Encouraging Interoperability for Wi-Fi Providers: Challenges and Opportunities Ahead

 **Policy Brief**

Interoperability allows a mobile device to dynamically use the multiple network faces available to it so as to maximize user satisfaction and system performance. In this policy brief we focus our recommendations based on the framework developed by scholars at IEEE that identifies three basic user profiles for network users. Building on this framework and based on simulation studies the study suggests that dynamic switching based on user profiles leads to higher performance and satisfaction. In this brief, we identify challenges associated with encouraging interoperability between domestic and international Wi-Fi networks of different service providers and between Wi-Fi and cellular networks. We conclude with recommendations on some measures that need to considered in order to encourage interoperability for Wi-Fi proliferation. Specifically, ensuring commercial viability of operators through careful design of pricing, billing and revenue sharing schemes is the need of the hour. Towards this we suggest simulation studies to assess the viability of various pricing and revenue schemes going forward.

**ISSUES IN INTEROPERABILITY**

Achieving interoperability between Wi-Fi and cellular networks is a very challenging task. Below are some of the challenges involved in achieving interoperability.

# switching between networks

Multiple network interfaces impact the performance and consumption, therefore the manner in which a mobile device dynamically switches is an important consideration.

**II. SEAMLESS HANDOVERS**

Maintaining existing network connections while switching between different networks is not feasible without ensuring seamless handover measures. Smooth handovers involve issues of diverse addressing schemes, different packet formats and sizes, and packet sequencing across multiple networks.

**III. BILLING & REVENUE SERVICE**

Working out arrangements to ensure commercial viability of all service providers is challenging. Presence of multiple service providers makes billing and revenue sharing is difficult.

**IV. SECURITY AND AUTHENTICATION**

Authentication of users and security of data transmitted across diverse and multiple networks is not easy to achieve. OTP based verification may be a bottleneck for which alternate measures should be identified and pursued.

**V. NETWORK ARCHITECTURES**

Load balancing between different networks and architectures requires new metrics to ascertain the load on networks and novel schemes to shift users to a different network.

**VI. QUALITY OF SERVICE**

Ensuring QoS in a system supporting handovers between multiple networks with diverse characteristics as in the future mobile devices will run apps and services that have stringent QoS requirements.

**VII. INTER-SERVICE PROVIDER AGREEMENTS**

Arrangements need to be worked out that facilitate cooperation between different service providers including between domestic and international operators. Such agreements need to factor in competition and conflicting interests

**VIII. IMPLEMENTATION**

Implementation of interoperability requires changes in network protocols and protocol stacks of mobile devices. Further, maintaining compatibility with existing systems while incorporating interoperability is critical.

**CLASSIFYING USER PROFILES**

A mobile station often finds itself in the coverage of cellular networks and Wi-Fi hotspot and can choose to connect to any of the available networks. Generally, the behavior of the mobile station is driven by its resource requirements and user interests. For example multimedia transmission will have different requirements than one that is just downloading emails. Following the framework suggested by the study conducted by IEEE we have approached the interoperability issue by identifying three classes of consumers based on their demands and needs from the network.

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1. Class A Bandwidth Conscious
2. Class B Cost Conscious
3. Class C Glitch Conscious

# ConclusionS

Interoperability between wireless and cellular is very challenging and we suggest that a user profile based switching approach may be more suitable for achieving.

##### SOURCES

Interoperability of Wifi Hotspots and Cellular Networks, Dilip Anthony Joseph, BS Manoj and C Shiva Ram Murthy, IEEE paper [2004]

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