Towards an Architecture for Personal Broadband

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Agenda

• Previous and Related Work

• Proposed Functional Elements

• Potential Industry Models

• Discussion
Previous and Related Work

- **Relevant Literature**
  - Corliano and Khan, Economic Tussles in the Public Mobile Access Market (British Telecom)
  - Personal Router, [http://pr.lcs.mit.edu/research](http://pr.lcs.mit.edu/research) (MIT)
  - Bandwidth Markets

- **Industry Efforts**
  - IETF seamoby working group: CARD
  - IRAP
  - UMA
  - IMS/SIP
  - ...
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Proposed Functional Elements

1. Network Discovery - identify which networks are available
   - Does the user need to provide their information in order to receive a list of networks? If so, what information is required?
   - Does the user only see a subset of the available networks?

2. Access Network Selection - select the appropriate network
   - Who decides which network should be selected?

3. Authentication and Authorization - gain access to the network
   - Who performs the authentication and authorization?
   - Are authentication and authorization always required?

4. Accounting – track usage of the network

5. Billing and Settlement – pay for the usage
## "Pieces of the Puzzle"

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<th>Function</th>
<th>Existing Systems and Protocols</th>
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<td>Network Discovery</td>
<td>- Candidate Access Router Discovery (CARD, IETF, RFC 4066)</td>
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<td>- Service Location Protocol (IETF)</td>
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<td>- Beacon Management</td>
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<td>- Universal Description, Discovery, and</td>
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<td>- Integration (UDDI)</td>
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<td>Access Network Selection</td>
<td>- CARD (depending on implementation)</td>
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<td>- 3G roaming</td>
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<td>Authentication and</td>
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Data Flow

• The user receives bits from whichever network serves as their access point.

• With Personal Broadband, the bits will not flow through the home provider by default.

• There are two possible models:
  – Triangular routing via the home provider or a 3rd party
  – Direct routing

The control bits and the data bits do not need to follow the same route.
Payment and Assumption of Risk

• The Personal Broadband architecture should support many possible business models.

• In order to test the flexibility of the architecture, we have considered the following models:
  – The user pays a home provider on an on-going basis (e.g. cell phones).
  – The user pays a 3rd party aggregator (e.g. iPass, Boingo, Paypal).
  – The user pays on the spot market.
  – The user pays nothing and the cost is subsidized through other channels (e.g. advertising).

• What other business models should we use to evaluate the architecture?
Subscription and Roaming

The user has a long-term relationship with a home provider (HP). The home provider establishes relationships with other providers (n by n).

Payment Flow
The user pays the HP directly. The HP distributes the $ to other providers based on their agreements.

Assumption of Risk
HP: User is malicious and will not pay their bill; other providers will not provide QoS and will not bill correctly
User: HP will misuse their profile information, will not bill correctly, and not establish sufficient relationships
Other providers: HP will not pay and user is malicious
3rd Party Aggregator

The user has a long-term relationship with a 3rd party aggregator. The 3rd party establishes relationships with the providers (1 by n).

**Payment Flow**
The user pays the 3rd party directly. The 3rd party distributes the $ to other providers based on their agreements.

**Assumption of Risk**
3rd party: User is malicious and will not pay their bill; other providers will not provide QoS and will not bill correctly
User: 3rd party will misuse their profile information, will not bill correctly, and not establish sufficient relationships
Other providers: 3rd party will not pay and user is malicious
Spot Market

The user establishes a short-term relationship with an available provider. Risk is either dynamically assumed or the participants are part of a common framework.

**Payment Flow**
The user pays on the spot market.

**Assumption of Risk**
*User*: Provider misrepresents services, misuses their information, and bills incorrectly

*Provider*: User is malicious and will not pay
Subsidized Access

The user pays nothing and the cost is subsidized through a 3rd party.

**Payment Flow**
A 3rd party pays the providers.

**Assumption of Risk**
3rd party: Providers will not bill correctly
User: Providers will misuse their profile information and will not provide sufficient service
Other providers: 3rd party will not pay and user is malicious
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