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
## Traditional payment systems

### Key features

<table>
<thead>
<tr>
<th>Feature</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
## 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, Sportsline.com</td>
<td>Fees from subscribers in exchange for access to content</td>
</tr>
<tr>
<td>Transactions</td>
<td>eBay.com, E-Trade.com</td>
<td>Fees for enabling or executing a transaction</td>
</tr>
<tr>
<td>Sales</td>
<td>Amazon.com, Sears.com</td>
<td>Retail sales of goods, information, or services</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

- Weakness in authentication (Secure Socket Layer ⇒ Secure Electronic Transaction)
- High cost (0.2-0.3€ per transaction ⇒ earlier minimum purchase price)
E-commerce vs. digital content
Japanese on-line market – wired vs. mobile in 2001

Mobile content market ¥110B
Mobile e-commerce market ¥115B

Mobile Internet 23%

Wired e-commerce market ¥706B

Wired content market ¥32B

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/clearing house 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 *subscriptions* and *Charging Data Records* (CDR) generated by network elements
- Packet-switched networks involve *Internet Protocol Data Records* (IPDR, cmp. CDR) for new services such as IP telephony, public WLAN, digital cable, and content
What is a Subscription?

• For instance
  – A wire and a hole in a switchboard
  – A phone number
  – A SIM card
  – An IP address
• An agreement with customer to provide a range of services
  – not at all a technical issue
• A portfolio of communication products offered to the customer
<table>
<thead>
<tr>
<th>Service Category</th>
<th>Core Services</th>
<th>Capabilities &amp; Features</th>
<th>Customer Segments</th>
<th>Time Frame</th>
<th>Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voice / Voip</td>
<td>Local / Long dist, International</td>
<td>Call forward, Caller ID, Follow me, Virtual TN, Push-to-Talk, Location, IM / Chat, A number, Balance</td>
<td>Region 1, Region 2</td>
<td>Summer, Winter</td>
<td>Stores, Call Center, Retail, Virtual operators</td>
</tr>
<tr>
<td>Mobile</td>
<td>Minutes, SMS, MMS, WAP, Streaming, GPRS, HSDSP</td>
<td></td>
<td>Teen, Young adult, Family, Traveller</td>
<td>Olympics, Anniversary</td>
<td>Week-end, special</td>
</tr>
<tr>
<td>Data xDSL</td>
<td>Internet access, eMail, Webspace, Security</td>
<td>Speed, SLA</td>
<td>Postpaid, Prepaid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV / Video</td>
<td>IPTV, DigiTV, VoD, Conferencing</td>
<td>Basic service, Sport package</td>
<td>Enterprise, SME, Home office</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td>Storage, Firewall, ASP applications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thousands of Products In Portfolio!

Source: Pasonen, 2005
TeleManagement Forum and eTOM
(enhanced Telecom Operations Map - standard)

Source: Pasonen, 2005
Rating, Pricing, Billing, Charging

Source: Pasonen, 2005
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

CDR flow
### 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>

**CAPEX/billing**

| Billing system              | 20000000   | 5  | 4000000        | Divided over 5 years   |
| Software upgrades           | 20000000   | 0,1| 2000000        | 10% of purchase price  |

**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
- Production cost of mobile C&B transaction 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

Credit account

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