Charging and billing (C&B)

S-38.041 Networking Business

Traditional payment systems
US market - Value and volume of payments

Source: U.S. Census Bureau, 2002
Traditional payment systems
Finland

- Role of cash decreasing very slowly
- Mass of micropayments to be optimized

**Key features**

<table>
<thead>
<tr>
<th></th>
<th>Cash</th>
<th>Credit card</th>
<th>Debit cards</th>
<th>Accumulating balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per transaction</td>
<td>low</td>
<td>high</td>
<td>high</td>
<td>low</td>
</tr>
<tr>
<td>Merchant fixed cost</td>
<td>low</td>
<td>high</td>
<td>high</td>
<td>high</td>
</tr>
<tr>
<td>User fixed cost</td>
<td>0</td>
<td>high</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>Merchant fee</td>
<td>0</td>
<td>3-5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Account required</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Anonymous</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Risk for consumer</td>
<td>yes</td>
<td>limited</td>
<td>limited</td>
<td>no</td>
</tr>
<tr>
<td>Risk for merchant</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
</tbody>
</table>
E-commerce

Basic business sectors

Business-to-Business (B2B) – 90% of all e-commerce

Business-to-Consumer (B2C) – 10% of all e-commerce

Consumer-to-Consumer (C2C) – 1% of all e-commerce

Role of network operators
- Access and transport service provider
- Charging for small content transactions of consumers

Revenue models

<table>
<thead>
<tr>
<th>Revenue model</th>
<th>Examples</th>
<th>Revenue source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertising</td>
<td>Yahoo.com</td>
<td>Fees from advertizers in exchange for advertisements</td>
</tr>
<tr>
<td>Subscription</td>
<td>WSJ.com</td>
<td>Fees from subscribers in exchange for access to content</td>
</tr>
<tr>
<td></td>
<td>Sportsline.com</td>
<td></td>
</tr>
<tr>
<td>Transactions</td>
<td>eBay.com</td>
<td>Fees for enabling or executing a transaction</td>
</tr>
<tr>
<td></td>
<td>E-Trade.com</td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>Amazon.com</td>
<td>Sales of goods, information, or services</td>
</tr>
<tr>
<td></td>
<td>Sears.com</td>
<td></td>
</tr>
<tr>
<td>Affiliate</td>
<td>MyPoints.com</td>
<td>Fees for business referrals</td>
</tr>
</tbody>
</table>

Source: Laudon&Taylor, 2003
E-commerce
U.S. on-line payment market – merchants view

- VISA has over 50% marketshare of all Internet payments (ref. "Verified by VISA")

Source: Gartner Group, 2002

E-commerce
On-line credit card process

- Weakness in authentication (Secure Socket Layer ⇒ Secure Electronic Transaction)
- High cost (0.2-0.3€ per transaction ⇒ minimum purchase 10€)
E-commerce vs. digital content

Japanese on-line market – wired vs. mobile in 2001

- Mobile content market ¥110B
- Mobile e-commerce market ¥115B
- Wired content market ¥32B
- Wired e-commerce market ¥706B

Mobile Internet 23% Wired Internet 77%

Source: ECOM, Natsuno, 2003

Digital content

Digital wallet – core technology

- Digital wallet
  - authenticates the consumer digitally (certificates, SET, etc)
  - stores and transfers value
  - secures the payment from consumer to merchant
- Potential benefits
  - one-stop-shopping for transactions and bill presentment
  - user information pre-set ⇒ better usability (single sign-on)
  - real-time integration of the complete transaction chain
  - enables payments of < 5€ in Internet
- Two basic digital wallet approaches
  - client-based wallet for consumers (e.g. MasterCard Wallet)
  - server-based wallet for merchants (e.g. MSN Wallet/MS.NET)
    - consumers resist storing personal information in servers!
- Successful standard missing (e.g. Liberty Alliance, 3GPP)
Digital content
Mobile super-distribution

- Mass delivery of legal mobile content with low cost (e.g. peer-to-peer MMS)
- Micropayment mediation for a large number of retailers (content aggregation)
- Operator gets the rights clearing revenue from content retailers
- Usage rules in MRV control the usage of a content object (e.g. music)
- Mobile operator can integrate DRM with existing charging (pre/postpaid)

Legend
DRM = Digital Rights Management
MRV = Mobile Rights Voucher
= Content path
= Control path

Operator charging and billing
Basic concepts

- **Charging**: a process where subscriber accounting information is retrieved for billing purposes
- **Billing**: generate and send a bill to subscriber based on certain tariffs
- Charging and billing are key components of *Business* and *Operations Support Systems* (BSS/OSS)
- Traditional circuit-switched charging is based on subscriber id and Call Detail Records (CDR) generated by network elements
- Packet-switched networks involve xDR, e.g. Internet Protocol Detail Records (IPDR) for new services such as IP telephony, public WLAN, digital cable, and content
Operator charging and billing

Traditional system

**Billing**
- Accounting system
- Administration module
  - Billing module
  - Fraud control module
- Customer care module
- Roaming/interconnect module
- Credit control module
- Rating module
- CDR processing module

**Charging**
- Network management
  - Mediation device

**Customers**

**Network infrastructure**

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**Operator charging and billing**

Cost breakdown – example mid-size operator (3-5M subs)

<table>
<thead>
<tr>
<th>OPEX, billing</th>
<th>Unit price</th>
<th>#</th>
<th>Total per year</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel</td>
<td>900000</td>
<td>100</td>
<td>9000000</td>
<td></td>
</tr>
<tr>
<td>Post-processing</td>
<td>3000000</td>
<td>1</td>
<td>3000000</td>
<td></td>
</tr>
<tr>
<td>Pre-paid/inter-operator</td>
<td></td>
<td></td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>Marketing</td>
<td>200000</td>
<td>1</td>
<td>200000</td>
<td></td>
</tr>
</tbody>
</table>

**CAPEX/billing**
- Billing system: 20000000
- Software upgrades: 20000000

**OPEX, charging**
- Installation and maintenance: 90000

**CAPEX, charging**
- Charging system: 4000000
- Software upgrades: 4000000

**CAPEX, total**
- 7200000

| OPEX, total | 13110000 |
| Total       | 20300000 |

**CAPEX % of total C&B costs**
- 35 %

Source: Gartner Group, Comptel, Swan 2003
Operator charging and billing
Cost analysis

- Total cost per bill (on paper) in traditional C&B can be several euros
- New features in mobile such as GPRS, prepaid, and multi-access roaming add C&B costs significantly (30% ?)
- Mobile operators fight the high C&B cost by offering their service to others or by outsourcing it
- Mobile C&B transaction cost can be reduced by
  - avoiding paper bills (electronic bills)
  - removing credit losses (post-paid ⇒ pre-paid/real-time)
  - eliminating history (digital credit ⇒ digital cash)
  - aggregating for settlement (digital wallet)
  - automating the top-up process (digital wallet)

Operator charging and billing
Mobile pre-paid process

**Top-up side**
- Pre-paid phone cards
- Automatic Teller Machines
- On-line digital wallet

**Payment side**
- Physical goods
- Physical services
- Digital goods
- Digital services
- Digital transport

Credit account