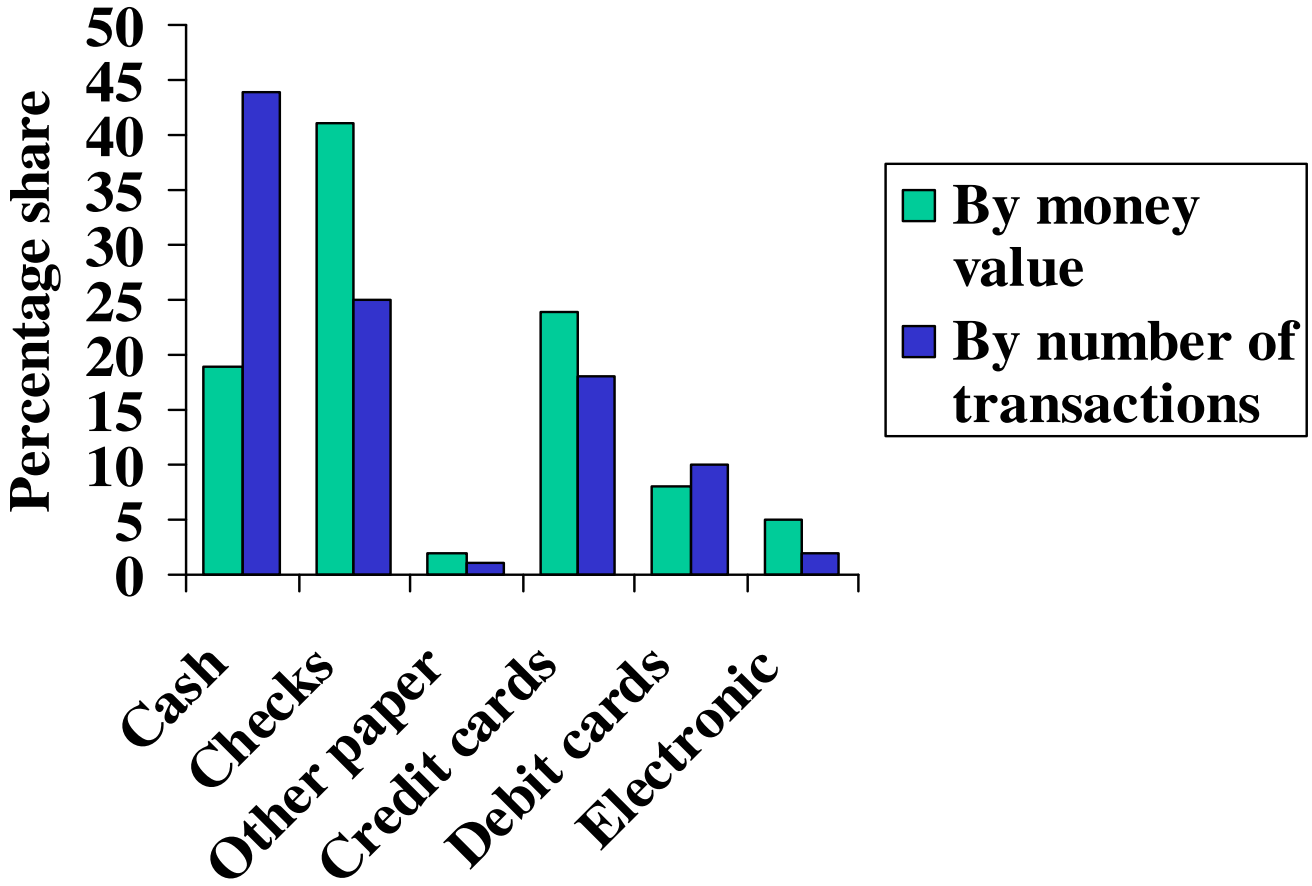
# Charging and Billing (C&B)

S-38.3041 Networking Business

# Traditional payment systems

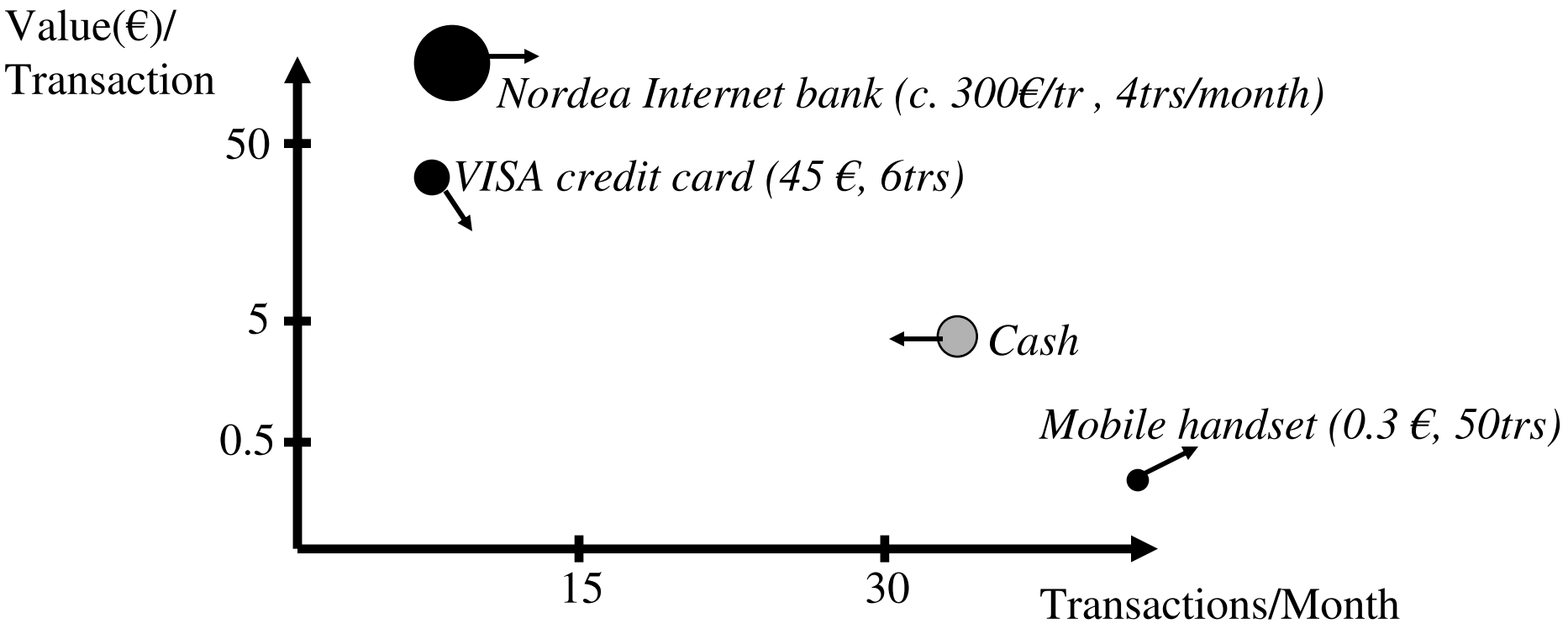
## US market - Value and volume of payments




Source: U.S.Census Bureau, 2002

# Traditional payment systems

Finland




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

# Traditional payment systems

## Key features

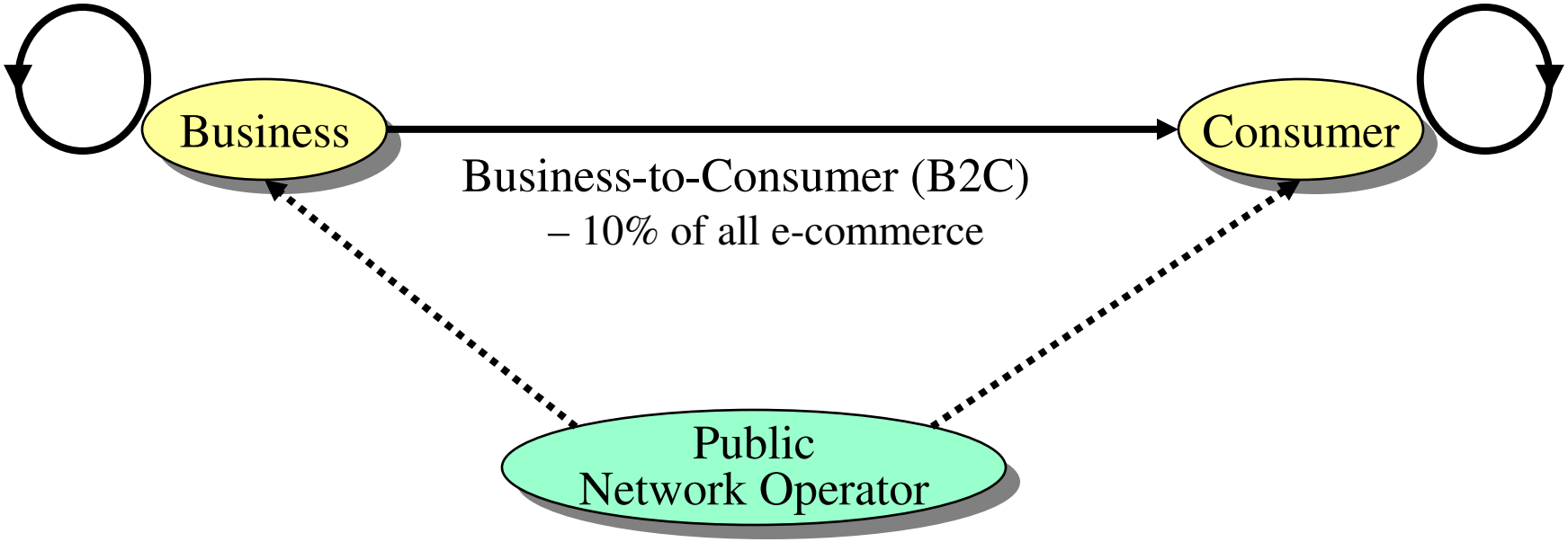
| | Cash | Credit card | Debit cards | Accumulating balance |
|---|---|---|---|---|
| Cost per transaction | low | high | high | low |
| Merchant fixed cost | low | high | high | high |
| User fixed cost | 0 | high | low | low |
| Merchant fee | 0 | 3-5% | | |
| Account required | no | yes | yes | yes |
| Anonymous | yes | no | no | no |
| Risk for consumer | yes | limited | limited | no |
| Risk for merchant | no | yes | no | yes |

# E-commerce

## Basic business sectors

Business-to-Business (B2B)
– 90% 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

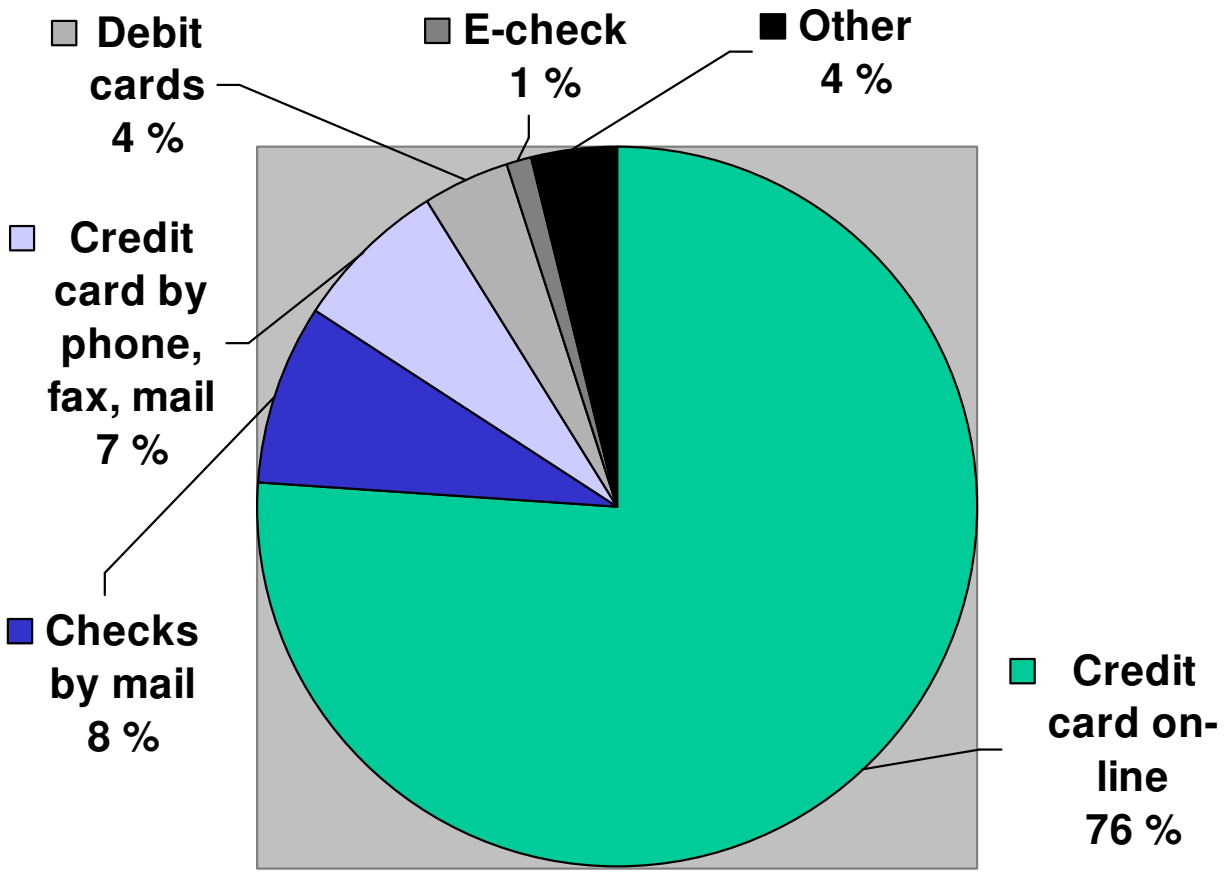
## Revenue models

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

Source: Laudon&Traver, 2003

# E-commerce

## U.S. on-line payment market –merchants view

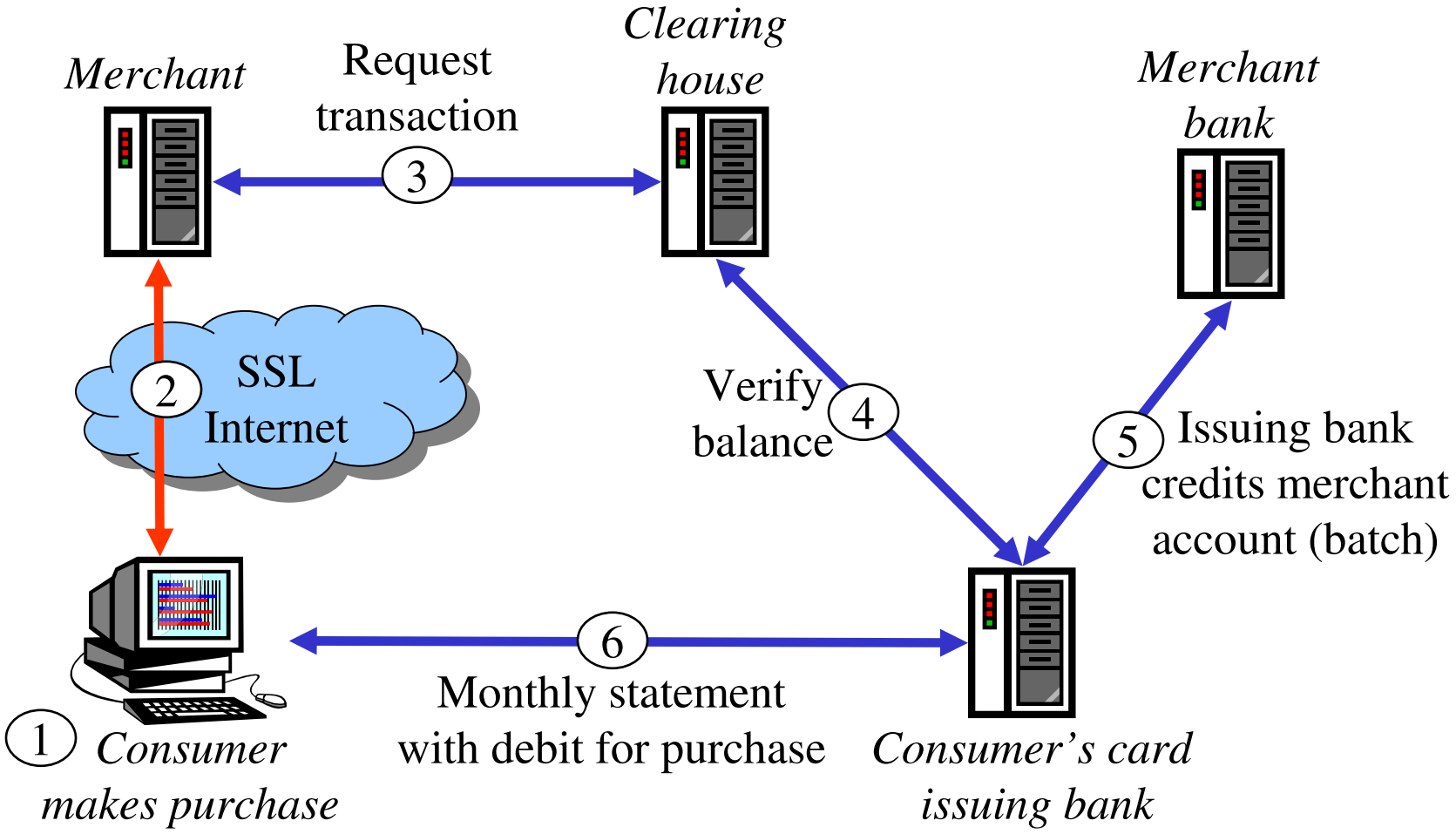



- VISA has over 50% marketshare of all Internet payments (ref. ”Verified by VISA”)

Source: Gartner Group, 2002

# E-commerce

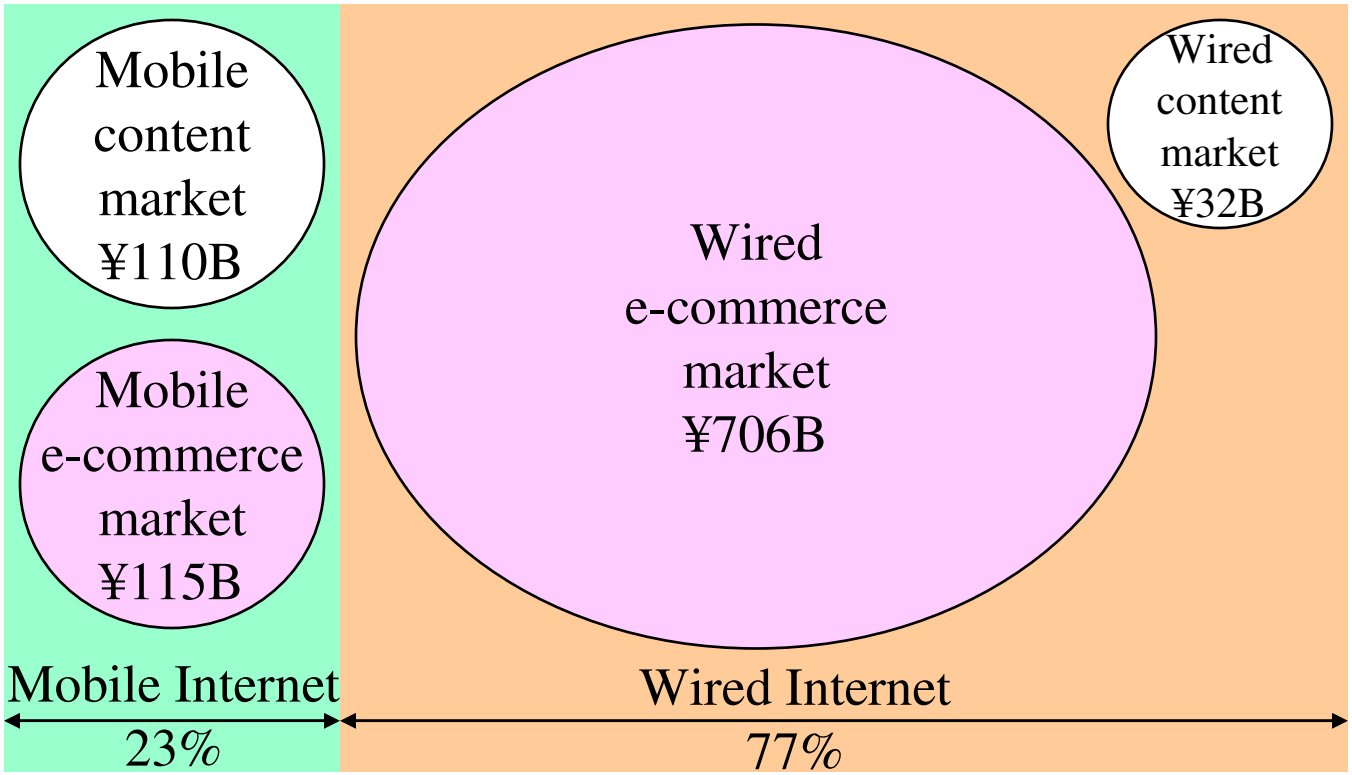
## On-line credit card process




- 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




Source: ECOM, Natsuno, 2003

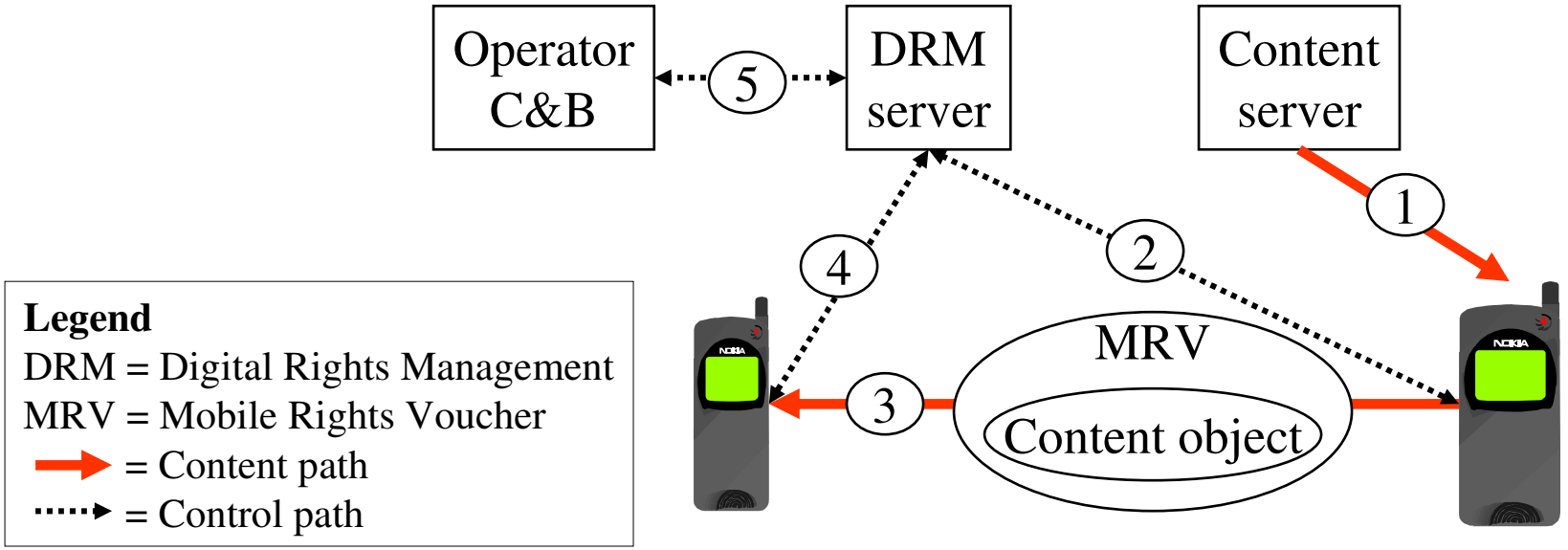
# Digital content

## 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

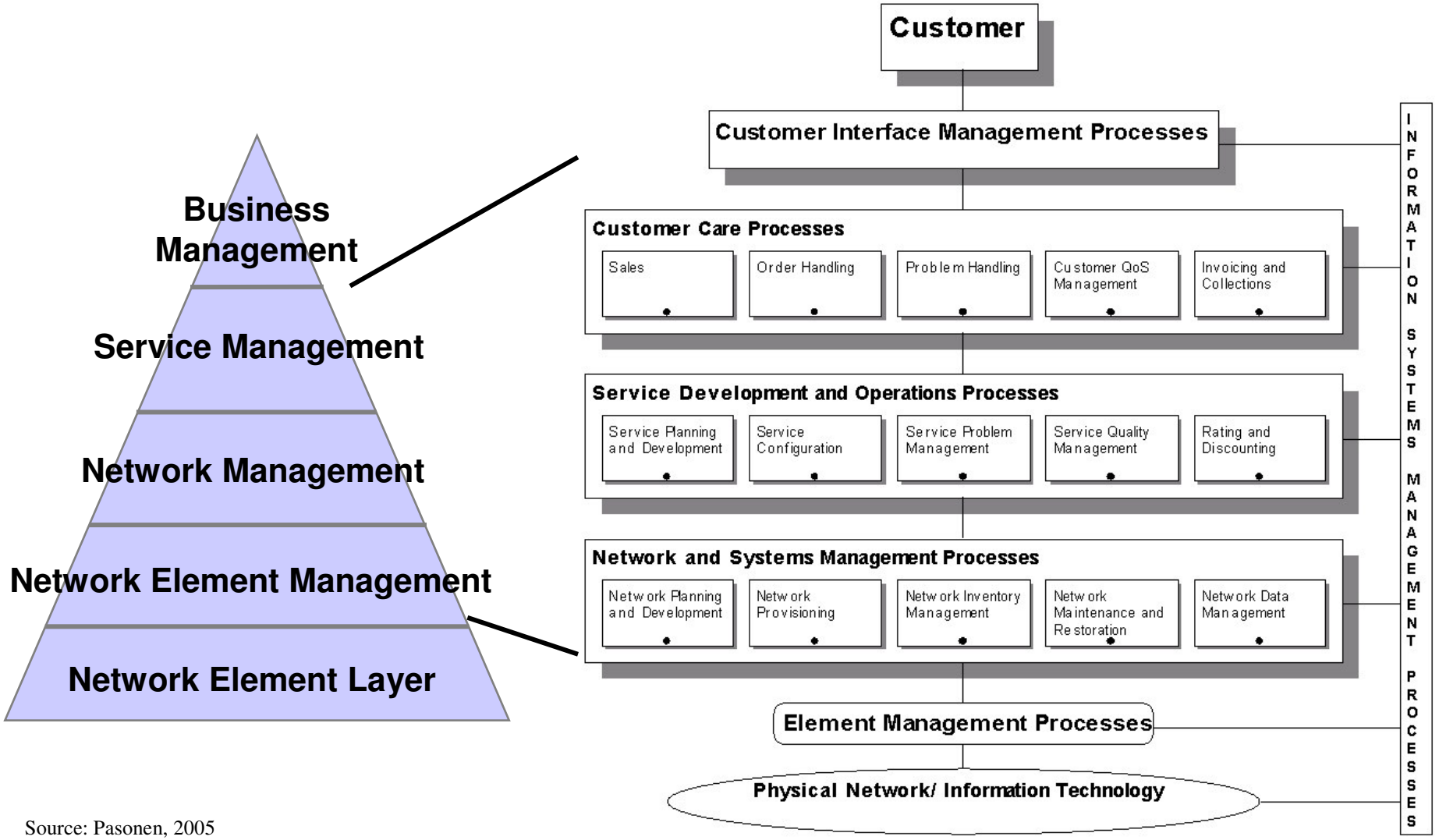
# What can a Subscription contain?

| 5 Service Category | 20 - 30 Core Services | 100 - 300 Capabilities & Features | 5 - 15 Customer Segments | 5 - 10 Time Frame | 3 - 10 Channels |
|---|---|---|---|---|---|
| Voice / Voip | Local / Long dist<br>International<br>Unified messaging<br>Conferencing | Call forward<br>Caller ID<br>Follow me<br>Virtual TN | Region 1<br>Region 2 | Summer<br>Winter | Stores<br>Call Center<br>Self Service |
| Mobile | Minutes<br>SMS, MMS, WAP<br>Streaming<br>GPRS, HSDSP | Push-to-Talk<br>Location<br>IM / Chat<br>A number<br>Balance | Teen<br>Young adult<br>Family<br>Traveller | Olympics<br>Anniversary<br>Week-end special | Retail<br>Virtual operators |
| Data xDSL | Internet access<br>eMail, Webspace<br>Security | Speed<br>SLA | Postpaid<br>Prepaid | **Thousands of Products In Portfolio!** | |
| TV / Video | IPTV, DigiTV, VoD<br>Conferencing | Basic service<br>Sport package | Enterprise<br>SME<br>Home office | | |
| Office | Storage, Firewall<br>ASP applications | | | | |

Source: Pasonen, 2005

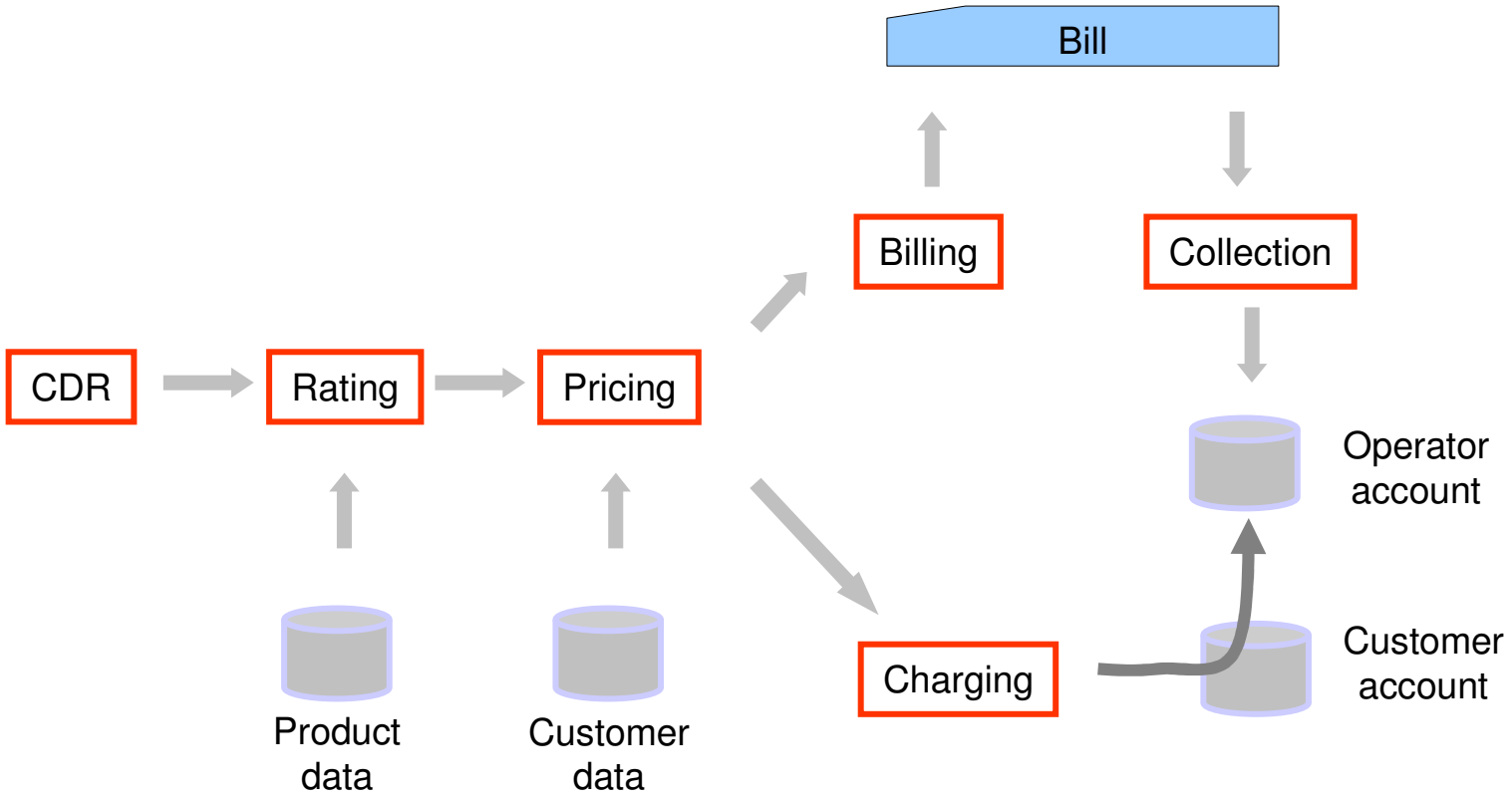
# TeleManagement Forum and eTOM

## (enhanced Telecom Operations Map -standard)




Source: Pasonen, 2005

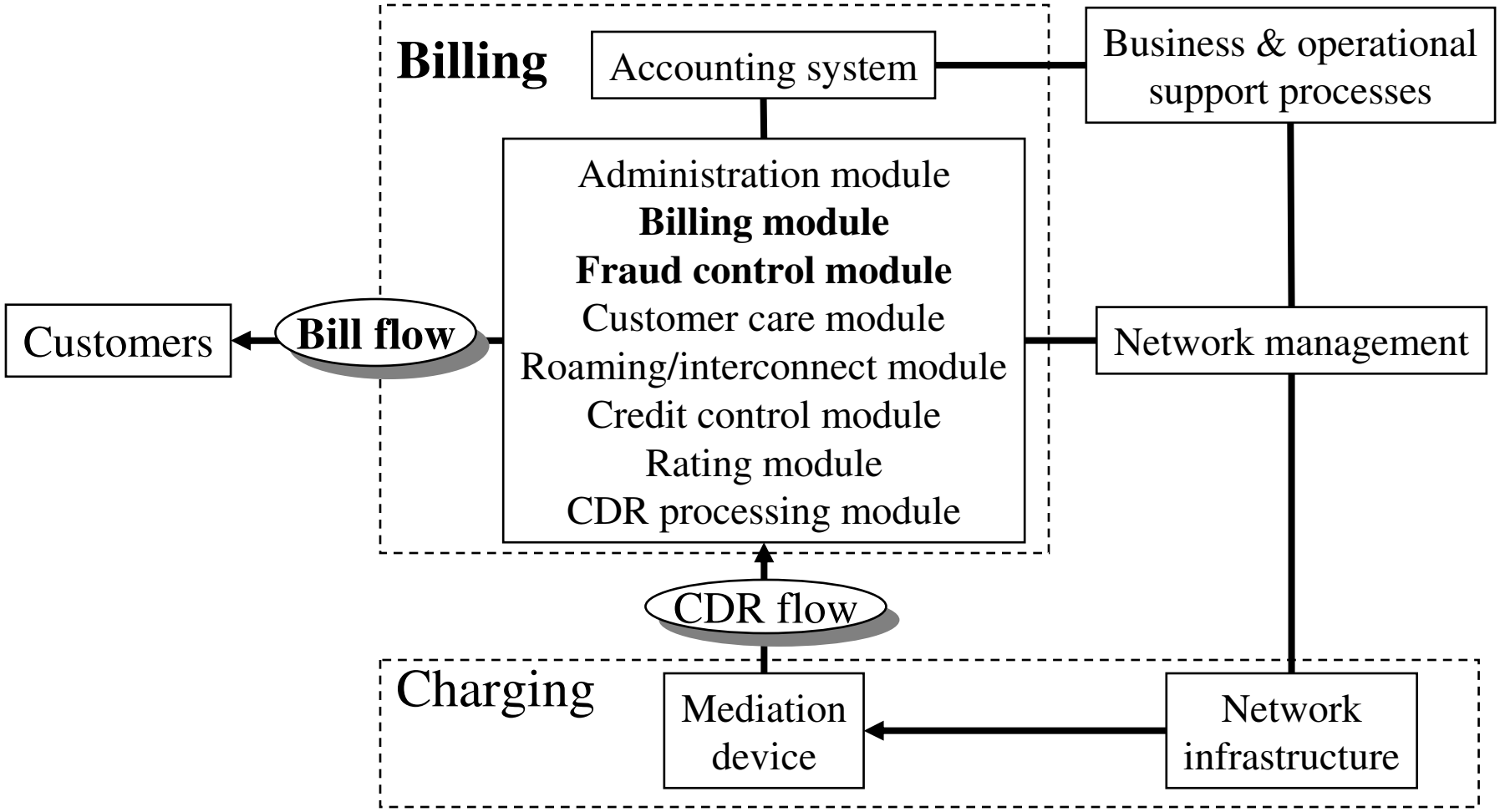
# Rating, Pricing, Billing, Charging




Source: Pasonen, 2005

# Operator charging and billing

## Traditional system



# Operator charging and billing

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

| **OPEX, billing** | **Unit price** | **#** | **Total per year** | **Comments** |
|---|---|---|---|---|
| Personnel | 90000 | 100 | 9000000 | |
| Post-processing | 3000000 | 1 | 3000000 | |
| Pre-paid/inter-operator | | | ? | |
| Marketing | 200000 | 1 | 200000 | |
| | | | | |
| **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