed, billions of dollars and more than 20 years to deliver broadband internet to only 7% of the country. At this rate, it'll take nearly a century to change.

A significant consequence of the current system is visible at a global level with the splintering of the internet into largely independent sections. There is the largely US dominated 'global internet' that is home to the largest companies in the world and is the internet that is referred to when most people talk about the world wide web. Although largely dominated by an english speaking minority, most of the world accesses this internet daily. Then, there is the chinese internet which is largely firewalled off from the rest of the web, accessible only within China and tightly controlled. Finally, there are many smaller regions on the internet in countries where the government exerts a strong level of control over its people and access to the internet is heavily restricted, regularly cut-off and largely censored.

All of these problems arise fundamentally from the nature of optical fiber technology. A change of technology at this level would provide far reaching benefits by creating a more equal system by virtue of being lower cost thereby being accessible to a greater number of people.

Free space optics - A breakthrough in laser communications

Light has been used as a communication system for millenia. From torches to lighthouses to semaphores on ships, humanity has always used light to communicate. Free Space Optics (FSO) is a technology that uses light propagating in free space for telecommunications or networking. Free Space means air, outside space, vacuum or something similar.

In the 1970s free space communications via light received a boost with the invention of lasers. Transmission speeds reached hundreds of megabits and found many applications within the military across all branches. The space industry also used this technology to communicate between satellites and this remained largely the use case till the early 2000s.

The first wave of companies in the early 2000s attempted to deploy free space optics and largely failed due to the high cost of the units as well as the lack of demand from consumers for high speed data at the time. The lasers of this era were also limited in speed to well under a gigabit per second and performed poorly in rainy conditions. Being ahead of its time and slightly underbaked - this is a common story in the technology industry. A good example of this is in machine learning or AI systems. Invented in the 1970s, they enjoyed much hype but never delivered because of a lack of scale of data that those algorithms needed to function accurately.

As machine learning is making a comeback, so is free space optics. The second wave of FSO lasers are multiple orders of magnitude better than generation one. Capable of transmitting 100

gigabits per second at distances over 20 kilometers, generation two of the lasers are capable of delivering > 99% uptime in most environments and weather conditions. This leap forward in reliability and speed is due to massive improvements in optoelectronics as well as lens manufacturing and smarter error correction algorithms in the last four decades.

The size of units has also dramatically decreased to no bigger than a shoebox and are capable of getting much smaller in future versions. The lasers are a class 1M eye safe laser tested to international standards and poses no threat to the environment or any living creature.

Free space optics in the context of 5G

5G or millimeter wave technology works fundamentally different from free space optics. The former uses radio waves while the latter uses light as a medium of transport. 5G is a one-to-many system designed to deliver access to end user devices such as mobile phones whereas FSO is one-to-one and is designed to deliver access between aggregation points.

Free Space Optics as the name suggests, uses license free spectrum to deliver data unlike 4G or 5G services which uses radio waves in the licensed spectrum to deliver service.

FSO fundamentally complements 5G by supporting 5G cells with sufficient bandwidth to deliver to a large number of end users. FSO can handle tens of thousands of concurrent users whereas a 5G cell may handle hundreds or a few thousand users at most.

Given that the 5G architecture is that of thousands of small cells with short range access, these cells will require a strong backhaul network for their data needs. FSO is well placed to service this market by providing a core network that 5G networks can sit atop of.

The technology roadmap for increase of throughput, efficiency, size and cost is extremely clear. Unit economics will continue to become more attractive as scale grows.

Wifi Dabba is deploying a grid of lasers across Bengaluru city

An optical mesh creating a high speed internet backbone can be created efficiently and cheaply using free space optics lasers. This core backbone will serve end consumers cheap and fast internet using overhead optical fiber as the last mile delivering fiber to the home.

Given the small size of our lasers and low power requirements, existing mobile telecommunications infrastructure is being used for efficiency of deployment. Wifi Dabba has partnered with tower infrastructure companies as well as high-rise building owners to secure installation and usage rights to deploy our lasers.

We have divided the city of Bengaluru, India into a grid of 100 regions. The city is roughly 625sqkm and each cell is roughly 6sqkm in-turn. Each region has a pair of FSO units providing

incoming and outgoing data signals. The FSO in each region is equipped with compute, networking, storage and power backup scalable enough to handle hundreds of thousands of devices per region.

Wifi Dabba fundamentally changes the anatomy of a broadband network

Physically

The wireless nature of the FSO saves Wifi Dabba nearly $90M in physical infrastructure deployment costs as well as saves nearly 5 years of time because the FSOs can be deployed in a matter of a few months. It's worth noting that FSO is much better for the environment because of the net emissions saved by not having to dig up streets for years at a time.

Also, now that the architecture of the network has gone from a monolith of fiber to flexible modular pieces that can be added and removed easily, this makes ownership and maintenance of the core network dramatically cheaper as well.

Upgrades and changes to the network become much easier because all parts are standardized, modular and easily accessible requiring minimal maintenance or installation time.

This lowers the floor of the skill and specialization of the labour required to deploy and maintain the network and also reduces the headcount of the workforce required.

Economically

Not only is it now cheaper by an order of magnitude to deploy a backbone network, each part of the network is composable and a commodity unit easily divisible. It then follows that each part can be assigned ownership and financing flexibly at a low per-unit cost.

Furthermore, given the inherently digital nature of an admittedly physical product, the ownership of the network can be separated from the geographical location of the network unit itself leading to a pathway to global ownership.

Culturally

Given that the network can be deployed with minimal regulation and with great speed, it follows that the organizational culture can be younger, more aggressive and forward looking. The previous requirement of having to deal with bureaucracy will no longer be a burden on the organization.

Topographically

Current broadband networks skew towards wealthier neighborhoods and business districts while ignoring the lower income areas as well as city outskirts and rural areas. Wifi Dabba's laser grid offers equal access to the entire city regardless of geographical position.

Features of the Wifi Dabba network

Prepaid billing starting at One Rupee per GB

While 98% of 4G connections in India are prepaid, in broadband, prepaid barely exists. Your only choice is to prepay large amounts of money and maybe get a free wifi router. The Wifi Dabba network is designed to offer as little as 1GB for a price anyone can afford.

Wifi Mesh network for roaming

Traditional ISPs are designed around a sort of hub and spoke system where each router is an end point for one specific customer only. This means that customers can only access the internet from their designated location and cannot roam across the network even if they know of another customer of the same ISP they share. This leads to under-utilization of the network and higher billing rates, both things that traditional ISPs love.

All routers on the Wifi Dabba network will give out a public wifi signal that anyone can access regardless of their geographical location. They will be able to roam across the network and access the Wifi Dabba signal wherever they go. You'll never have to share a wifi password again.

DabbaOS

The strength of broadband industry players is more to the manpower and regulatory capture side rather than the technology side due to the nature of the physical deployment itself. The industry uses old billing and customer management that is largely outdated and was written in the early 2000s. Rigid billing and access software with equally rigid data caps is the norm. APIs are unheard of in the industry.

DabbaOS a network operating system designed to be flexible and be closer to a cloud provider than the traditional systems. Each region in the laser grid is supported by a mini data center at the laser location. Developers will have APIs that give them access to this storage and compute with a greater visibility into devices on the network allowing them to build new kinds of applications that are not yet possible.

App store

Wifi Dabba is providing developers with unprecedented access and visibility into the network along with storage and compute resources. We hope this platform will allow developers to build

apps that deliver great value to users. These apps could be content filters, caching services, security services and many other applications not yet conceived.

Wifi dabba router

A free dual band wifi router is provided to all customers. The router is a stripped down design for deployment at scale and cheap replacement. Wifi Dabba routers can also work with existing internet connections though some billing details may need to be changed.

The customer experience of the Wifi Dabba network

There are two types of customer segments on the network. Those with a fixed connection and roaming customers. Fixed connection customers are consumers that reach out to wifi dabba and receive a wifi dabba router along with installation of our fiber line. These customers can be homes, retail, offices, factories, hotels and other establishments. Roaming customers are those that do not have a fixed wifi dabba connection but are only users of the public wifi network.

Enhanced distribution model

Wifi Dabba has the unique advantage of being able to "push" sales along with "pull" sales as compared to traditional internet service providers. While traditional providers have to advertise and then rely on consumers to contact them, Wifi Dabba, because it is a public wifi network, can proactively install Wifi routers at public locations, retail outlets and more. Each installation increases the reach and roam area of the network thereby increasing the number of customers that can be served more efficiently.

Wifi Dabba and PM-WANI

In late 2020, the Union cabinet of the Indian government approved the proposal of the Department of Telecom to proliferate broadband internet through public wifi networks under the framework of the Prime Minister's Wifi Access Network(PM-WANI).

Wifi Dabba was a founding member of the proposal and had the largest number of hotspots during the field trials and had a strong input into the spirit and letter of the proposal.

The PM-WANI framework is important to low cost internet access for the next billion users because it paves the way for anyone to resell data. This is an important point because in the current system, in order to be a data provider, one had to apply for a license, provide bank guarantees, pay higher taxes and be burdened with high levels of administrative reporting. PM-WANI allows anyone to profit from the sale and distribution of internet access without any of the aforementioned requirements.

This key pillar means that the financing of a broadband network can have a broader base than was traditionally possible, dramatically lowering the bar for anyone to become an ISP. With our

breakthroughs in laser technology and a streamlined regulatory framework there is fertile ground to build the next generation of internet service providers.

ISP in a box

India has a unique broadband and cable tv ecosystem. Despite the presence of large mobile telecom providers that have served the 4g market well, all the players combined barely have single digit penetration into the broadband or cable tv market. The fixed-line business of communications in India is largely split up into tens of thousands of smaller local cable tv operators or LCOs. These LCOs tend to have anywhere from 50 to a few hundred subscribers for their small cable tv or broadband business. These LCOs tend to be running multiple parallel businesses like local real estate brokerage or mobile recharge services too. They have difficulty growing their connectivity business due to a lack of capital and technical know how.

Wifi Dabba is going to aggregate these smaller players and provide them with a hardware and software platform that will help them leverage their greatest strength - their local knowledge and on-ground manpower capabilities and operations. DabbaOS will provide them with an authentication and monetization layer that makes billing simple. Furthermore, their network will form part of the larger Wifi Dabba mesh to take advantage of roaming users and network effects.

There are hundreds of cities in India alone with populations greater than one million people. Wifi Dabba can provide an ISP in a box kit to local entrepreneurs to setup a city-wide wifi network in a matter of a few months.

Own a piece of the internet

Armed with an asset-light low cost laser system with good unit economics and flexible software, Wifi Dabba then took a step towards increasing public ownership of the system. The idea of super fast, super cheap internet and Wifi Dabba's mission has long resonated with the general public. We have received thousands of emails and calls inquiring about partnerships and other manners of cooperation.

Wifi Dabba partner program

In late 2020 Wifi Dabba launched our first partner program - the PoP program.
We divided the city of Bengaluru into 100 regions that could be nominally owned for $20,000 a region. Each region is called a PoP or Point of Presence. The owner of the region was entitled to a revenue share from the subscribers in that region. The partner program sold out in just over a month. Engineers, product managers and plenty of folks working at the hottest tech companies around the world largely compose the demographic of owners.

During the sale of the partner program, we observed a tremendous amount of demand from users around the world asking to participate at a lower price point. This positive indicator led us

to spend some time looking at a manner in which it would be feasible for large numbers of people around the world to participate in the ownership and rewards of the network.

Blockchain and crypto funding for public goods

Helium is a LoraWan network that distributes long range, low power network devices and incentivizes users to install and maintain these networks. The rewards for users come in the form of a cryptocurrency HNT. FreedomFi is another project targeted towards 5G deployments.

The interest and viability of these prior projects have served as an indicator of the future of communications systems deployments. Wifi Dabba occupies a strong position in this framework. Unlike others, Wifi Dabba fully manages and maintains the infrastructure on behalf of the owners rather than requiring users themselves to own and operate the infrastructure. And unlike the immature IoT market for LoraWan and the future promise of a 5G network base, Wifi occupies the sweet spot of high bandwidth and low cost. Geography also plays a strong role, India is the 2nd largest mobile network subscriber base in the world. Consumption of data is nearly doubling every year and Indian consumers are hungry for more data. There is a gap in demand for data ready to be served today.

WD Exchange

The Wifi Dabba allows anyone to trade data like it's oil. The WD exchange is a platform for ISPs, consumers and data traders designed to boost the deployment of broadband networks worldwide. Data traders help provide liquidity to ISPs that can be used to grow their networks. Users purchase data on these new networks and data traders are rewarded for providing the initial capital. The ISPs are incentivized to run good networks and provide value to data traders and customers. The first ISP on the WD exchange is Wifi Dabba, we hope to onboard more ISPs going forward.

Data Trader(DT)

A DT is an individual who has purchased internet bandwidth on WD *bandwidth exchange*[1]. Anyone can become a DT on the *WD network*[2] by signing up for the program. The *minimum internet bandwidth*[3] a DT can purchase is 7500Gb.

Minimum Data purchase	Price in USD	Price in INR	Price per Gb (INR)

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[1] *An online WD marketplace where buy/sell transaction occurs for bandwidth*
[2] *A physical telecom network that exists across the city*
[3] *One can buy multiples of 7500Gb packs. Minimum buy 1 pack*
[4] *The one who buys internet bandwidth for accessing the internet for personal use*
[5] *A ERC 20 coin issued on blockchain using smart contract*

7500 Gb	100	7500	1

On Ramp

Once purchased using fiat currency, DT can list a sell contract on the WD bandwidth exchange. A *WD consumer*[4] can now purchase this internet bandwidth by paying a fee of INR 1 / Gb. This fee is paid to Wifi Dabba account via CC/UPI/NetBanking or other available payment instrument.

Everytime 1 Gb of data is sold from the DT's account, a *WD coin (WDC)*[5] gets minted and is transferred to the wallet of DT.

Once DT sells all the 7500Gb, S/he would have collected 7500 WDC in his/her wallet. DT can now place a buy contract for another 7500Gb on the WD bandwidth exchange. This time DT can purchase this bandwidth by paying in USD or INR or WDC.

Currency	MinimumData Purchased (Gb)	Price per Gb	Cost price for DT
USD	7500	USD 0.0134	USD 100
INR	7500	INR 1	INR 7500
WDC	7500	WDC 0.91	WDC 6825

Liquidity for DT.

Option 1:
A DT can sell WDC to Wifi Dabba at following rate:

Sell WDC in INR	0.80p / 1 WDC	INR 6000 / 7500 WDC
Sell WDC in USD	0.01067c / 1 WDC	USD 80.03 / 7500 WDC

The coin gets burnt to ensure circulation of WDC in the market is finite.

Option 2:
A DT can sell WDC on an open *crypto exchange*[6] at the *market rate*[7].

Recovery model:

Cycle	Opening WDC balance	Purchase Gb	Sold Gb	Sold Gb (cumulatively)	Closing WDC	INR margin	USD margin
1	0	7500 (via usd)	7500	7500	7500	6000	80.03
2	7500	7500	7500	15000	8175	6540	87.23
3	8175	7500	7500	22500	8850	7080	94.43
4	8850	7500	7500	30000	9525	7620	101.63
5	9525	7500	7500	37500	10200	8160	108.83
6	10200	7500	7500	45000	10875	8700	116.04
7	10875	7500	7500	52500	11550	9240	123.24
8	11550	7500	7500	60000	12225	9780	130.44
9	12225	7500	7500	67500	12900	10320	137.64
10	12900	7500	7500	75000	13575	10860	144.85
11	13575	7500	7500	82500	14250	11400	152.05
12	14250	7500	7500	90000	14925	11940	159.25
13	14925	7500	7500	97500	15600	12480	166.45
14	15600	7500	7500	105000	16275	13020	173.65
15	16275	7500	7500	112500	16950	13560	180.86
16	16950	7500	7500	120000	17625	14100	188.06
17	17625	7500	7500	127500	18300	14640	195.26
18	18300	7500	7500	135000	18975	15180	202.46
19	18975	7500	7500	142500	19650	15720	209.67
20	19650	7500	7500	150000	20325	16260	216.87
21	20325	7500	7500	157500	21000	16800	224.07
22	21000	7500	7500	165000	21675	17340	231.27
23	21675	7500	7500	172500	22350	17880	238.47
24	22350	7500	7500	180000	23025	18420	245.68
25	23025	7500	7500	187500	23700	18960	252.88

[6] any exchange like Uniswap, Coinbase, Binance, etc
[7] The rate at which WDC is trading in the open market. Subject to availability.

Token allocation

100% of all coins/tokens generated will go to hotspots owners. No investor, team member or any other party affiliated with Wifi Dabba will receive coin/tokens. Wifi Dabba coin/token is an ERC-20 token.

Risk factors

a. Wifi Dabba is attempting to deliver low cost internet access using novel and disruptive technologies in a low margin, high volume emerging market.

b. Wifi Dabba promises to execute its duties on a best effort basis, however, in any competitive technology business, there exists a risk of failure.

c. In the event of a cease of operations or shutdown, Wifi Dabba may not be able to provide or guarantee liquidity for any outstanding amount.

Wifi Dabba timeline

-   WD EXCHANGE LAUNCHES

    Wifi Dabba launches the WD exchange. A platform for trading data like its oil. The WD exchange brings together data traders, ISPs and end consumers to create a market that provides capital for ISPs, cheap internet access for consumers and rewards for data traders.

    2021

-   PARTNER POP PROGRAM SOLD OUT

    In late 2020, we launched a partner program wherein anyone could purchase a region of the WD network - called PoPs - for $20,000 USD and in return receive share of revenue. The program sold out in just over a month.

    2020

-   10 LASER LINK FIELD TRIALS BEGINS

    We deploy 10 laser links across the city to monitor performance in the real world with real conditions. We go on to run this trial for nearly 18 months. The invaluable data these real world trials allow us to deploy the production network more efficiently and resiliently.

    2020

-   FIRST WIFI DABBA LASER IS DEPLOYED

Our first laser is deployed in Bangalore connecting two 10 storey residential towers set 5km apart. We successfully beam an internet connection across the city at a cost dramatically lower than anything else available right now. This successful test gives us the confidence to start scaling out the laser network.

<div align="right">2020</div>

- DEVELOPMENT OF LASER BACKHAUL BEGINS

As we grow our network, we start to realize that the existing infrastructure of internet access in India is built on ancient techniques and practices. The industry relies on expensive underground fiber to power their core networks, as a result, the cost of internet to end consumers is extremely high due to the high capital costs of deploying underground fiber. Wifi Dabba starts to look for a way to dramatically lower the cost of core networks to benefit the end consumer.

<div align="right">2020</div>

- COLIVING MANAGED WIFI SERVICES

Wifi Dabba partners with Oyo and other leading coliving providers to deliver super fast, super cheap, roaming internet to over 150 buildings and 10,000 tenants across Bangalore. Now our network is in retail as well as residential markets.

<div align="right">2019</div>

- GOOGLE STATION DEPLOYMENT

Wifi Dabba partners with Google's next billion user initiative to deploy co-branded public wifi hotspots across Hubli, a busy tier-2 city in the south of India.

<div align="right">2018</div>

- PM-WANI

Wifi Dabba plays a key role in the creation of the Prime Minister's Wireless Access Network Interface, helping to lay the ground for a fairer internet where the redistribution and sale of data can be done by anyone.

<div align="right">2018</div>

- WIFI DABBA EXPANDS TO 1,000 LOCATIONS

Over the course of a year, we aggressively expanded our deployment and installed hotspots across the city of Bangalore in stores, bakeries, juice shops and tea stalls.

<div align="right">2017</div>

- WIFI DABBA IS ACCEPTED INTO YCOMBINATOR

We had grown to 5 hotspots by this time and started seeing regular usage at all locations. We raised $1.2M from angel investors and funds from around the world.

<div align="right">2017</div>

- IN LATE 2016, A WIFI HOTSPOT GOES LIVE AT A TEA STALL

  We installed a broadband connection and a raspberry pi serving as a wifi router. It got popular really quick. Pretty soon a ton of customers at the tea stall started using the Wifi.

<div align="right">2016</div>

- MILDLY CLASSIC STANDUP MEETINGS

  Mildly classic, a software consulting company, used to have a little evening ritual where the entire team would go out for a cup of tea and a little break around 5pm every. single. day. We started noticing really quick that it would be useful to have high speed wifi at the tea stall to check on project statuses or just quickly google a fun topic everyone's talking about.

Conclusion

The mainstream acceptance of cryptocurrency DeFi along with breakthroughs in laser technology now allow for a more democratic ownership of internet infrastructure. Wifi Dabba's mission is to bring a billion Indians online with super fast super cheap internet.