



Understanding Consumer Perspectives on the 6 GHz Band: Key Findings & Recommendations for the Way Forward

Table of Contents

- 01** Background
- 02** In-person In-depth Discussion Details
- 03** Study Findings
- 04** CUTS Recommendations

Executive Summary

- 1 Low income consumers with more family members are caught in a vicious Wi-Fi exclusion trap and end up paying for individual mobile data connections. There is a need to make Wi-Fi accessible to them and accommodate new users in the ecosystem.
- 2 Significant potential is identified to improve QoE in current Wi-Fi services through effective competition, standards and appropriate grievance redressal for consumers.
- 3 Need to gain an early mover's advantage to leverage the future of Wi-Fi by ensuring availability of compatible devices and a supporting ecosystem for the new generation of Wi-Fi and unlock new use cases.
- 4 More awareness and security around public Wi-Fi and PM-Wani scheme is required.

About CUTS

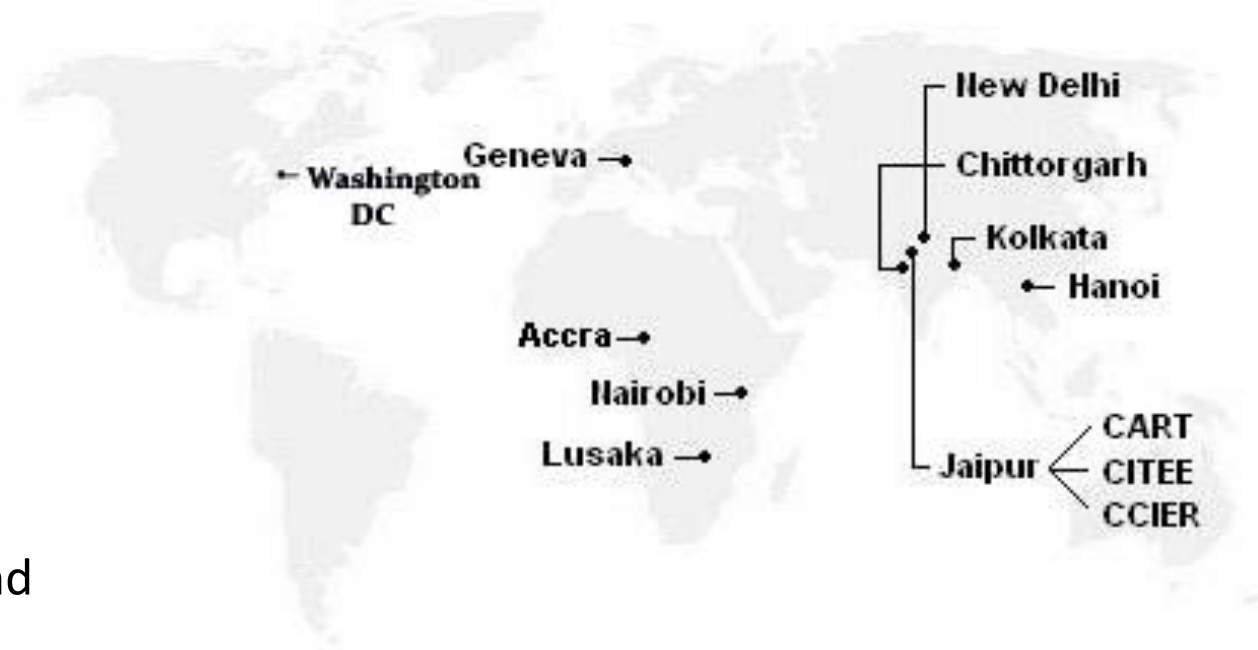
- Pursuing consumer sovereignty since 1983
- Promoting optimal regulation, good governance, and rules based trade in global south, in this pursuit
- Bridging the gap between policy and practice through evidence based research, advocacy, networking, and capacity building
- Key initiatives at the intersection of law, technology, and society include:

[Demystifying Reality from Myth for 5G in India](#)

[Elements of Ethical Framework for 6G and Creating Opportunities for India and Australia](#)

[Understanding Consumer Perspectives on Encryption](#)

[Undertaking Workshops on Regulatory Impact Assessment for TRAI](#)



[Coding and Enforcing Mobile Internet Quality of Standards in India](#)

[Broadband Labels for Greater Transparency & Informed Consumers](#)

[Towards Effective Choice: A Nation-Wide Survey of Indian TV Consumers](#)

[Data Localisation and Digital Exports from India](#)

[Consumer Impact Assessment of Data Localisation](#)

Project Background

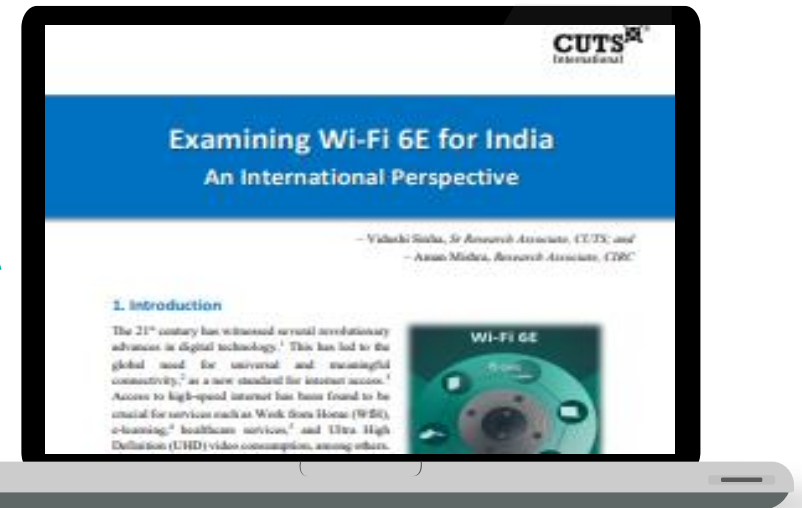
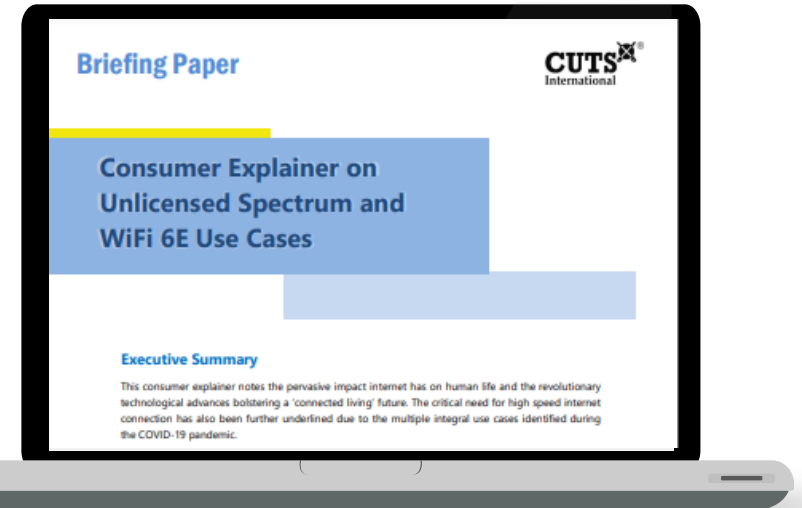


To understand and highlight:

- Consumer perspectives regarding challenges & concerns arising from broadband services operating in the existing bands
- Consumer preferences, possible benefits & future expectations from 6 GHz band

Previous
Outputs

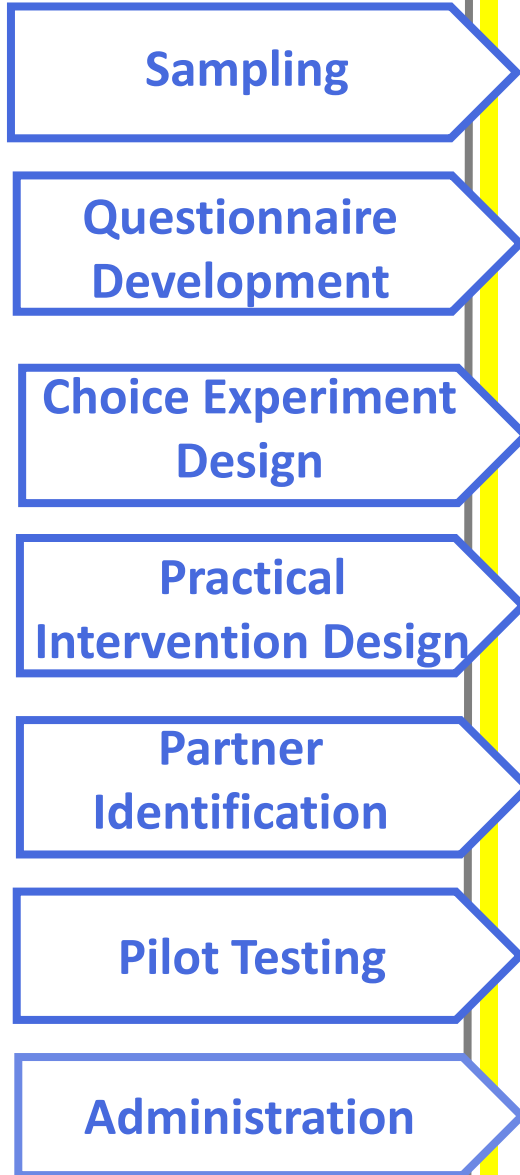
Consumer Explainer on Unlicensed Spectrum and Wi-Fi 6E



International Comparative Paper

In-person In-depth Discussion Details





PROCESS



~380 Respondents

15 In-depth interactions

8 Locations

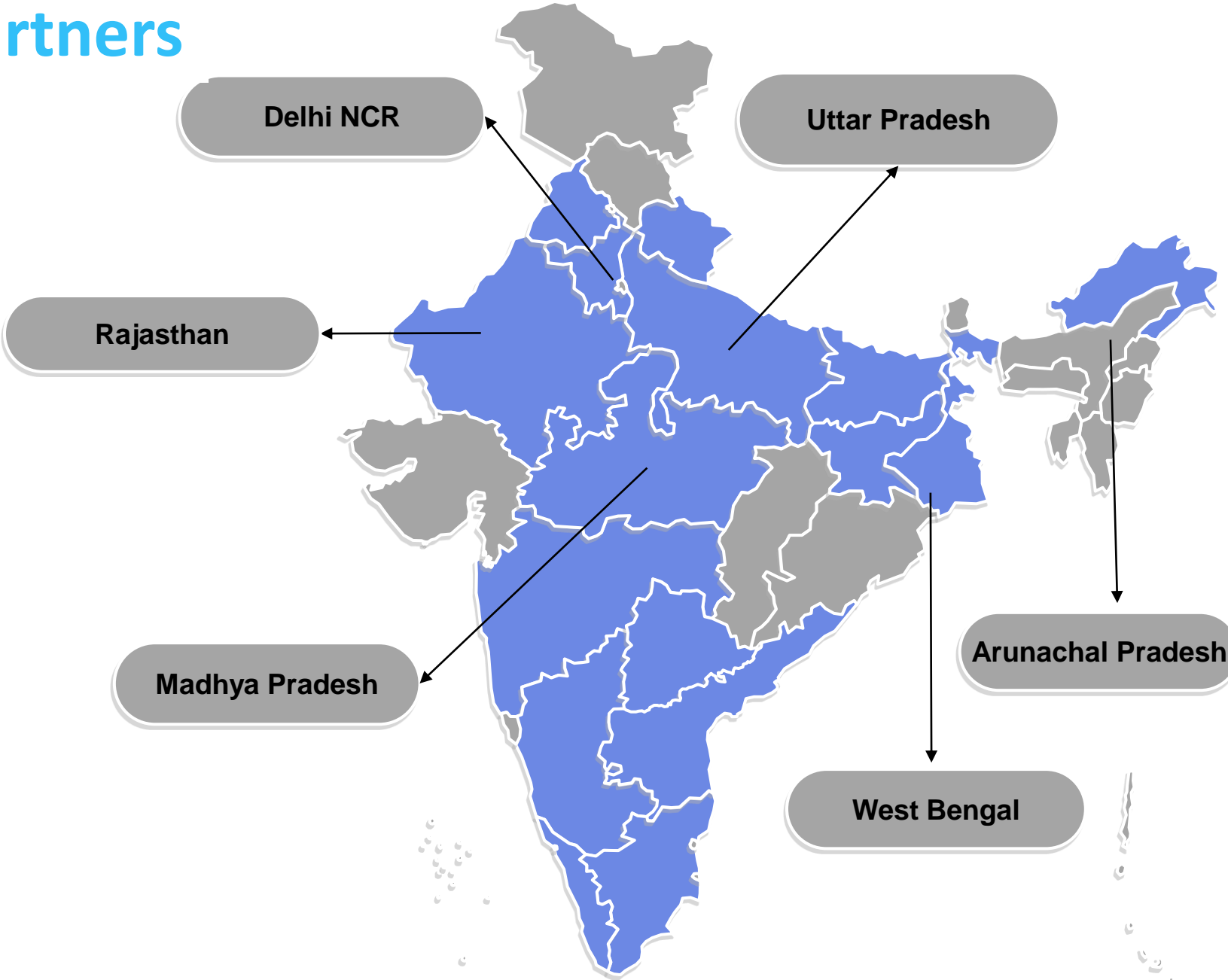
3 Languages

2 Modes

- Different income levels
- Homemakers, Farmers, Anganwadi workers, Students, Professors, Lawyers, Engineers, Entrepreneurs, etc.
- Policy Think Tanks, NGOs, Mining Offices, Court Premises, Educational Institutions, Hotel, Public Places, etc.
- Wi-Fi & Non Wi-Fi users
- Perspective on Public Wi-Fi

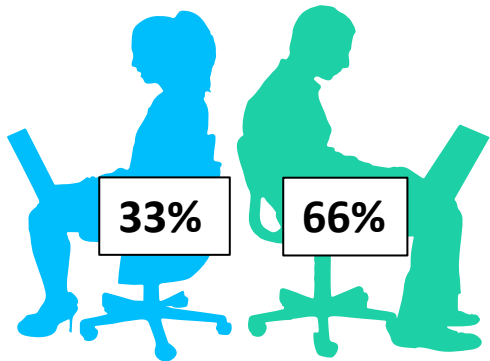
Survey Locations & Partners

- CUTS Chittorgarh Human Development Centre
- CUTS Calcutta Resource Centre
- CUTS Delhi Resource Centre & CUTS Institute for Regulation & Competition
- National Law Institute University, Bhopal
- BBD University, Lucknow
- ITC Fortune, Lucknow
- Ashoka University, Sonapat
- IIIT Bangalore

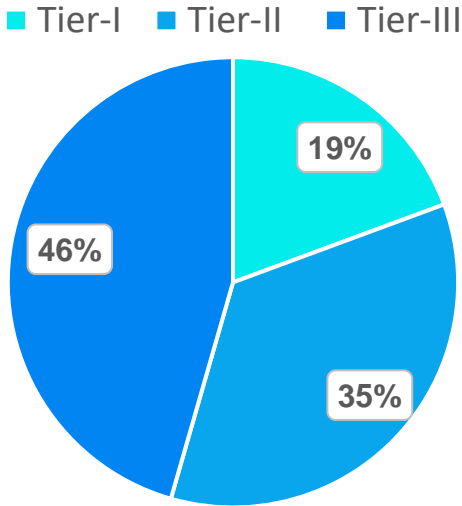


***Note:** Responses were collected from states highlighted in blue, in the above map. Labelled states include locations where in-person interactions were conducted.

Respondent Profile



Gender Distribution

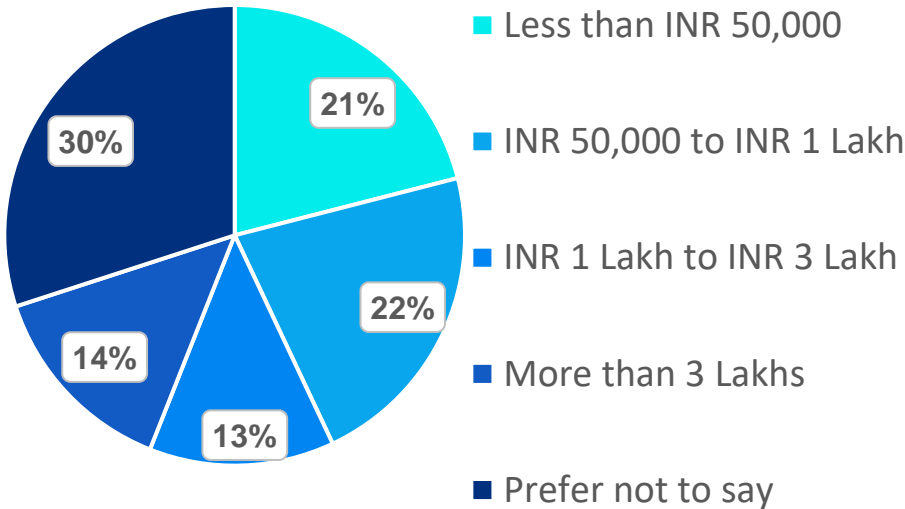


Location Classification



Different backgrounds

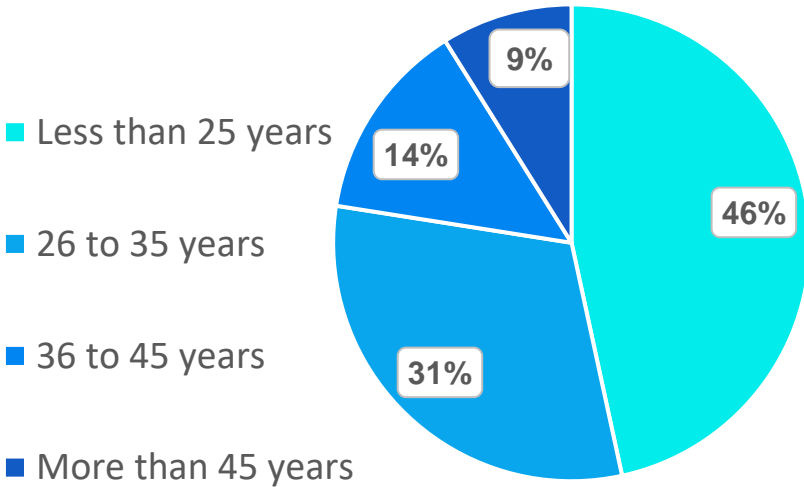
Note: Remaining 1% prefer not to disclose.



Income Level Distribution



Average family members in a household



Age Range

Wi-Fi Penetration & Access



52%

Have

Wi-Fi Connections at Home

Don't
have

48%

Chittorgarh, Rajasthan



Kolkata, West Bengal



Majority respondents have Wi-Fi. After interactions with those who do not have Wi-Fi, two perspectives emerged:

Mendori, Madhya Pradesh



Kolkata, West Bengal



Rural perspective : (i) Lack of awareness; (ii) Lack of availability; (iii) Costly (Double expense for Wi-Fi & data)

Urban perspective: Office goes access Wi-Fi in office

Wi-Fi at Home: Penetration across different categories of cities

Tier-I

88%

Tier-II

60%

Tier-III

32%

New Delhi

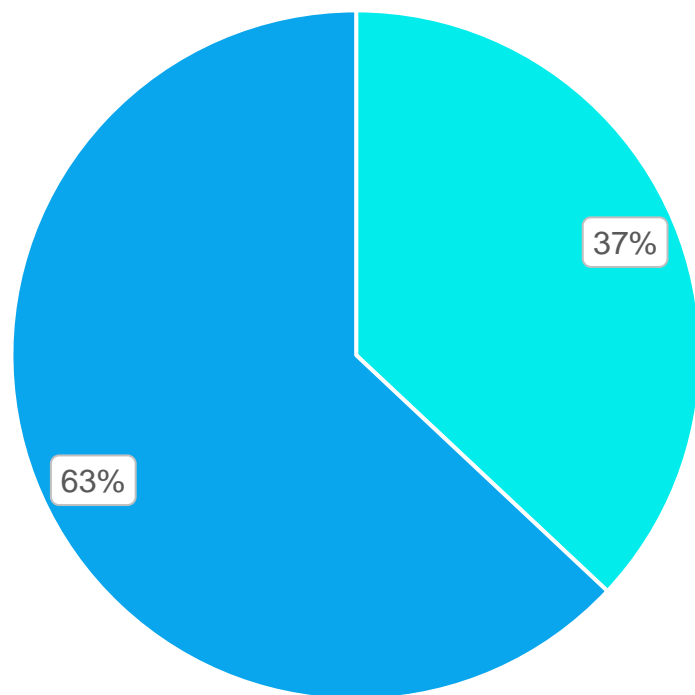
Bhopal, Madhya Pradesh

Chittorgarh, Rajasthan

Wi-Fi penetration is extremely high in Tier-I cities and there is a considerable uptake of Wi-Fi in Tier-II cities. Tier-III cities and rural area respondents expressed need for greater Wi-Fi penetration.

Perceptions on Wi-Fi Installation: Non-Wi-Fi Respondents' View

Out of respondents who do not have Wi-Fi, more than 63% respondents said that they wanted to install Wi-Fi.



- Not planning to install Wi-Fi
- Planning to install Wi-Fi



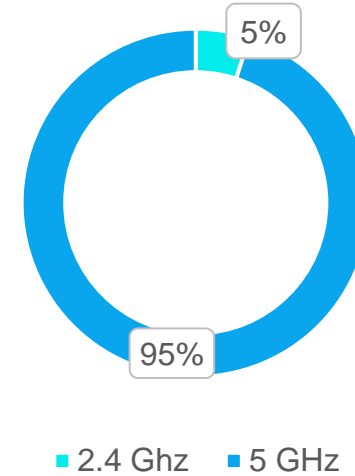
Practical Intervention Exercise Impact: On observing the difference in video quality on 2.4 GHz and 5 GHz band, 41% of respondents originally not planning to install Wi-Fi, changed their decision.

Wi-Fi Package Preference: Practical Intervention

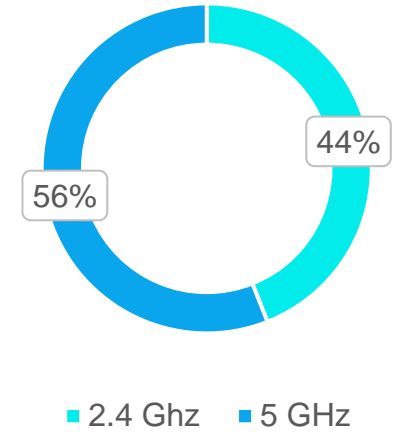


Note: Based on 39 responses.

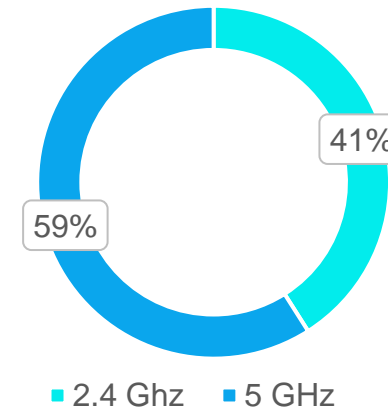
Higher Speed



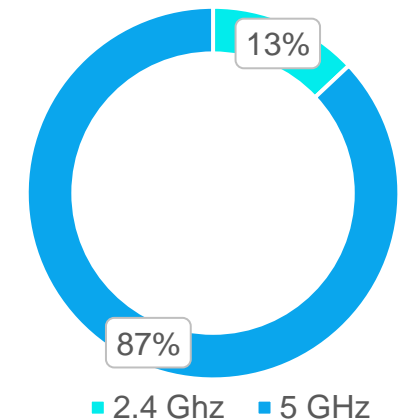
Reliability



Coverage



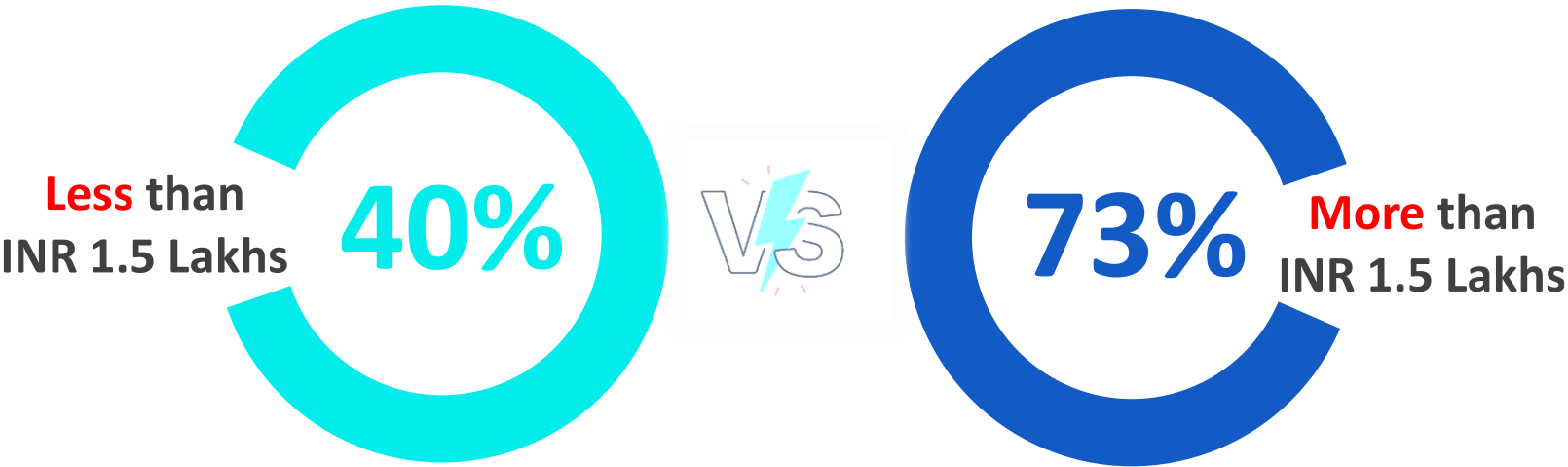
Connection to multiple devices



On most of the parameters, upon comparison of respondents' experience in the practical intervention, 5 GHz emerged as the clear preference. With even more bandwidth than 5 GHz, 6 GHz can increase QoE further.

Wi-Fi haves and have nots 🔍

Homes with lesser average monthly family income are less likely to have Wi-Fi connections



Homes with more family members are less likely to have Wi-Fi connections



Wi-Fi Exclusion Trap

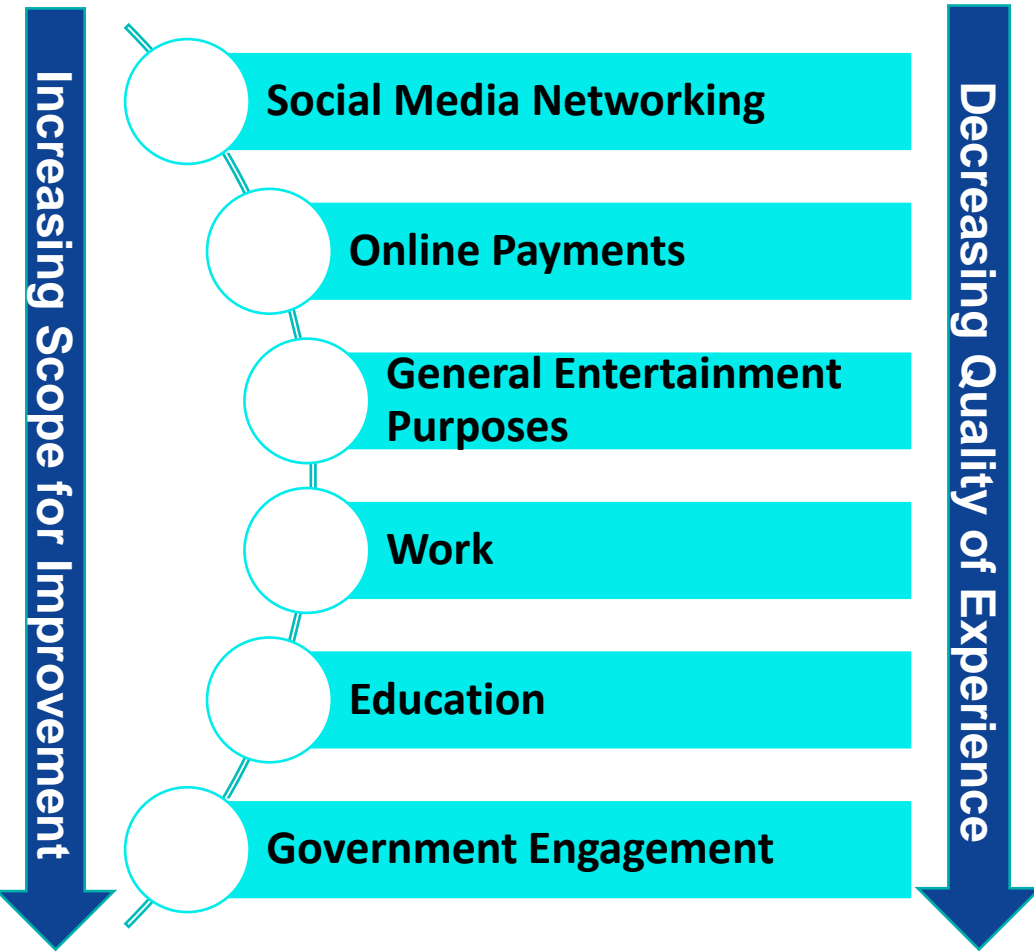
- Families with less average monthly family income and more number of family members are **unable to install Wi-Fi.**
- Those who can benefit from Wi-Fi features like ability to support multiple connections, round-the-clock availability and relatively less price (than individual mobile data connections) are unable to do so.

Wi-Fi at newer bands can help extract those in the trap by providing **more public Wi-Fi access points, reliable and multiple connections with additional bandwidth and by leveraging potential for enhancement of income generation.**

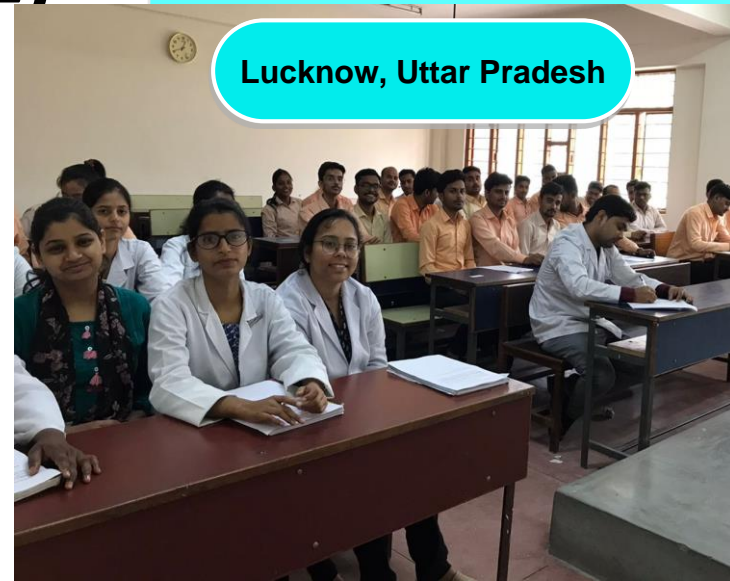
Wi-Fi Experience & Expectations



Wi-Fi Use Cases & Quality of Experience (QoE)



Importance of Wi-Fi for Education



- Increased reliance since COVID
- Used for sharing student resources/ repository
- Many schools & colleges continue to use online mode for specific activities



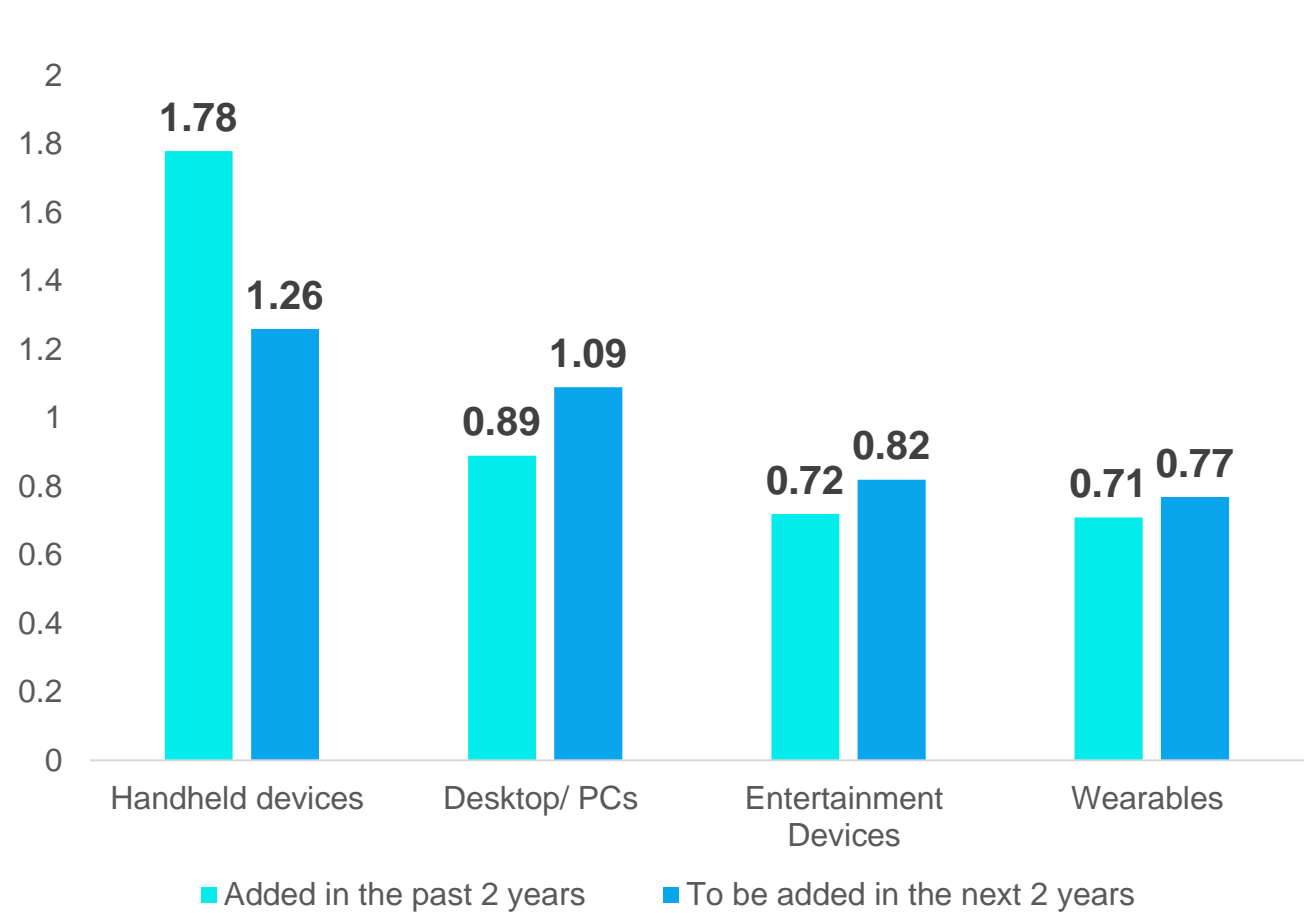
Students had average QoE

- Multiple lags
- Voice distortion
- Turned video off to save bandwidth

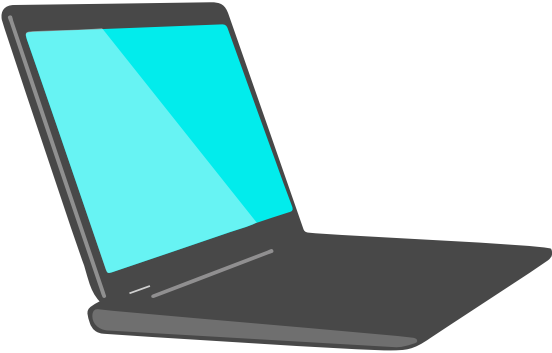
The shift to Wi-Fi is driven by criticality of Wi-Fi for different use cases (as shown above). Specifically for education and work, Wi-Fi plays an important role, however there is a **need for new Wi-Fi technologies that can improve QoE.**

Future Demand & Trends in Wi-Fi Connected Devices

There is an increase in demand and adoption of Wi-Fi connected devices. Across all device categories, younger respondents are more likely to add Wi-Fi connected devices in next 2 years.



Note: Based on Wi-Fi respondents in in-person interactions



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

Perceptions on installing/upgrading Wi-Fi in Future

44%

Want to upgrade to latest Wi-Fi that supports high-end devices



Bhopal, Madhya Pradesh



Topmost reasons include:

- Better quality of experience (QoE)
- Increased internet usage
- Increase in number of family members



Perspectives on Mobile Data

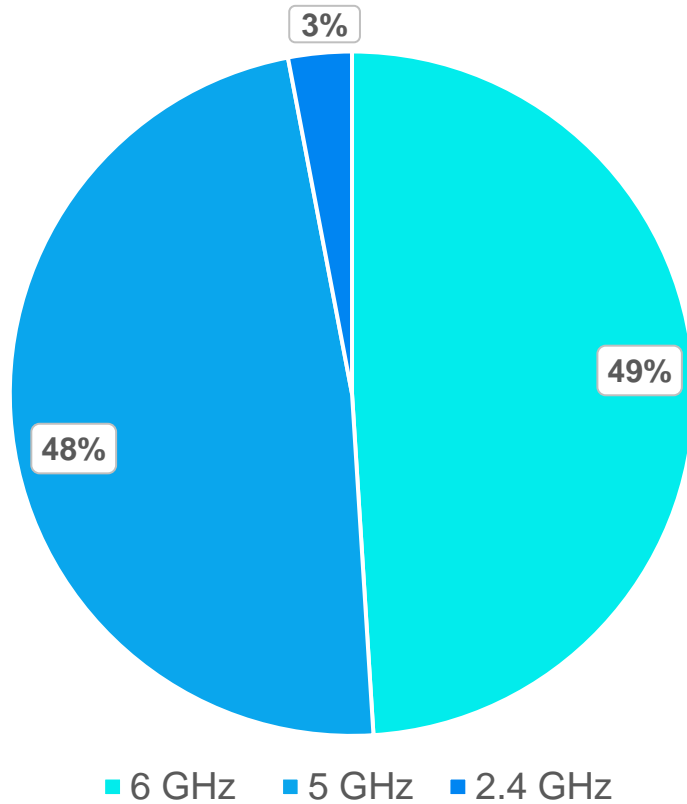
- Mobile data limit insufficient (exhausted by 4PM)
- Poor telecom coverage (rural & North-East India)
- Slow & intermittent speed/ connection
- Costly data tariffs



Chittorgarh, Rajasthan

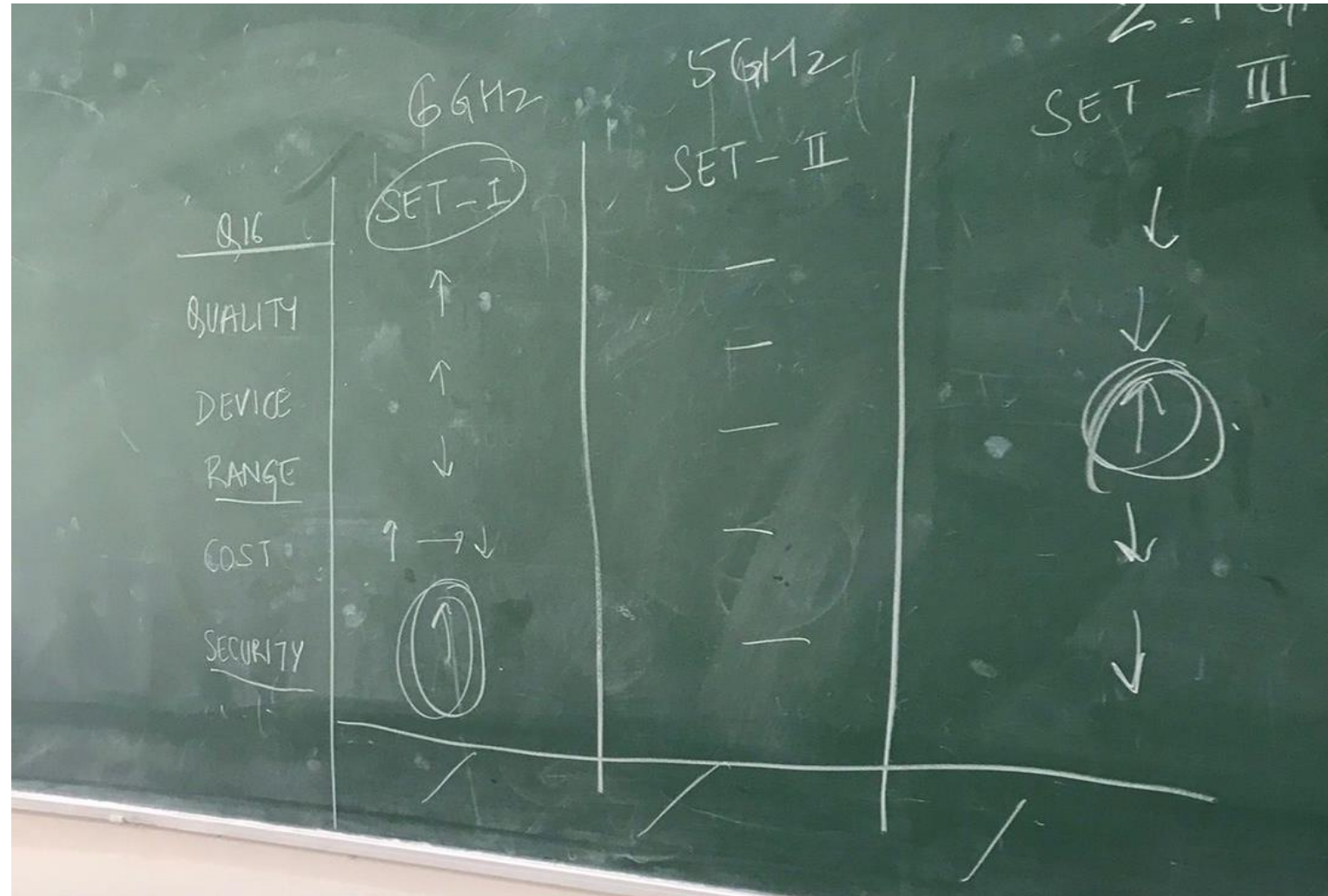
Urban respondents want to upgrade to the **latest Wi-Fi** compatible with the latest high-end devices. Rural respondents highlight challenges of using mobile data, thereby, making a case for Wi-Fi. Many of these respondents are excluded from access to quality internet (especially women) since they are in a **Wi-Fi Exclusion Trap**.

Wi-Fi Package Preference: Choice Experiment



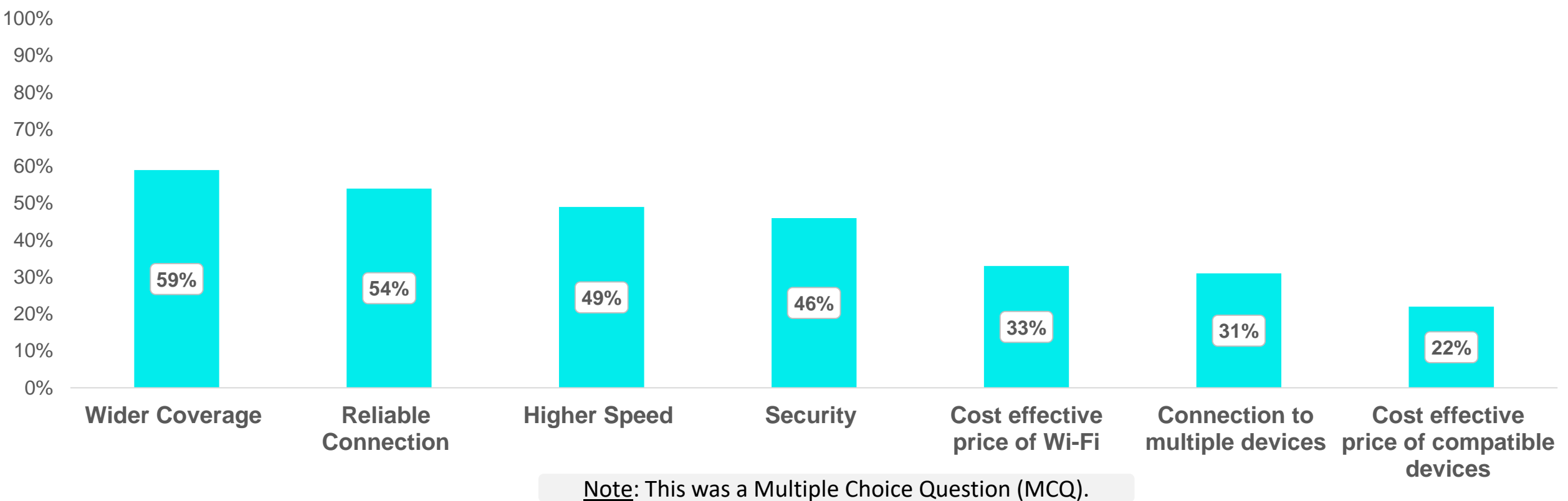
Pie chart indicating perceptions on most preferred Wi-Fi band

Note: Based on 368 responses.



There was **close competition** between 5 GHz and 6 GHz band in the choice experiment (for the purpose of this exercise, parameters including quality, number of device connection(s) supported, range, compatible devices, cost and security were shared).

Future of Wi-Fi: Expectations of Respondents



Consumers demand reliable connection, allow multiple devices to connect with the new bandwidth, lower latency, better security, etc. This is expected to be met by **features of new Wi-Fi technologies such as Wi-Fi 6E will be able to meet expectations respondents have from Wi-Fi.**

Further, it is found that 40% respondents are price sensitive (i.e. expect cost effectiveness of Wi-Fi or compatible devices (or both)). **If a supporting ecosystem is made available, the cost of both is likely to reduce with scale.**

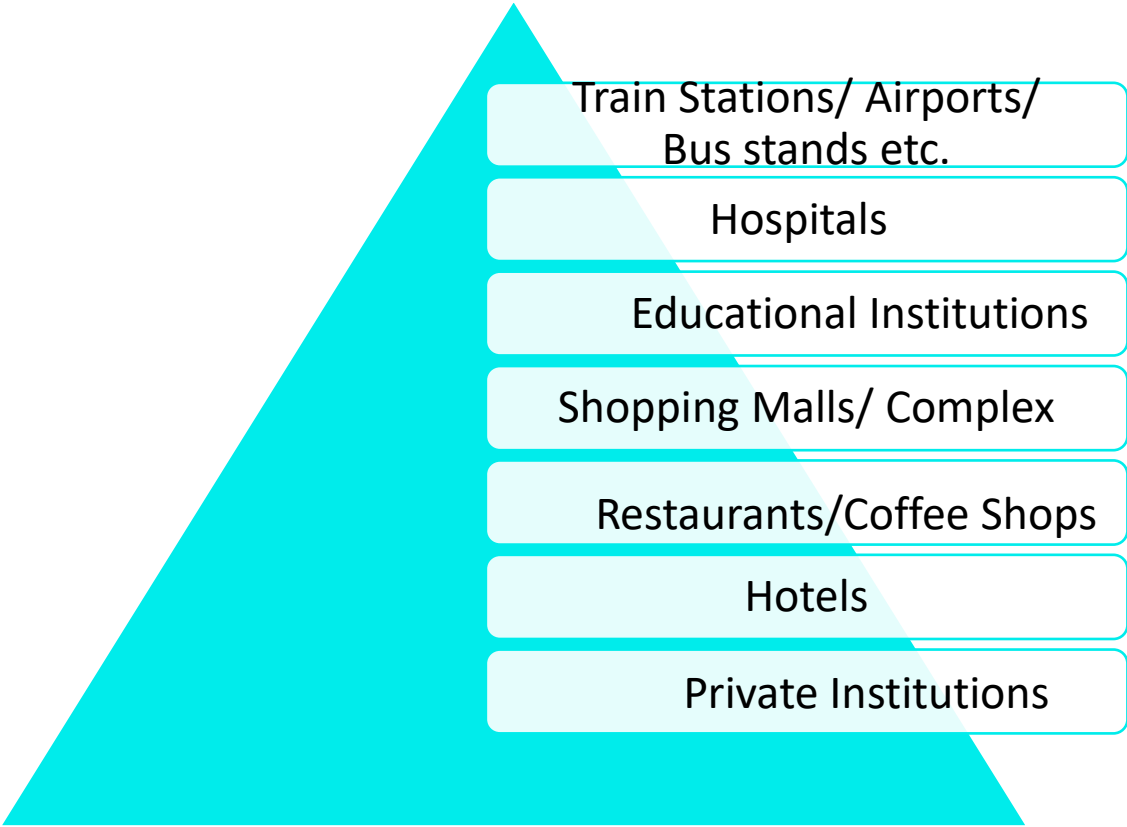
Perceptions on Public Wi-Fi & PM- Wani scheme



Perceptions on Public Wi-Fi

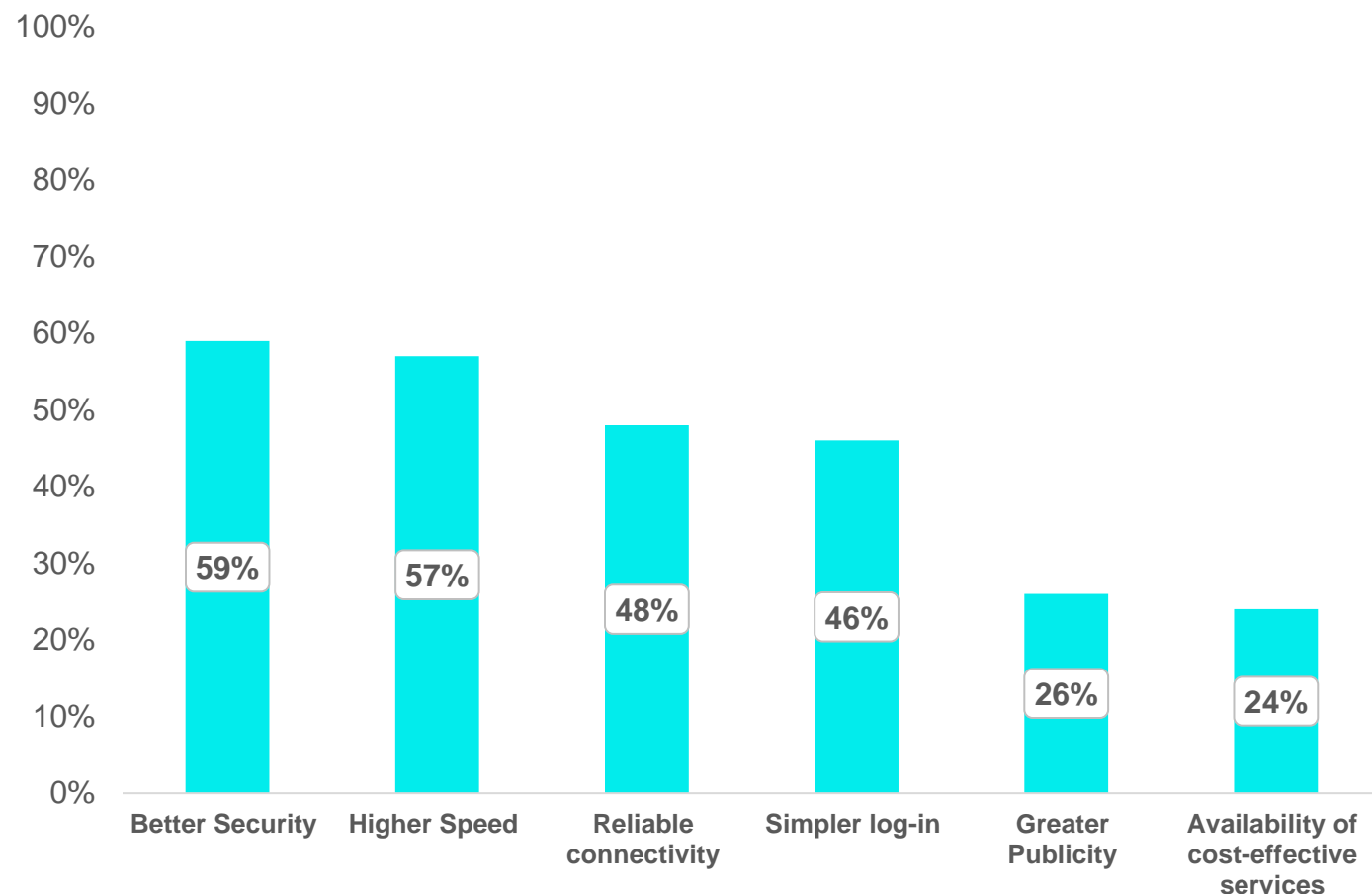
61%
Respondents have used
Public Wi-Fi

Places where respondents have used public Wi-Fi



6 GHz band would provide additional bandwidth to support public Wi-Fi to provide broadband connectivity for all. There is a need to provide **better QoE in public places** such as train stations, bus stands, hospitals, etc, which are frequented by majority of the respondents.

Perceptions on Improvement of Public Wi-Fi



Note: This was a Multiple Choice Question (MCQ).



Security

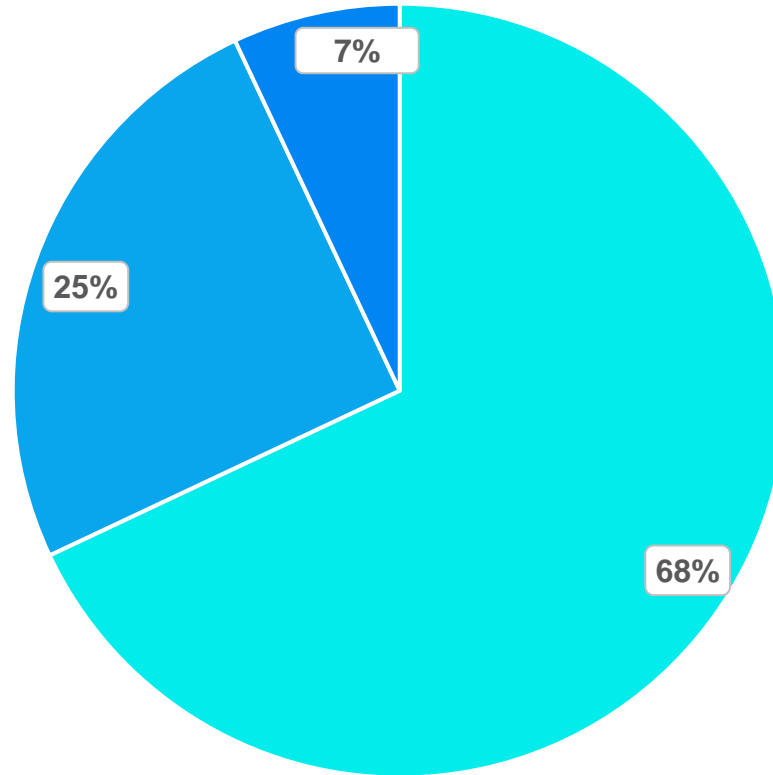
Majority of the respondents were concerned about their data. They shared that sufficient safeguards should be there in future generations of Wi-Fi technology to protect data.



Respondents shared their wish list on improvements required in public Wi-Fi and it is seen that many of the expectations can be met if Wi-Fi functions on the 6 GHz band. Wi-Fi 6E also **supports the new security protocol and is likely to use encryption to protect users' data.**

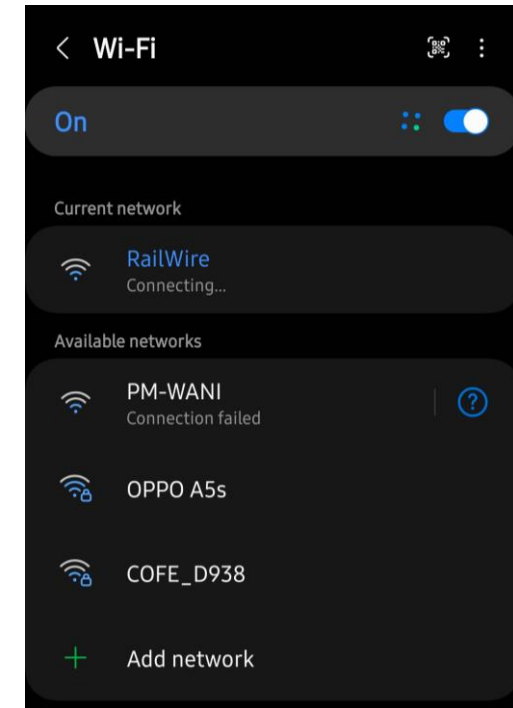
Perceptions on PM-Wani scheme

Perspectives on the PM-Wani Scheme



- Unaware
- Aware and not used
- Aware and used

Most respondents who were aware of PM-Wani scheme and had tried to avail the same, were unable to connect properly. Thus, there is a need to ensure availability of access points.



6 GHz band would provide additional bandwidth to support proliferation of schemes such as PM-Wani.

Summary of Key Findings

- 1 Most Wi-Fi connections at home are from Tier-I and Tier-II cities. **Wi-Fi has emerged as preferred mode of connection**, even in Tier-III/ rural areas. Many non Wi-Fi users have also shown interest in Wi-Fi installation.
- 2 There is a **Wi-Fi exclusion trap** i.e. those with more family members (and therefore more devices) and lesser average monthly family income (and therefore lesser disposable income for internet access), end up paying for individual mobile data connections and can not install Wi-Fi.
- 3 **Better QoE** remains one of the topmost reasons for respondents to want to switch to Wi-Fi. Among its use cases, Wi-Fi is especially important for education and work. There may also be several emerging new use cases which need to be unlocked.
- 4 Demand and adoption of **Wi-Fi connected devices is increasing** and is especially popular among the younger generation(s). Many are **willing to upgrade their Wi-Fi to support high end devices**.
- 5 A majority of respondents have used public Wi-Fi, although are not aware and have not used PM-Wani. Concerns such as **security** and **lack of availability** are the topmost reasons in connecting to public Wi-Fi.

Recommendations for the Way Forward

- 1 Need to make secure Wi-Fi easily accessible at affordable costs, while taking last mile-connectivity into account with a view to extract consumers from the Wi-Fi exclusion trap
- 2 Necessary measures to be taken to ensure consumers are offered better quality of experience across different Wi-Fi use cases
- 3 Due cognizance must be placed on future trends of devices and an ecosystem supporting such devices must be made available
- 4 Increase awareness on Wi-Fi to rural consumers, benefits of public Wi-Fi and about PM-Wani
- 5 Further evidence-based research to understand consumer perceptions, progress made and challenges remaining on different aspects related to internet connectivity and Wi-Fi, with a view to achieve integrated urban-rural development

Limitations of the Study

- 1 The study focuses on consumer experience as opposed to technical specifications on utilisation of current 2.4 GHz and 5 GHz bands, available for Wi-Fi.
- 2 The perspective on use of 6 GHz by 5G has not been covered under the ambit of this study.
- 3 The study has been formulated taking the Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) in mind. A Technology Acceptance Model (TAM) was proposed to provide a theoretical basis for investigating the major factors determining Wi-Fi 6E technology acceptance across a variety of consumer demographics in India. Previous research using TAM has showed a high correlation between behavioural intention to adopt a new technology and actual adoption of the same. This does not rule out any mistakes.

Thank You!

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