Why hasn’t HIP been widely adopted (yet)?

Initial results of HIP deployment study

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Research question

• Why has HIP not been widely deployed yet?
  – Missing demand?
  – Weaknesses in technical design?
  – Disadvantages compared to substitutes?
  – Incentive problems?
  – Problems in standardization?

• Which are the primary reasons?

• What should happen that HIP would get deployed?
Research method: Expert interviews

• 17 semi-structured interviews (Jun 21 – Sep 1, 2011)
  – Duration: 45 – 90 min
  – Mostly open-ended questions

• Interviewees with different backgrounds
  – Different stakeholders: OS vendors, ISPs, Network device vendors, Application service providers, Academia
  – IETF experts (4 IAB members, 2 area directors)
  – HIP developers (4 people with HIP RFCs + close followers)
  – Developers of substitutes (MIP, IPsec, IKE, MobIKE, SHIM6)
  – Business managers
Attitudes towards HIP

• Positive feedback on architectural beauty
  – Modularity, performance, purity
  – Standardization done well (even though too slowly)

• Skepticism about real-world relevance
  – A beautiful architecture lacking real-world deployability
  – No belief in HIP due to practical and business reasons

• No hate nor strong objection
  – Harmless research activity → no need for objection
Reasons for non-deployment (1/2)

• No **business** demand (lack of **real** need)
  – No homegrown use case or a killer app
  – HIP-like mobility may not be needed or is not enough
  – Security is rarely a good selling point

• **Stack** change required in **both** ends
  – OS vendors have not had incentive to deploy (no demand)
  – No benefits unless the other end has also adopted
    → **Not incrementally deployable**
Reasons for non-deployment (2/2)

• **Point solutions** favored (specific instead of generic)
  – Optimized to single problem and easier to deploy
  – Problems solved on application layer, not with IETF protocols

• **Research mindset** = architectural beauty before deployability
  – NAT traversal problems, lack of incremental deployability, ...
    → Many people abandoned as interesting but unrealistic
  – Standardization process taken too long
  – Marketing problem: no stubbornness to push to some use
Opinions not unanimous

<table>
<thead>
<tr>
<th>Some suggested reasons for non-deployment</th>
<th>Do not agree</th>
<th>1 (low)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 (high)</th>
<th>AVG</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIP is missing a killer application.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>8</td>
<td>5</td>
<td>4.06</td>
</tr>
<tr>
<td>There is no real demand(/need) for HIP.</td>
<td>6</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>3.73</td>
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<tr>
<td>Substitute technologies are favored.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>9</td>
<td>2</td>
<td>3.53</td>
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<tr>
<td>HIP is a too big change and people favor point solutions solving a single problem.</td>
<td>1</td>
<td>0</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>3.50</td>
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<tr>
<td>HIP development started with research mind-set. (Real-world deployment considerations inadequate).</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td>3.00</td>
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<tr>
<td>Experimental track status discourages adoption.</td>
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<td>4</td>
<td>2</td>
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<td>3</td>
<td>1</td>
<td>2.64</td>
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</table>

- Engineer’s need ≠ Business manager’s need
- Outsiders see HIP as a big change (both mental & deployment)
- HIP is missing credibility to be relevant in the real world
- Experimental flag does not matter
What should happen that HIP would get deployed?

- External event to trigger
  - Increasing mobility & multihoming make HIP more relevant
- HIP would find its niche
  - E.g., closed networks or M2M communication
- Production level implementation
  - Co-deployed with an attractive application
- Improve (incremental) deployability
  - Many things done but awareness needs to be improved
  - Also improving visibility to apps could help (API/library)
- Some parts of HIP reused in other protocols
Related work in IETF

• RFC 5218 – What makes for a successful protocol

• IETF OUTCOMES – Successes and Failures

• Draft: HIP Experiment Report

• Expired draft: Issues of HIP in an Operators Networks