Plugging in the Consumer in the 6 GHz Discussion

Executive Summary

This Snapshot of Findings brings to the forefront consumer perspectives on Wi-Fi, and its availability on the wireless spectrum band- 6 GHz, which is not available for license-exempt use in India, as yet. As of now, Wi-Fi in India is available on the 2.4 and 5 GHz bands.

Many countries are deliberating on the choice of regulation, i.e. licence, delicense/ exemption from license or partial licence 6 GHz. The Department of Telecommunications (DoT) in India has set up a committee to study the same. It includes industry associations, Ministry officials, and academia, among others.

In order to add a consumer perspective to this discussion, CUTS implemented a study based on in-depth consumer interactions from a diverse respondent profile, across different geographical locations in India, to understand their perspectives, challenges, expectations from Wi-Fi and perceptions on the availability of Wi-Fi on 6 GHz.

Findings & Recommendations

- Low-income consumers with more family members are caught in a Wi-Fi exclusion trap. Wi-Fi should be made available to them and accommodate new users.

- Significant demand to improve quality of experience (QoE) in current Wi-Fi services exists. This can be met through better competition, following the latest Wi-Fi protocols & effective consumer grievance redressal.

- Need to gain early mover's advantage to leverage the future of Wi-Fi by ensuring the availability of compatible devices and a supporting Wi-Fi ecosystem, and unlocking new use cases.

- Awareness and security around public Wi-Fi and PM-Wani scheme should be increased, through involvement of consumer groups and grassroot organisations.

Background of the Study

A Pan-India study on understanding consumer perspectives, challenges and expectations from Wi-Fi and perceptions on the availability of Wi-Fi on the 6 GHz band was undertaken by Consumer Unity & Trust Society (CUTS), with support from ITU-APT Foundation of India (IAFI) in October 2022-May 2023.

Need for the Study

The Internet can be accessed through Wi-Fi using 2.4 GHz and 5 GHz spectrum bands in India.[1] Globally, many countries have made the 6 GHz band (5925 GHz to 7125 MHz) also available for license-exempt use now, which enables Wi-Fi providers to offer their services in the 6 GHz band without the need to obtain the licence. While some adopted licence-exempt use of the entire 1200 MHz available in the 6 GHz band, some partially adopted and some are still considering appropriate regulation.[2]

In India, DoT established a committee to study the issue. Representations by telcos,[3] tech companies,[4] technology policy experts[5] and TRAI opinions are available in the public domain.[6] Several technical reports and macroeconomic analyses on Wi-Fi and the 6 GHz band are available as well. However, a consumer perspective on challenges, benefits and expectations from Wi-Fi is missing.

Study Details

In light of the above, the study was launched to understand and highlight: (i) Consumer perspectives on challenges and concerns from Wi-Fi services in the existing bands; (ii) Consumer preferences, benefits and future expectations from the 6 GHz band.

For a holistic understanding of consumer perspectives, a comprehensive questionnaire with innovative quantitative and qualitative methodology components, such as **choice experiments**[7] and **practical intervention**[8] involving interactive sessions, was designed. This was administered through in-depth, in-person interactions conducted over 15 sessions in six states of India. The study covered around 400 respondents from different backgrounds across various geographical locations.[9]

Key Findings

Surge in Wi-Fi Penetration

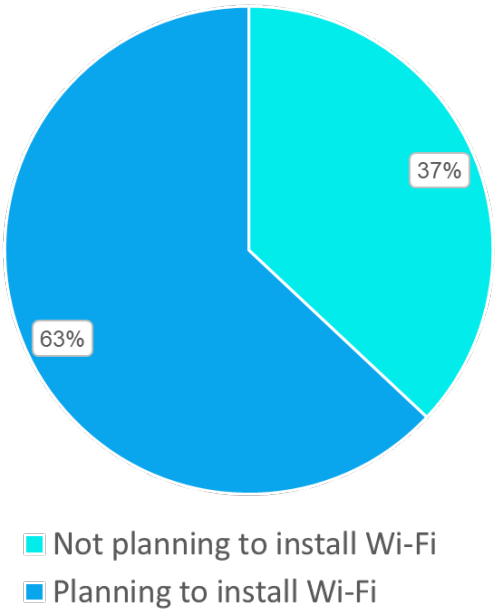
A majority of the consumers had Wi-Fi connections at home. Penetration of home Wi-Fi connections was considerably high in Tier-I (88 percent) and Tier-II cities (60 percent).

In Tier-III cities/ rural areas, lesser consumers (32 percent) had the connection. These consumers shared that there was a lack of accessible Wi-Fi service providers in their vicinity. Further, there were concerns regarding

dual expenditure on individual mobile data connections and Wi-Fi connections, stressing their limited resources.

Despite these concerns, many consumers were interested in the possibility of installing Wi-Fi, as shown in Figure 1.

Figure 1: Preference of those not having Wi-Fi at home



With this likely increase in Wi-Fi consumers in mind, it is necessary to ensure that existing and new users can be accommodated in the Wi-Fi ecosystem.

The availability of Wi-Fi on the 6 GHz band (Wi-Fi 6E), with its additional bandwidth of over 1200 MHz, can potentially ease and decongest Wi-Fi services in existing 2.4 GHz and 5 GHz bands as well, allowing service providers to design appropriate service packages for potential Wi-Fi consumers.

Inability to Access Wi-Fi in the Exclusion Trap

A majority of the consumers from Tier-III towns and rural areas have been unable to make the shift to Wi-Fi, even though they would like to since they are caught in a vicious Wi-Fi exclusion trap.

As shown in Figure 2, it is seen that low-income families with more family members are less likely to have Wi-Fi connections. Even though these are the consumers that could benefit the most from having a Wi-Fi connection at home, with round-the-clock availability and the ability to connect to multiple devices at the same time.

Figure 2: Co-relation of average monthly family income and number of family members with Wi-Fi connections at home

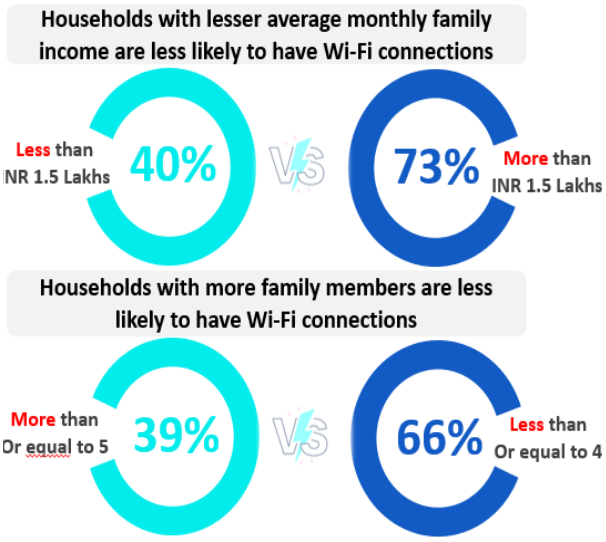


Figure 3: Experiences of those in the Wi-Fi exclusion trap

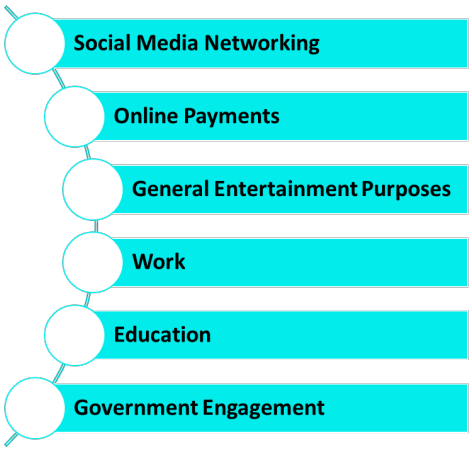
- Uninterrupted and reliable internet access is not available throughout the day
- Data gets exhausted by around 4 PM, leading to limited income generation and growth opportunities
- Due to lack of appropriate coverage, especially in rural and north-eastern regions of the country, many are unable to access intenet
- Women and senior citizens rarely have material access to internet-connected devices, as the limited disposable income is generally spent on providing internet access to other family members

Ensuring the availability of uninterrupted and reliable internet at affordable rates to such consumers powered by Wi-Fi can aid in pulling them out of the exclusion trap, thereby bolstering the efforts to bridge the digital divide and inequalities.

Licence-exempt use of the 6 GHz bands can therefore unlock significant economic opportunities for consumers, which could increase family's disposable income. It could also enable internet access for women and other family members for longer durations, whose interests were not necessarily being prioritised earlier.

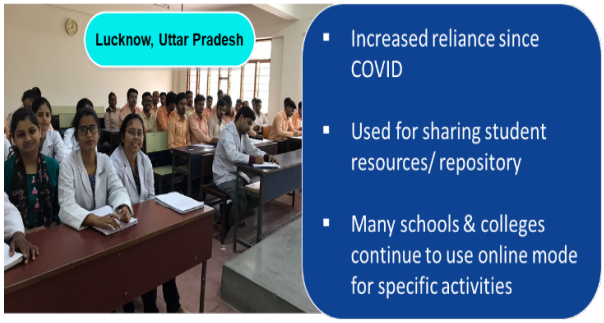
Woes with Quality of Experience (QoE)

Figure 4: Consumers' QoE in Decreasing Order



Current Wi-Fi users highlighted that although Wi-Fi is critical across several use cases, there is considerable need for improvement in the quality of experience especially for use cases such as education and work.

Figure 5: Consumer Views on QoE in Lucknow

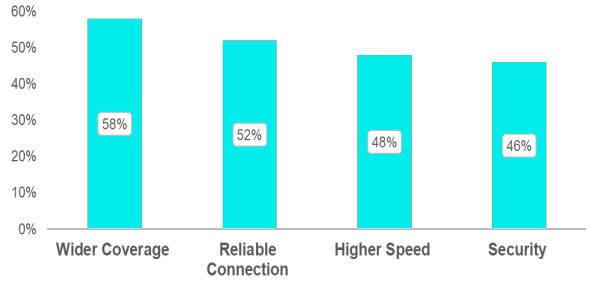


College students and working professionals, who were a part of the in-depth interactions, shared that for

critical use cases such as education and work, higher internet speed and more reliable connections were necessary.

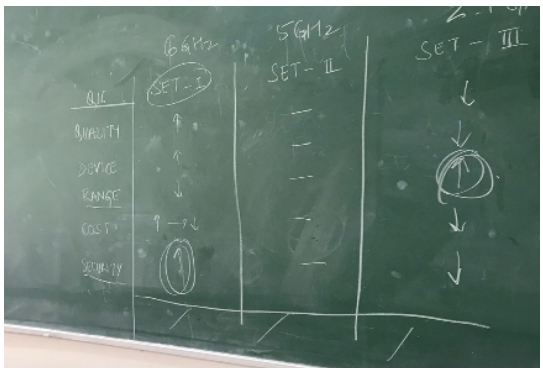
In this regard, Wi-Fi 6E offers a promising solution. It can cater to increasing consumer demands with expanding network capacity[10] and achieve faster internet speed,[11] lower latency,[12] with better security[13]- all of which are expectations of consumers from Wi-Fi as well, as highlighted in Figure 6.

Figure 6: Future Expectations of Consumers from Wi-Fi



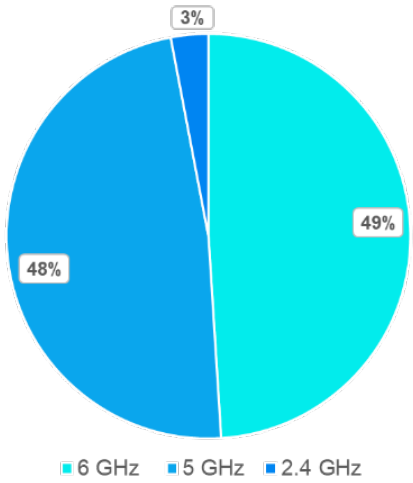
In the choice experiment, technical features (parameters such as speed, reliability, device compatibility, etc.) of the three bands, i.e. 2.4 GHz, 5 GHz and 6 GHz bands, were shared.

Figure 7: Choice Experiment Explained to Consumers



On being asked which band they preferred as a whole, there was a close competition between the 5 GHz and 6 GHz bands.

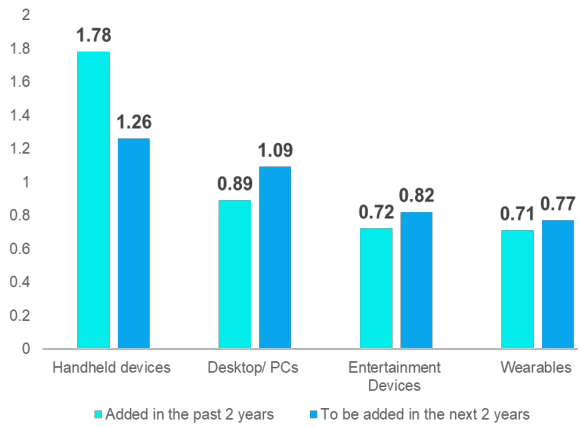
Figure 8: Choice Experiment between 2.4, 5 and 6 GHz Band



Towards a Connected Future

Apart from explicitly choosing technical features of the 6 GHz band over other bands, 44 percent of consumers also indicated that they would like to upgrade to the latest Wi-Fi technology, which supports high-end devices.

Figure 9: Increased Demand & Adoption of Wi-Fi Devices



With the increased demand and adoption of Wi-Fi-connected devices (refer to Figure 9), younger respondents were found to be more likely to add Wi-Fi-connected devices in the next two years, across categories, as shown in Figure 10.

Figure 10: Average Devices to be Added by Consumers

Age Range	Desktop/ PCs	Handheld Devices	Entertainment Devices	Wearables
Less than or equal to 35 years	1.17	1.35	1.08	0.94
More than 35 years	0.51	0.91	0.64	0.39

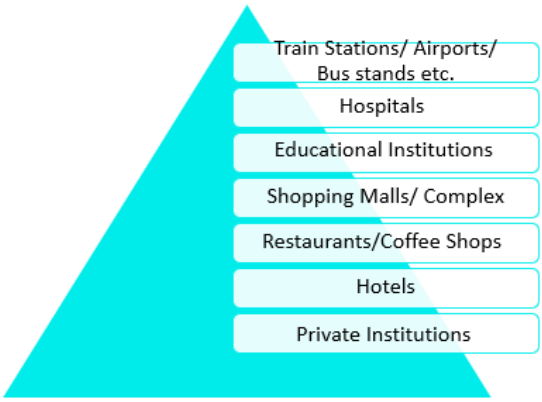
Younger consumers are more keen on buying Wi-Fi-connected devices, particularly entertainment/ gaming and wearables.

Reportedly, this year over 473 million Wi-Fi 6E devices are likely to be shipped.[14] Noting such trends, efforts towards creating a supporting device ecosystem are necessary in India. Without the same, networks will operate on limited compatibility and consumers will miss out on 6 GHz's potential and benefits.

Unfulfilled Potential of Public Wi-Fi

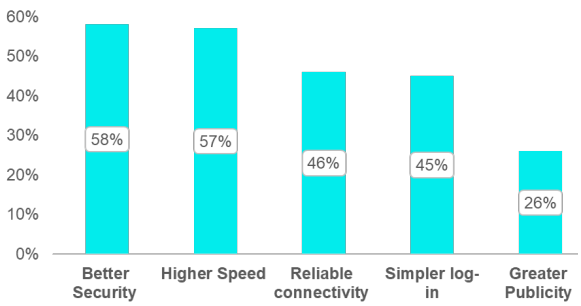
61 percent of users have used public Wi-Fi. However, it is identified that in public places which are frequented by all (including those consumers caught in the Wi-Fi exclusion trap), the QoE of public Wi-Fi fares the lowest. As seen in Figure 11, the QoE is the lowest at train stations, airports, bus stands, etc. and the highest in private institutions.

Figure 11: Public Wi-Fi QoE (in increasing order)



A need for improvement(s) in public Wi-Fi (refer to Figure including better security, higher speed, reliable connectivity and simpler log-in, has been highlighted. Consumers also said that greater publicity/awareness of public Wi-Fi was necessary, as shown in Figure 12.

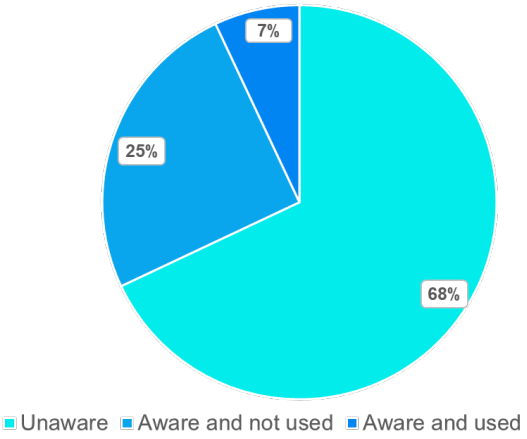
Figure 12: Areas of Improvement for Public Wi-Fi



In this regard, it was also found that awareness of the PM-Wani scheme was

abysmally low. 68 percent of consumers were unaware of the PM-Wani scheme, as shown in Figure 13.

Figure 13: Perceptions on Awareness Regarding PM-Wani



The availability of the 6 GHz band for license-exempt use could improve QoE, providing greater bandwidth, better throughput, lower latency, lesser interference and better security to consumers. With these features, 6 GHz has the potential to improve the performance of public Wi-Fi and the PM-Wani scheme, offload the burden from existing Wi-Fi bands and bolster the enablement of broadband access to all in India.

Recommendations

- Need to make reliable **and secure Wi-Fi easily accessible at affordable costs** while taking **last-mile connectivity into account to extract consumers** from the Wi-Fi exclusion trap.
- Necessary measures to be taken to ensure consumers are **offered a better quality of experience** across different Wi-Fi use cases through better competition, following the latest Wi-Fi protocols & effective consumer grievance redressal.
- Due cognisance must be placed on **future trends of devices, and an ecosystem supporting such devices** must be made available to realise the potential of Wi-Fi and unlock new use cases.
- **Increase awareness** of Wi-Fi to rural consumers, benefits of public Wi-Fi and about PM-Wani, with support from grassroots organisations.
- Further **evidence-based research** is required to understand consumer perceptions, progress made and challenges remaining on different aspects related to internet connectivity and Wi-Fi **to achieve integrated urban-rural development.**

Endnotes

1 More details are available at: https://cuts-ccier.org/pdf/findings-recommendations-understanding-consumer-perspectives-on-6ghz-band.pdf

2 Countries enabling Wi-Fi in 6 GHz (Wi-Fi 6E). Available at: https://www.wi-fi.org/countries-enabling-wi-fi-in-6-ghz-wi-fi-6e

3 https://economictimes.indiatimes.com/industry/telecom/telecom-news/its-tech-majors-vs-telcos-for-rich-6-ghz-pickings/articleshow/79895062.cms?from=mdr

4 https://trai.gov.in/sites/default/files/Facebook_others_companies%20combined_10112020.pdf

5 https://www.financialexpress.com/opinion/connecting-india-delicense-6-ghz-and-v-bands-for-superior-wi-fi/2350080/

6 https://www.trai.gov.in/sites/default/files/Recommendations_31082021_0.pdf

7 In the choice experiment, respondents were asked to choose between the three Wi-Fi bands, i.e. 2 GHz, 5 GHz and 6 GHz, based on technical features such as speed, security offered, device connections supported, etc.

8 In the practical intervention, respondents were given a video watching and speed test exercise. The respondents were expected to note the difference in their quality of experience when their device was connected to Wi-Fi on 2.4 GHz versus 5 GHz.

9 More details are available at: https://cuts-ccier.org/pdf/findings-recommendations-understanding-consumer-perspectives-on-6ghz-band.pdf

10 The 6 GHz band offers additional 1200 MHz bandwidth and thereby reducing congestion.

11 Wi-Fi 6E can deliver faster data rates since it has access to broader channel bandwidths in the 6 GHz range.

12 The 6 GHz band's less interference and congestion help to minimise latency, which leads to quicker response times and improved real-time communication.

13 Wi-Fi 6E supports the latest encryption standards, such as WPA3 (Wi-Fi Protected Access 3), which offers stronger data protection and encryption algorithms.

14 https://wifinowglobal.com/news-blog/momentum-builds-19-5-billion-wi-fi-devices-will-be-in-use-this-year-wi-fi-alliance-says/

This Snapshot of Findings is prepared by Vidushi Sinha, Senior Research Associate, and Krishaank Jugiani, Research Associate, CUTS International as a part of the project titled 'Understanding Consumer Perceptions on the 6 GHz Band, along with guidance, support and inputs from Amol Kulkarni, Director Research, CUTS International. .

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July, 2023