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

Value(€)/Transaction

- Nordea Internet bank (c. 300€/tr, 4trs/month)
- VISA credit card (45 €, 6trs)
- Cash
- Mobile handset (0.3 €, 50trs)

- Role of cash decreasing very slowly
- Mass of micropayments to be optimized
# Traditional payment systems

## 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><strong>Cost per transaction</strong></td>
<td>low</td>
<td>high</td>
<td>high</td>
<td>low</td>
</tr>
<tr>
<td><strong>Merchant fixed cost</strong></td>
<td>low</td>
<td>high</td>
<td>high</td>
<td>high</td>
</tr>
<tr>
<td><strong>User fixed cost</strong></td>
<td>0</td>
<td>high</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td><strong>Merchant fee</strong></td>
<td>0</td>
<td>3-5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Account required</strong></td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Anonymous</strong></td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td><strong>Risk for consumer</strong></td>
<td>yes</td>
<td>limited</td>
<td>limited</td>
<td>no</td>
</tr>
<tr>
<td><strong>Risk for merchant</strong></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

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

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

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

Public Network Operator

Business

Consumer

Public Network Operator
## E-commerce

### 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&Traver, 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

1. Consumer makes purchase
2. SSL Internet
3. Request transaction
4. Verify balance
5. Issuing bank credits merchant account (batch)
6. Monthly statement with debit for purchase

- 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

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

- 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)
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
Rating module
CDR processing module

Business & operational support processes

Network management

Customers

Bill flow

Charging

Mediation device

Network infrastructure

Customers

Bill flow

Charging

Mediation device

Network infrastructure

Business & operational support processes

Network management

Customers

Bill flow

Charging

Mediation device

Network infrastructure

Business & operational support processes

Network management
## 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>90000</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>

<table>
<thead>
<tr>
<th>CAPEX/billing</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Billing system</td>
<td>20000000</td>
<td>5</td>
<td>4000000</td>
<td>Divided over 5 years</td>
</tr>
<tr>
<td>Software upgrades</td>
<td>20000000</td>
<td>0.1</td>
<td>2000000</td>
<td>10% of purchase price</td>
</tr>
</tbody>
</table>

| OPEX, charging           |            |    |                |                        |
|--------------------------|------------|----|----------------|                        |
| Installation and maintenance | 90000    | 10 | 900000         |                        |

| CAPEX, charging          |            |    |                |                        |
|--------------------------|------------|----|----------------|                        |
| Charging system          | 4000000    | 5  | 800000         | 20% of billing system  |
| Software upgrades        | 4000000    | 0.1| 400000         | 10% of purchase price  |

| CAPEX, total             | 7200000    |    |                |                        |
| OPEX, total              | 13100000   |    |                |                        |
| 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