

# The Personal Router

Steven Bauer  
bauer@mit.edu

George Lee  
gjl@mit.edu

Indraneel Chakraborty  
indranil@mit.edu

Xavier Brucker  
xavier@mit.edu

Xiaowei Yang  
xw@mit.edu

Ben Leong  
benleong@mit.edu

John Wroclawski  
jtw@mit.edu

Laboratory for Computer Science  
Massachusetts Institute of Technology  
Cambridge, MA 02139-4307

## ABSTRACT

The Personal Router Project explores the technical challenges associated with creating open interfaces to wireless services. Our project enables users to dynamically and automatically choose between wireless services based upon requirements and prices. Our goals are (1) to create an open, competitive market in which small and large providers may easily offer customized wireless services and (2) provide users with convenient access to these services through a small personal router. Our poster illustrates our system architecture and presents a selection of the research problems we are pursuing.

A personal router is a small, portable hardware platform that provides wireless network connectivity for users' communication requirements. The personal router negotiates services with wireless providers and continuously selects the most appropriate as applications and user requirements change. Service selection is based upon algorithms that incorporate learned user preferences, application requirements, service profiles and price information. Other functionality includes providing authentication and security services for the associated personal devices.

Our project is motivated by the shortcomings of current models of wireless service. Changing between wireless services requires manual reconfiguration, purchasing new devices, swapping network or SIM cards, or waiting until long-term contracts expire. Services are only provided by regional or national providers (such as cellular networks and 802.11 hot-spots) or by local institutions (such as wireless LANs). Users are bound technologically and contractually to these single means of network access.

Research in many areas is required to build our personal

router and enable choice among wireless services. Important problems include:

- Algorithms for dynamically and automatically selecting wireless services
- Characterization of network services and application requirements
- QoS algorithms and protocols to support advertised service profiles
- Solutions for rapid interprovider mobility
- Mechanisms for learning user preferences and incorporating them into service selection
- Pricing models and payment mechanisms that enable this new market
- Multi-party security, authentication and privacy

The research problems we are addressing of most interest to the networking community are the first four. For instance, we are experimenting with service selection algorithms that incorporate various sources of information. Service selections must be reevaluated as application requirements change, other profiles become available, and connection quality varies. The personal router must maintain appropriate network services in potentially complicated and dynamic environments.

The second and third research problems above are closely related. Wireless providers need to be able to express their service offerings in ways that can be reasoned about by the service selection algorithms and can be supported at the underlying MAC layers. Traditional approaches of describing service profiles are being extended to better characterize network performance and application requirements.

We currently have a laptop based version that implements our service selection and integration framework. Ultimately, we plan to build inexpensive prototype hardware personal routers. These compact routers will foster a research environment for creating and experimenting with new interesting wireless devices. For additional information please see <http://pr.lcs.mit.edu>.

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