Micropayment Architectures

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Agenda

Micropayment Architectures

- Market expectations
- Emerging applications
- Micropayment architectures
  - Generic model
  - Typical variations
  - Technical considerations
  - Sample transaction flows
- Business models
- Vendors and systems
- Current issues
What is a Micropayment?

Definitions …

• A micropayment is any payment under $10 that is used primarily to buy and sell digital goods over the Web
• A micropayment system is any payment system that handles transactions as small as 1¢
• A micropayment represents the transfer of value from one entity to another in arbitrarily small amounts, where transfer revenue is greater than transfer cost (W3C Micropayments WG)
• Micropayments ≡ Digital Cash ≡ eMoney
• Micropayments ≠ Digital Cash ≠ eMoney
Market Expectations

Who needs micropayments?

• Sellers?
  – Yes, if they can sell new things at lower pricing points
  – Yes, if they can simplify the purchase process
  – Yes, if they can lower their cost of payments
  – Yes, if they can get quick payment finality
• Buyers?
  – Maybe, if it saves them money
  – Maybe, if they can do new things
• Financial Institutions?
  – Only if they can derive incremental revenue
  – Only if there is an existing market of buyers and sellers
Application Domains

Granularity Opportunity

Premium Content On the Web
mCommerce with wireless devices
Email Postage And Spam Mgmt
Bandwidth Reservation

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Content Business Models

Micropayment applications ...

- Pay-per-click
- Flat-rate subscriptions
- Usage-based metering
- Preferred service
- Advertising filtering
- Loyalty points
- Advertising rebates
- Donations & tips
- Couponing
- Tiered pricing

*Unified Model is Starting to Emerge*
## Two Architectural Models

<table>
<thead>
<tr>
<th><strong>Notational Model</strong></th>
<th><strong>Token Model</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Value held centrally</td>
<td>• Value held locally</td>
</tr>
<tr>
<td>• Buyer directs value to be transferred to seller</td>
<td>• Buyer hands value to seller with a token</td>
</tr>
<tr>
<td>• Mirrors credit / debit accounting</td>
<td>• Mirrors stamps, tickets, subway tokens</td>
</tr>
<tr>
<td>• Shared purchase history</td>
<td>• Private purchase history</td>
</tr>
<tr>
<td>• Accounts are “protected”</td>
<td>• Tokens can be lost</td>
</tr>
<tr>
<td>• No client software (*)</td>
<td>• Client software required (*)</td>
</tr>
</tbody>
</table>

(*) Except for exceptions
### Four Fundamental Variations

<table>
<thead>
<tr>
<th>Notational Aggregation</th>
<th>Notational Prepaid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Billing information on file, all purchases aggregated against a single end-of-period transaction.</td>
<td>Prepaid value held in account, all purchases are debited against prepaid balance.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prepaid Tokens</th>
<th>Proof of Credit (Hybrid)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepaid value held in tokens, which are spent on purchases. Sometimes there is “change”.</td>
<td>Billing information on file, a token (as proof of credit) is used to run up a tab with each merchant.</td>
</tr>
</tbody>
</table>
# Technical Considerations

## Notational Systems
- Buyer authentication
- Seller authentication
- Account protection

## Token Systems
- Forgery & Counterfeiting
- Token theft & content theft
- Double Spending

## All Micropayments Systems
- Website Integration
  - Document tree integration
  - Pricing markup technique
  - URL protection
- Problem Resolution
  - Replays
  - Refunds
  - Credits
1) Buy a URL
2) Invoice specifics (redirect)
3) Authenticate buyer
4) Present/confirm payment
5) Authorization (redirect)
6) Payment confirmation
7) URL delivery

Buyer already has billing relationship with financial agent, now makes a purchase
1) Buy a URL
2) Invoice specifics (redirect)
3) Authenticate buyer
4) Present/confirm payment
5) URL retrieval / proxy
6) URL delivery

Same as notational architecture #1, but financial agent retrieves content for buyer
Token Architecture #1

1) Buy a URL
2) Invoice specifics
3) Payment in tokens
4) Double-spending check
5) URL delivery

Buyer already has purchased tokens from financial agent, now makes a purchase
Business Model: Revenue

Buyer Derived Revenue
- Currency conversion fee
- Convenience fee
- Account maintenance
- Transaction fee
- Buyer float (prepaid)

$ \rightarrow \text{Financial Agent} \rightarrow $ 

Seller Derived Revenue
- Setup fee
- Account maintenance
- Minimum volume fee
- Settlement fee
- Transaction fee
- Seller float

$ \rightarrow \text{Financial Agent} \rightarrow $ 

Buyer

\rightarrow \text{Financial Agent} \rightarrow 

Seller

All determined by the financial agents terms & conditions
Can also license customer lists, freeze assets, & generate advertising revenue

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Financial agent has fixed cost per user and variable transaction cost. Must also absorb losses from fraudulent merchants & buyer/seller disputes.
<table>
<thead>
<tr>
<th>Vendors &amp; Systems (Sample)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CentMeter</td>
</tr>
<tr>
<td>ClickShare</td>
</tr>
<tr>
<td>e-Cash</td>
</tr>
<tr>
<td>e-gold (1)</td>
</tr>
<tr>
<td>eCharge</td>
</tr>
<tr>
<td>Enition</td>
</tr>
<tr>
<td>iBUC</td>
</tr>
<tr>
<td>InternetCash (2)</td>
</tr>
<tr>
<td>Internet Dollar</td>
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<tr>
<td>iPIN</td>
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<tr>
<td>Jalda</td>
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<tr>
<td>Magex</td>
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<tr>
<td>MagnaCash</td>
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<tr>
<td>MilliCent</td>
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<tr>
<td>Mojo Nation</td>
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<tr>
<td>Mondex (3)</td>
</tr>
<tr>
<td>NextGenPay</td>
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<tr>
<td>Online Toll</td>
</tr>
<tr>
<td>PayPal (4)</td>
</tr>
<tr>
<td>Qpass</td>
</tr>
<tr>
<td>Trivnet</td>
</tr>
</tbody>
</table>

(1) Plus all other gold-based currencies (GBCs)
(2) Plus all other prepaid card providers
(3) Plus all other smart card-based payment systems
(4) Plus all other person-to-person payment service providers
Current Micropayment Issues

What the industry is talking about …

• Well-known websites that now charge for content
• How to establish a critical mass of sellers *and* buyers
• Role of *Open Source* in micropayments
• Interplay of micropayments, privacy, anonymity, and copyright
• Possible opportunities to marry micropayments with P2P
• Lock up of key intellectual property
• Standardization of a common pricing markup language
• Evolution to a common merchant payment toolkit
• Latest PayPal statistics 😊
Summary

- Micropayments are still over the horizon, but clearly coming
- Growing recognition the Internet needs new business models
- Lots of people are involved with lots of ideas
- The community welcomes all participants!
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