

HIP, a Marketing Analysis

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Of the proposals to split ID and locators in the Internet, HIP is the best thought-through and most complete seen to date. The HIP drafts written nearly 5 years ago by Bob Moskowitz have inspired a growing community of fans to continue the development of HIP.

The architectural appeal of HIP comes from its splitting of IDs and locators. This split should allow for simpler solutions for mobility and host multihoming. HIP is also appealing for a few other pieces of functionality it provides, including a mechanism to secure the bindings of IDs to public/private key pairs, a lightweight key exchange protocol and a plausible scheme for providing opportunistic encryption of traffic between HIP-enabled hosts.

According to its detractors, HIP is an example of a solution in search of a problem. The solution-in-search-of-a-problem criticism has some merit. However good general-purpose lower layers of systems, the building blocks, are to some extent a solution in search of a problem in each case. Ethernet, IP, and computers in general are all designed without a specific application-level problem in mind.

The power of good architecture is the reusability of the components and the general purposefulness of the systems that result. HIP is an attempt at just this sort of general purposefulness. Its appeal has given it some staying power in the community of protocol developers who like to contemplate such things. HIP appears to hold promise to simplify some rather complicated (some would say muddled) protocols that have been under development in the IETF for many years. Its value, if it is to be realized, would come when HIP is widely deployed.

Yet we still don't know if HIP (or any other similar scheme for an ID/Locator split at or near the network layer) will see any significant real-world deployment.

1 Technology Adoption Life Cycle

In Geoffrey Moore's classic high-tech marketing book *Crossing the Chasm* he describes the technology adoption life cycle in 5 stages: Innovators, Early Adopters, Early Majority, Late Majority, and Laggards. The one sentence summary of his book is that the challenges that a startup company must overcome in order to succeed in the marketplace are different in each stage of technology adoption, that each stage in the sequence is necessary (none can be skipped), and that the transitions between the different stages are especially critical.

The vision of HIP's ultimate value is wrapped up in the potential it will have when its use becomes widespread, i.e. during the Early and Late Majority stages. However we are barely into the Innovators' stage with HIP, and we do not appear at this point in time to have any Early Adopters identified.

If HIP is to get anywhere, then (according to Moore's thesis) we must find and succeed in selling HIP to Innovators (to complete the Innovator's stage) and then transition to Early Adopters. That will require an application that can deliver value when it is running on a HIP-enabled stack that could not deliver the same value without HIP.

2 The Competition

Successful applications used on the Internet today have already been adapted to cope with most of the mobility and security challenges they normally encounter in the wild of the Internet. Most problems that HIP addresses are already handled in one way or another in existing networks, protocols, and applications.

2.1 Mobility

Mobility today is handled in a number of ways. Users are mobile and can move from machine to machine. Either their interactions with the net are insensitive to identity (such as reading a web page) or the user provides their identity and a password explicitly (like logging into a web site, or logging into one of MIT's Athena workstations). Host mobility to different network attachment points (with different IP addresses obtained via DHCP at each point) can be tracked by a website which stores a cookie on the client side, and this cookie can be used to track the session as it moves from one locator to another.

VPN systems commonly used to allow traveling employees access to their company's network through the company's firewall also provide a solution of sorts to the challenge of mobility. The applications running on the client platform all see a network in which the address that they use does not change, and the temporary addresses that the portable computer obtains from different networks are used only for the endpoint of the VPN tunnel.

2.2 Security

Security today is mostly handled either in the application (either directly or using SSL), or in a VPN layer underneath. In few but perhaps an increasing number of cases, IPSEC is used directly (i.e. not as part of a VPN implementation). A surprising amount of communications are secured by ssh, either directly (the remote login) or via ssh's port forwarding tunnels (for applications other than remote login).

2.3 Identity

When Identity needs to be maintained over changes of IP address, then web browser cookies, or certificates are usually used (depending on the degree of security required).

3 Find a niche

When faced with a market full of established competitors, the usual strategy is to find a niche, or a market segment, in which the newcomer can establish a foothold and distinguish itself.

What might be a good niche for HIP? For the Innovators who are not so demanding of value, simply keeping TCP connections open (e.g. ssh, xmpp) as a host changes connectivity may be sufficient demonstration of value.

Finding a niche or market segment is more critical when moving to Early Adopters and Early Majority. Instant messaging and voice are two applications where the marketplace has not yet picked a winner, though there are strong contenders vying in those spaces already. New peer-to-peer systems have been appearing and those already in existence continue to evolve. We still have the possibility that new applications (that we have not heard of yet) will appear and become popular. Perhaps we should invent one. (What would HIP be perfect for?)

4 Ssh

At the first HIP BOF at the London IETF, Steve Bellovin suggested that HIP is (if it is as good as its advocates say) ripe for an ssh-like success. Ssh was deployed and successfully defined a standard for remote login through the open availability of source code to an especially useful program.

Ssh provided remote login secured using opportunistic encryption. Its niche market today is (and perhaps initially was) remote system administration. (Hardly anyone else uses remote virtual terminals over the Internet anymore.) Factors that contributed to ssh's adoption included the ease with which it could be deployed: it could be installed and used between consenting systems without any updates required other than on the two machines involved. The leap-of-faith method of accepting the ssh's host key, while not ideal in that it might be vulnerable to a man-in-the-middle attack, was critical in that it allowed the user to immediately begin to use ssh without any cumbersome configuration steps or manual key installation.

5 Summary

In order to realize the value of a HIP-enabled future, we should:

- Find an application that would demonstrate HIP's value and be useful (to people other than Innovators).
- Implement it.
- Deploy it.