

Review of BillPay

Achieving Good End-to-End Service Using Bill-Pay

by Estan, Akella, Banerjee.
– Kevin Roundy –

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1 Contributions of BillPay

Billpay is a recent clean-slate idea that could revolutionize billing procedures if it were implemented across the internet. It provides a mechanism that empowers end-users by allowing them to obtain better service for their data by optionally paying for better service on important traffic.

At this stage Billpay is not particularly well-defined, but as presented, it could be incrementally deployed across the internet. Since it is an optional service that doesn't affect existing non-billpay traffic, it could be deployed by a few ISPs and show some dividends for end-users right away. Of course its impact will be much greater once it has been implemented by tier-1 ISPS, but it makes financial sense for ISPs to offer this service since it could fatten their revenue streams.

Bill-pay's nanopayments work at the per-packet level. This initially might seem to be unnecessarily fine-grained, but by doing things this way the routers in the internet are freed from having to maintain any state, which would be necessary if this were done on a per-flow basis.

2 Shortcomings of BillPay

Billpay still seems to be in the concept stage, in fact it actually seems to have evolved somewhat into the "A la carte" idea which was recently put forth by its authors, and it has many issues to resolve. The incredible amount of flexibility that it provides to end-users is a two-edged sword. By allowing source routing on the packet-level there is an incredible potential for major oscillation in network. When a network becomes congested, a large number of users may begin to use bill-pay, resulting in major oscillations as packets switch routes from one path to another. The idea of major oscillations and transferring all of this source routing power to the end-users is likely to make major ISP's very nervous and perhaps unlikely to adopt this technology.

It is extremely important to have a good digital secretary with bill-pay so that intelligent decisions are made, avoiding oscillation in response to one's own traffic and keeping the human user from having to constantly micromanage the routes taken by his/her packets. It is not clear how effective a digital secretary could be, and the result ultimately depends very heavily on its quality.

A related issue is that hackers would have additional monetary incentives to break into end-hosts and route heavy amounts of bill-pay traffic to their computers. The proposed solution of forcing end-users to run the digital secretary underneath a virtual machine monitor is obviously impractical, and the other alternative that they present would require special hardware devices to be given out on a very large scale, which would be quite expensive.

3 Implications of BillPay

The idea behind bill-pay has great potential because it promises significant benefits to end-users and ISP's alike, but it raises a large number of questions that are left open and whether or not the idea ultimately will have an impact will depend on whether those questions can be answered. Additionally, the problems introduced by allowing source-routing make the idea unattractive to ISP's. A more manageable problem would be to allow the client to put nanopayments into his/her

packets for better QoS but relinquish source-routing possibilities, making the problem space more tractable.