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## **Training**

# **ANSAwise - Services in the Electronic Marketplace**

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### **Abstract**

This is an optional module of ANSAwise.

It is used in DS13/3, the 3 day "Understanding Distributed Systems Architecture" course.

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**Approved**  
Briefing Note

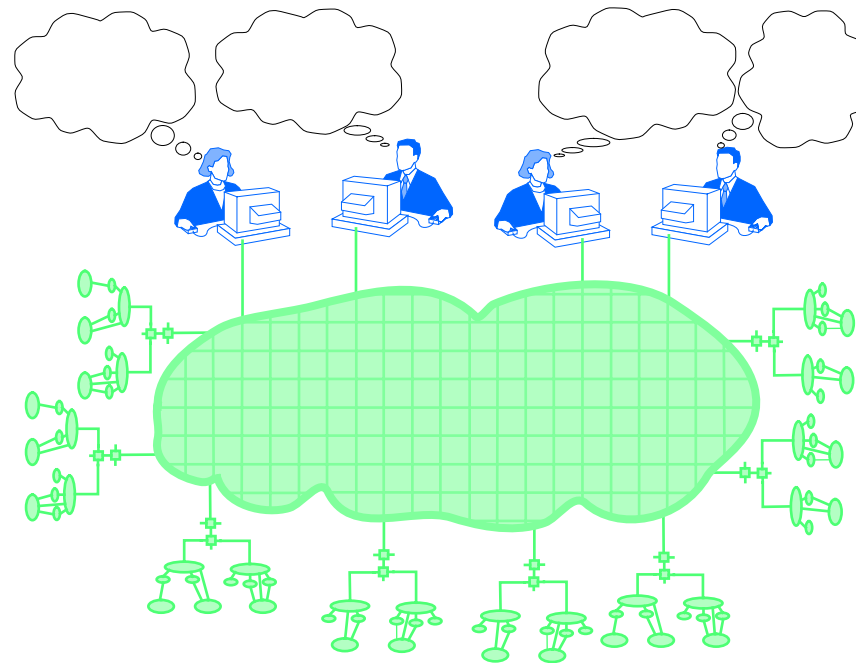
24th October 1994

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**Distribution:**  
**Supersedes:**  
**Superseded by:**



## Services in the Electronic Marketplace





## In this session

- *Examine the state of electronic services, today and tomorrow*
- *Discuss the impact for remuneration*
- *Explore the implications of federation and organizational boundaries*
- *Look at the capabilities of scripts and Intelligent agents*



## Electronic Services Today

- *Commercial services on the World Wide Web*
- *Directories of commercial sites*
- *Online product information – conventional payment*
  - 49 advertising/marketing servers with 3 or more listings
  - 694 business/commercial sites in the directory
- *Online ordering – conventional payment*
  - Flowers, books, CDs, videos, pizza ... mainly USA suppliers
  - Do you trust the Internet with your credit card details?
- *Online payment via an agent*
  - Downtown Anywhere Account – Personal Payment Password



## Problems with today's electronic services

- ***Availability***
  - services are often unreachable or overloaded
  
- ***Consistency***
  - links to services do not work because they are out-of-date or entered incorrectly
  
- ***Remuneration: getting paid!***
  - How do you pay?
  - How is unauthorised copying prevented?

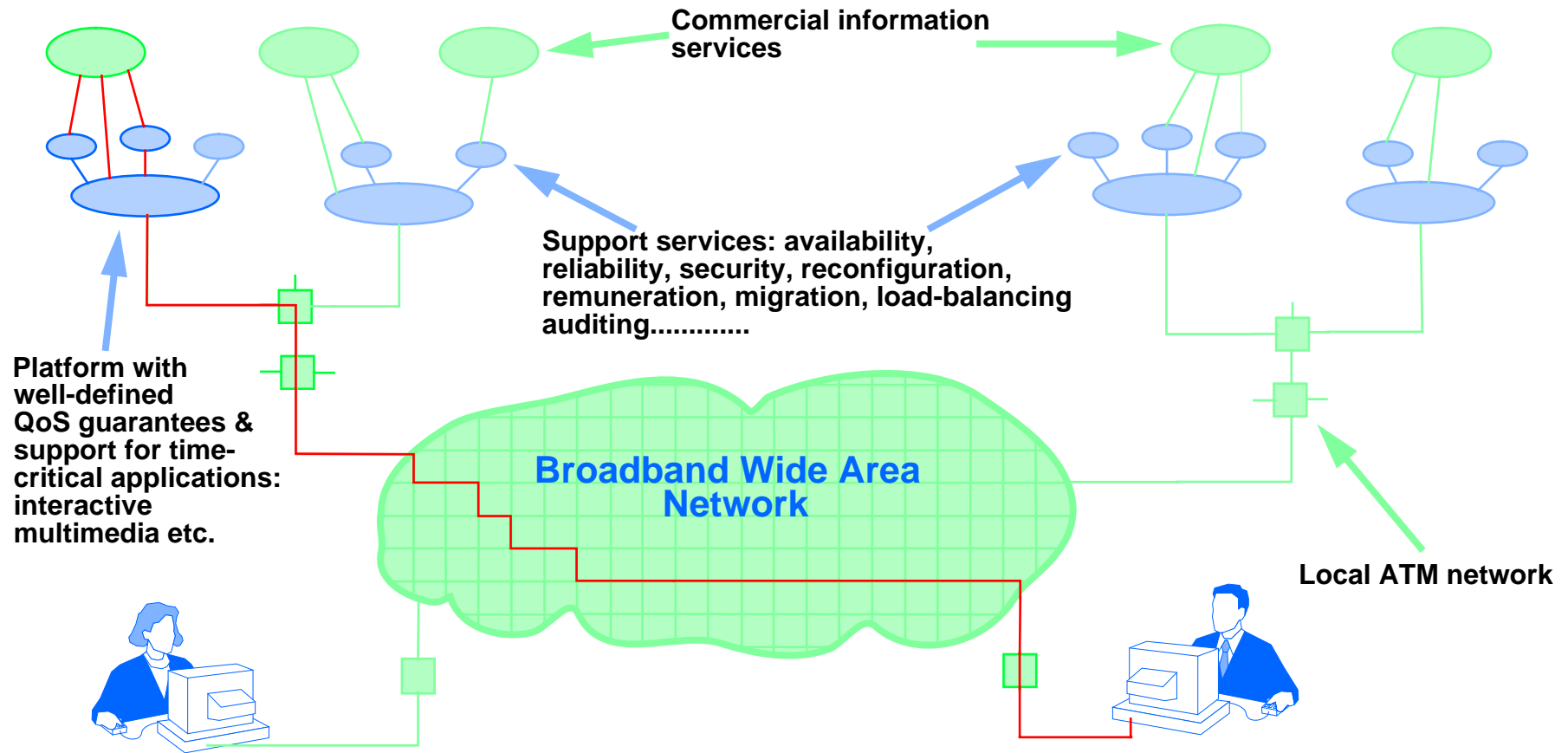


## The effect and the solution

- *A limited range of services is delivered*
  - Advertising is online, but few services are delivered online...
  - ... any information-based service could be delivered online
  - ... movies, software, literature

**Need high performance, with guarantees**

# Electronic Services Tomorrow







## The benefits to suppliers and integrators

- ***Telecommunications suppliers***
  - increased demand for bandwidth
  
- ***Platform and hardware suppliers***
  - increased demand for systems to control the network and provide the services
  
- ***System integrators***
  - more and more permutations of systems will need to cooperate



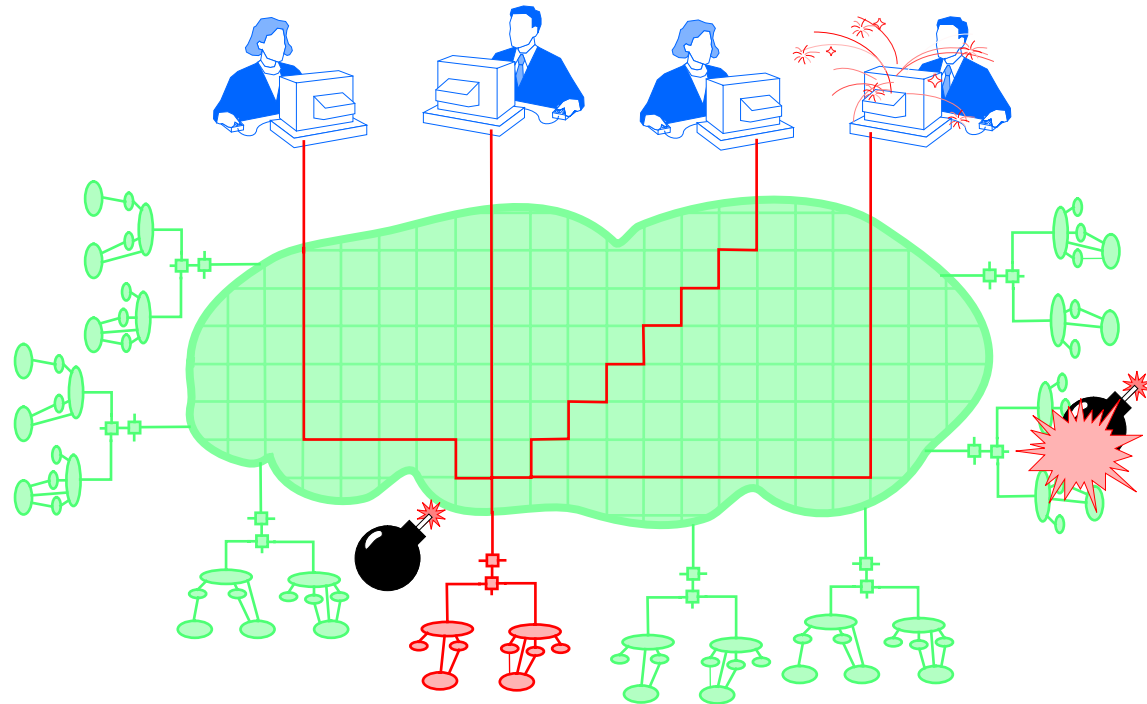
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## The benefits to providers and customers

- ***Service providers***
  - there is a world-wide market irrespective of their location or size
- ***Information service customers***
  - more high quality information can be made available at lower rates
- ***Information owners and originators***
  - they now have a world-wide choice of publisher

## What are the Infrastructure Success Factors?

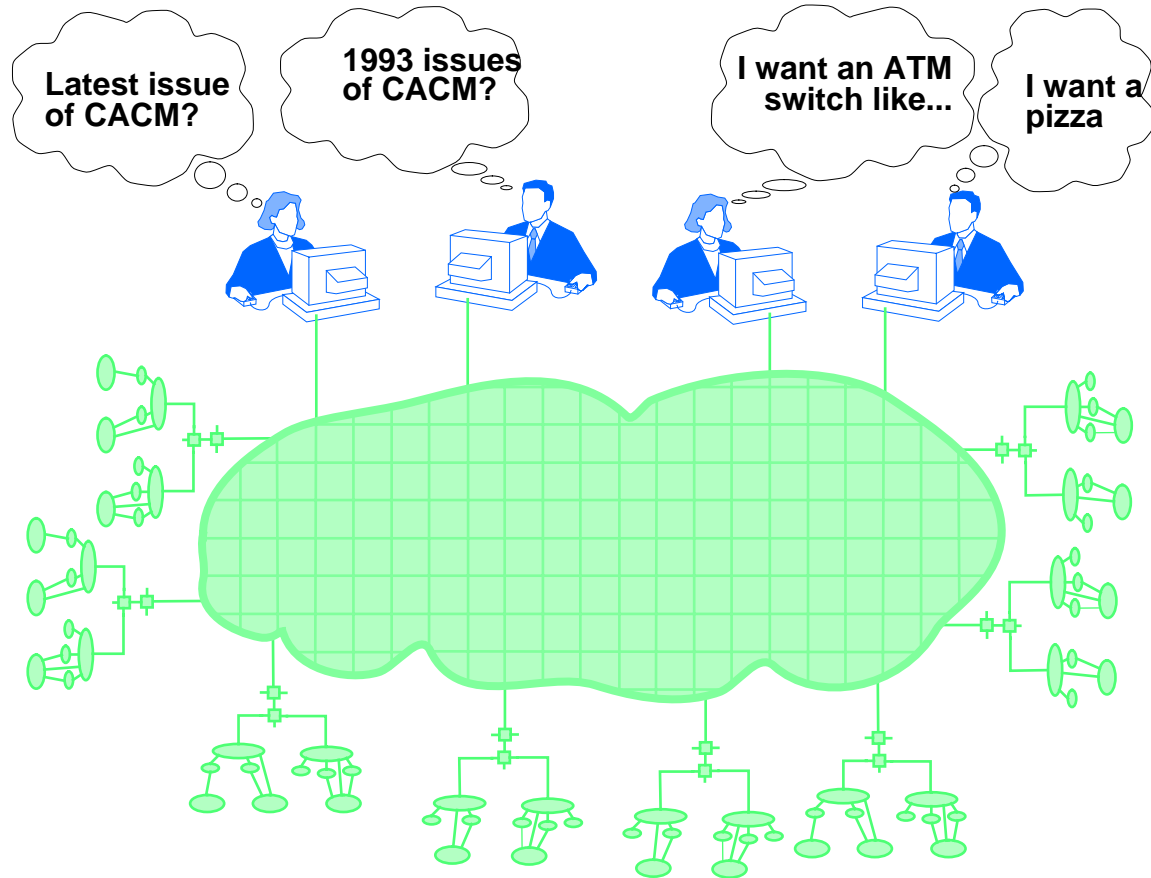
- *Resource control*
- *Dependability*
- *Interactive Multi-media*
- *Ubiquitous connectivity*
- *Security*
- *Remuneration*





## What are the Application Success Factors?

- *Trading & naming*
- *Agents & brokers*
- *Fast service development & deployment*
- *Multi-party, federated collaboration*

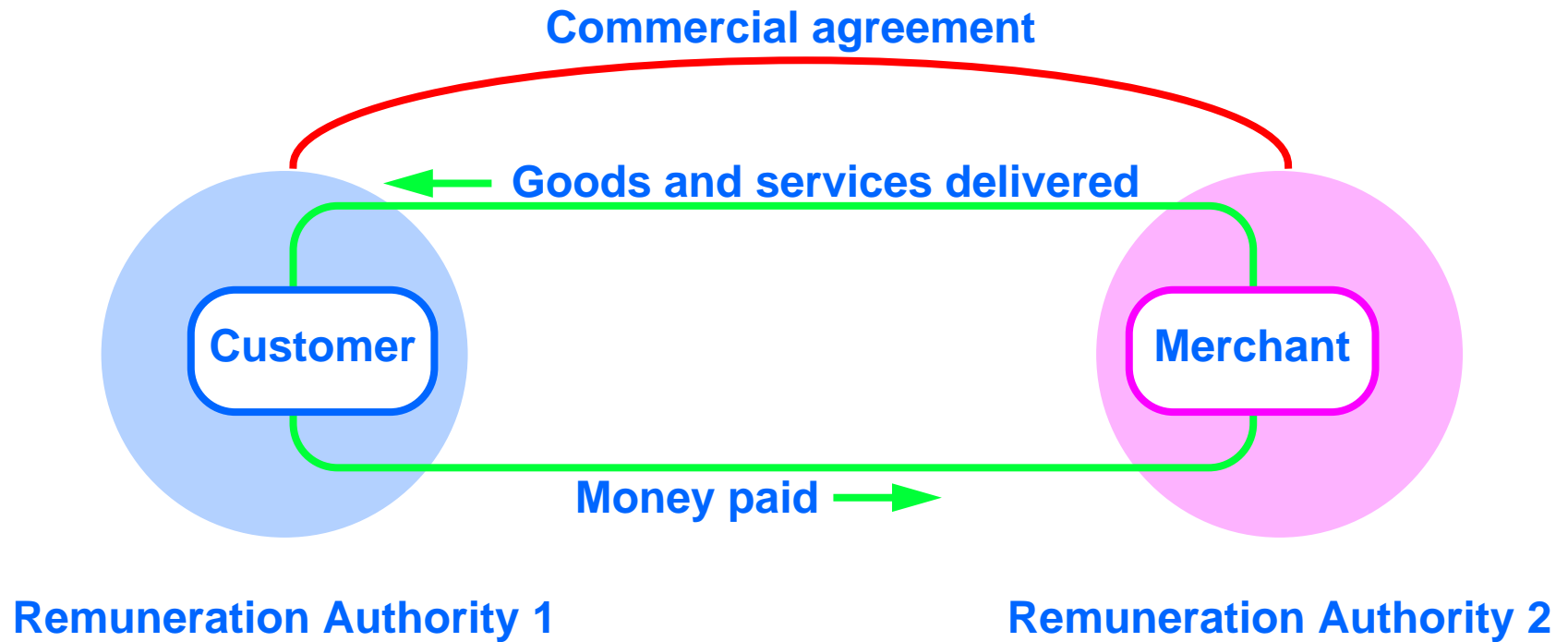




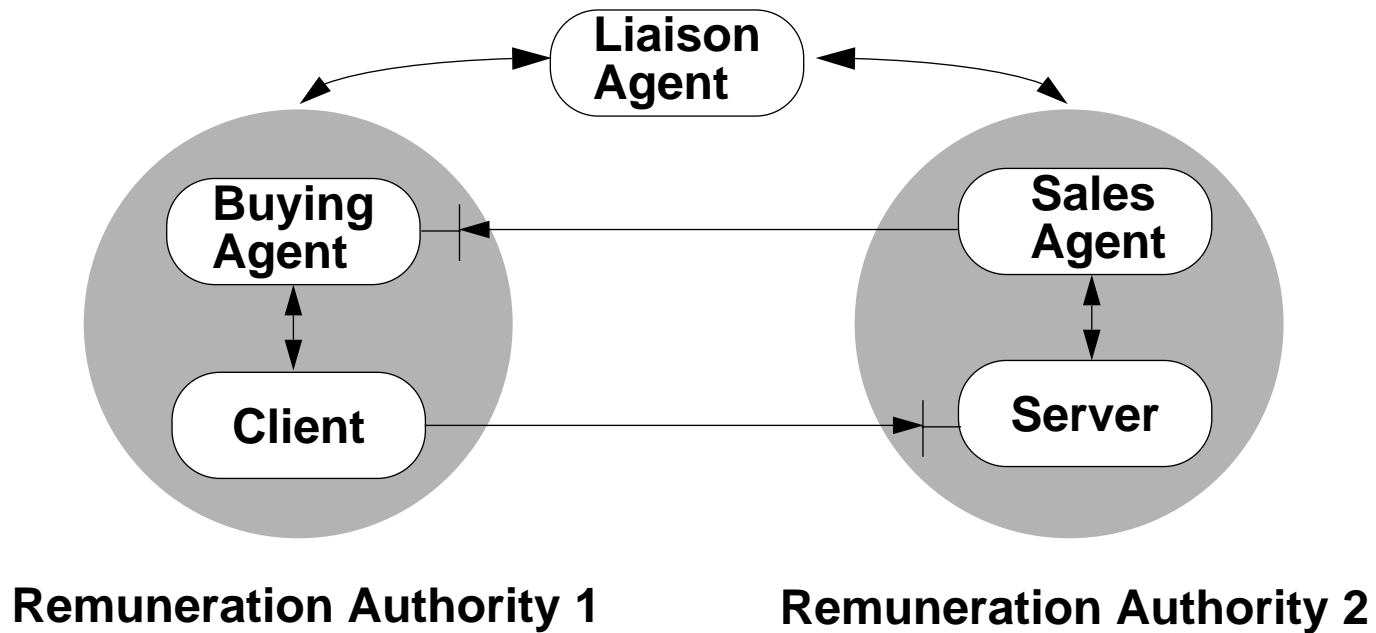
## Remuneration

- *What are the issues in remuneration?*
- *Remuneration strategies*
- *The problems that the absence of remuneration mechanisms is causing*
- *Some well-established real-world remuneration scenarios*
- *Electronic currency requirements and federation*

## Simple Remuneration Model

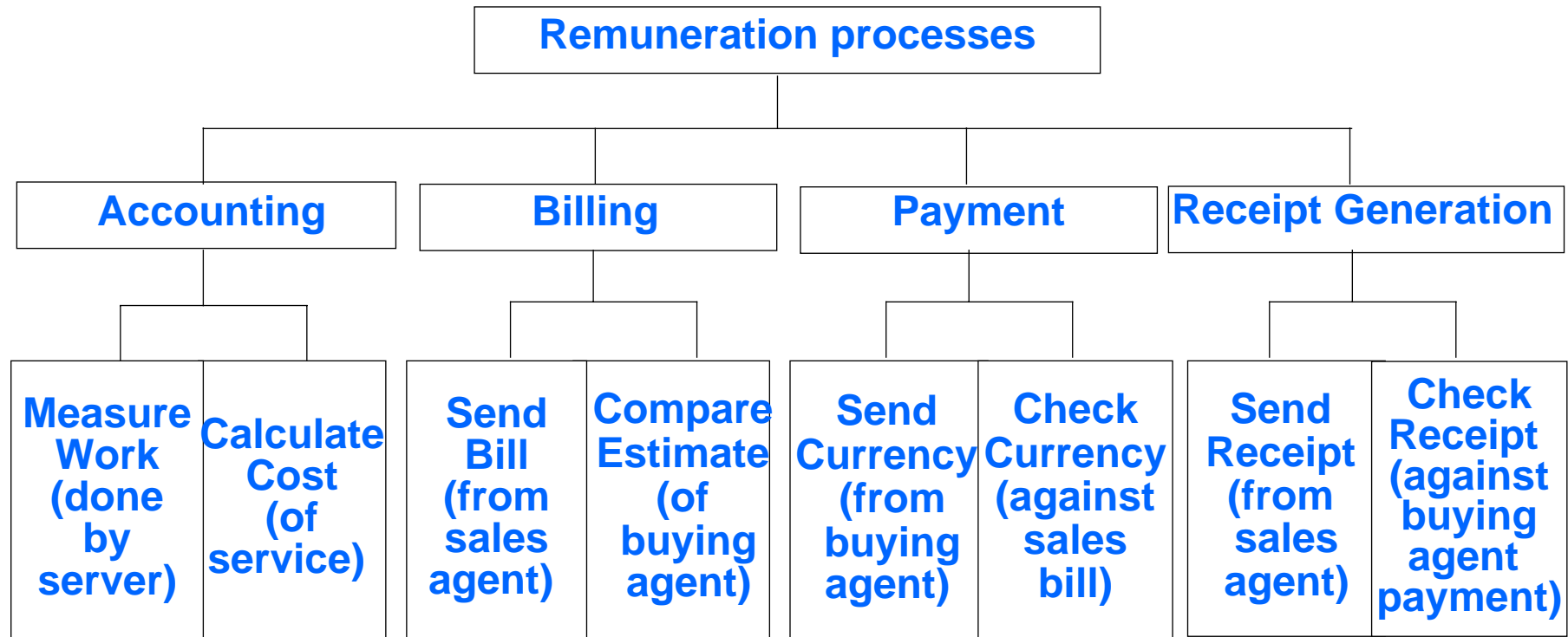


## Remuneration Model in a Client-Server Environment





# Remuneration Processes







## Analysis of Remuneration Processes

- *A commercial agreement*
  - represents agreement on all parts of the remuneration processes
  - includes specification of the strategy/policy in each process
  
- *The overall strategy is based on*
  - possession of goods
  - use of service
  - provision of effort



## Accounting Strategies

- *To measure what has been consumed*
  - resources (storage, time, bandwidth)
  - quality (priority, response rate, dependability, other QoS, level of demand)
- *To provide assurance mechanisms*
  - avoidance or resolution of accounting disparity



## Billing Strategies

- ***What will it cost?***
  - set price: e.g. free
  - direct relation to accounted consumption
  - additional factors: maintenance, documentation, discounts (e.g. for loyalty)
  
- ***When is billing expected?***
  - before, after or during consumption
  
- ***How is payment requested?***
  - distributed processing system interaction
  - external paperwork



## Payment Strategies

- ***What currencies can be used?***
  - cash, cheque, bank credit transfer, electronic currency
  - payment in kind: inter-departmental credit, reciprocal services
- ***When is payment first due?***
  - before, after or during consumption
  - with or without explicit billing information
- ***When is payment expected by?***
- ***How is payment delivered?***
  - interaction via distributed processing system
  - external transaction



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## Receipt Generation Strategies

- *Is a receipt necessary?*
- *What information must be provided?*
  - consumer, provider, buyer or sales agent identification
  - date, goods or services, accounting information
  - tax details
- *Assurance mechanisms*
  - avoidance or resolution of payment/goods and service provision disparity
  - non-repudiation of payment: assured identification of sales agent?
  - non-repudiation of provision: assured identification of billing agent?



## Problems of Absence of Remuneration Mechanisms

- *At the moment, accounting for goods and for services is different*
  - **Electronic goods (e.g. a thesaurus): typically on the basis of possession**
  - **Electronic services (e.g. telecommunications): use**
- *Software could be marketed as either goods or services...*
  - **... but difficulties (e.g. security and legislation) in using on-line remuneration services mean most software is marketed as goods**



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## Software Goods and Services

- ***Software goods***
  - are large, complex: small units are not cost effective
  - often need protection: directly prevents reuse
  
- ***Software services***
  - enable central quality control and rapid maintenance
  - could be traded in small functional units (trading scale problem?)



## Some Remuneration Scenarios

- *Electronic Funds Transfer (EFT) is used for a number of purposes*
  - can they be used to support payment in a distributed electronic marketplace?
  
- *Examine these EFT scenarios*
  - Inter-Bank Billing
  - Automatic Teller Machines (ATMs)
  - Electronic Funds Transfer at the Point of Sale (EFTPOS)

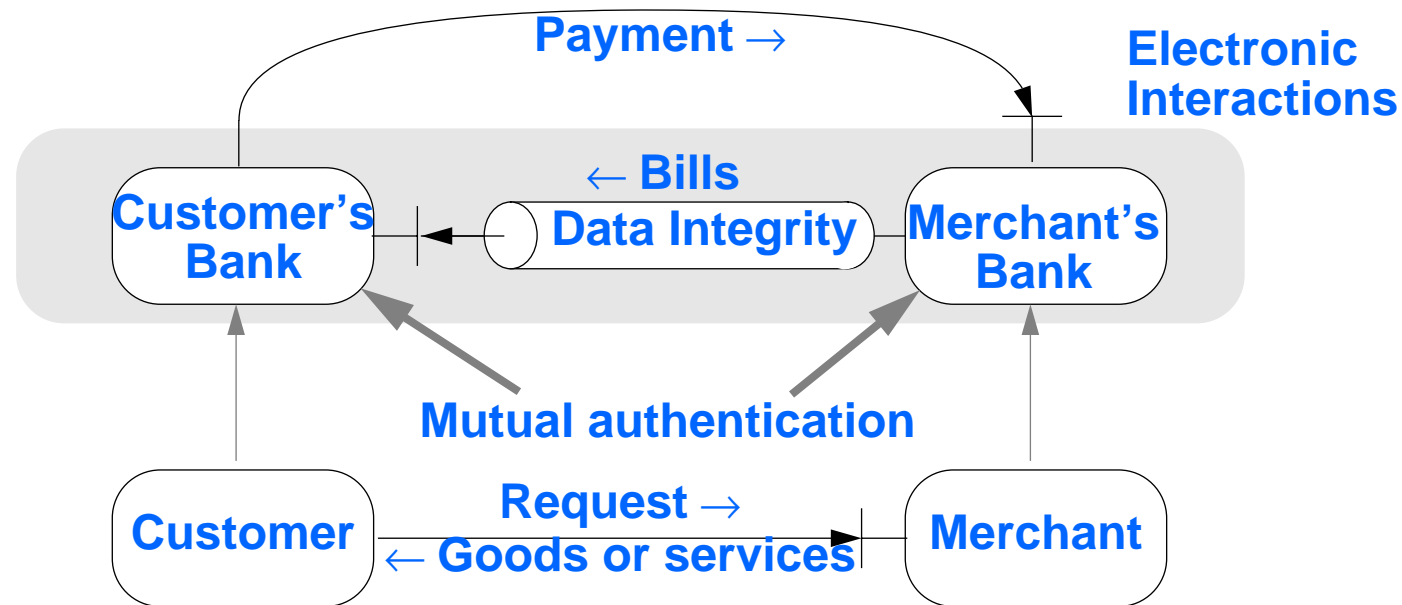




## Scope of EFT

- *EFT typically deals with legally-negotiable currency*
  - what you can do is limited by national remuneration authorities
  - this may be an unnecessary restriction on mechanisms in a global electronic marketplace
- *None of these scenarios are intended to address payment by (or payment to) electronic entities*

## Inter-Bank Billing



- *Customer requests and receives goods or services*
- *Merchant's bank bills Customer's bank*
- *Customer's bank pays Merchant's bank*

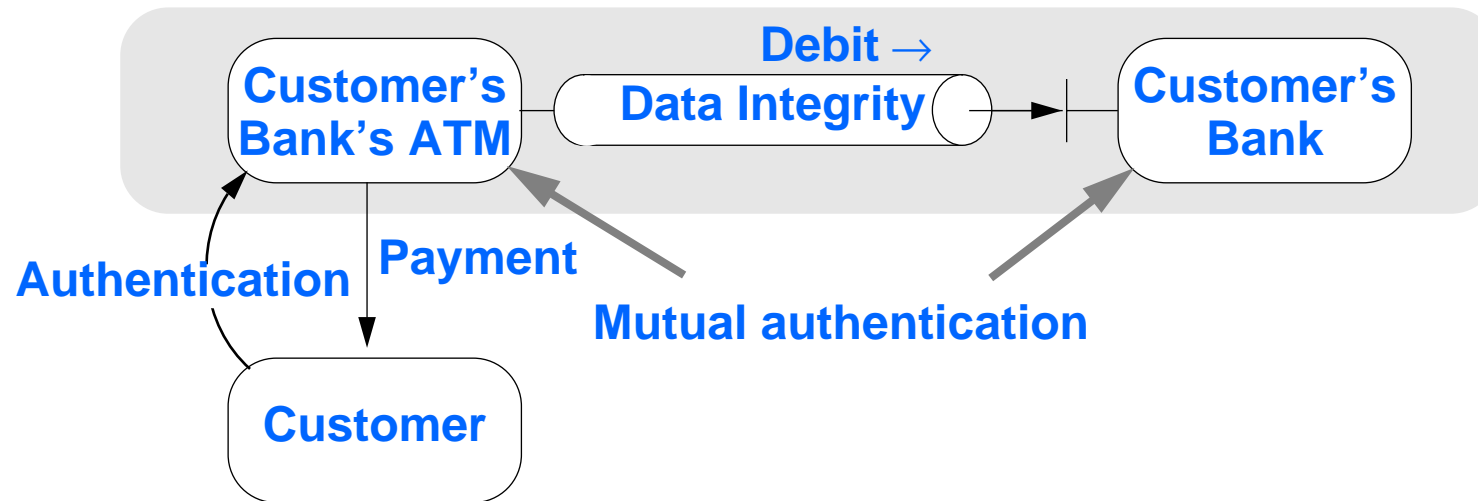


## Analysis of Inter-Bank Billing

- *Payment is not part of the electronic interaction; the interaction is purely for billing*
- *It is not intended to support general electronic payment or billing*
- *Requirement for inter-bank trust means that the mechanism won't scale easily*
  - *to a large number of banks*

## Automatic Teller Machines (ATMs)

Electronic Interactions



- *Customer authenticates with ATM*
- *ATM delivers cash to customer and debits bank account*

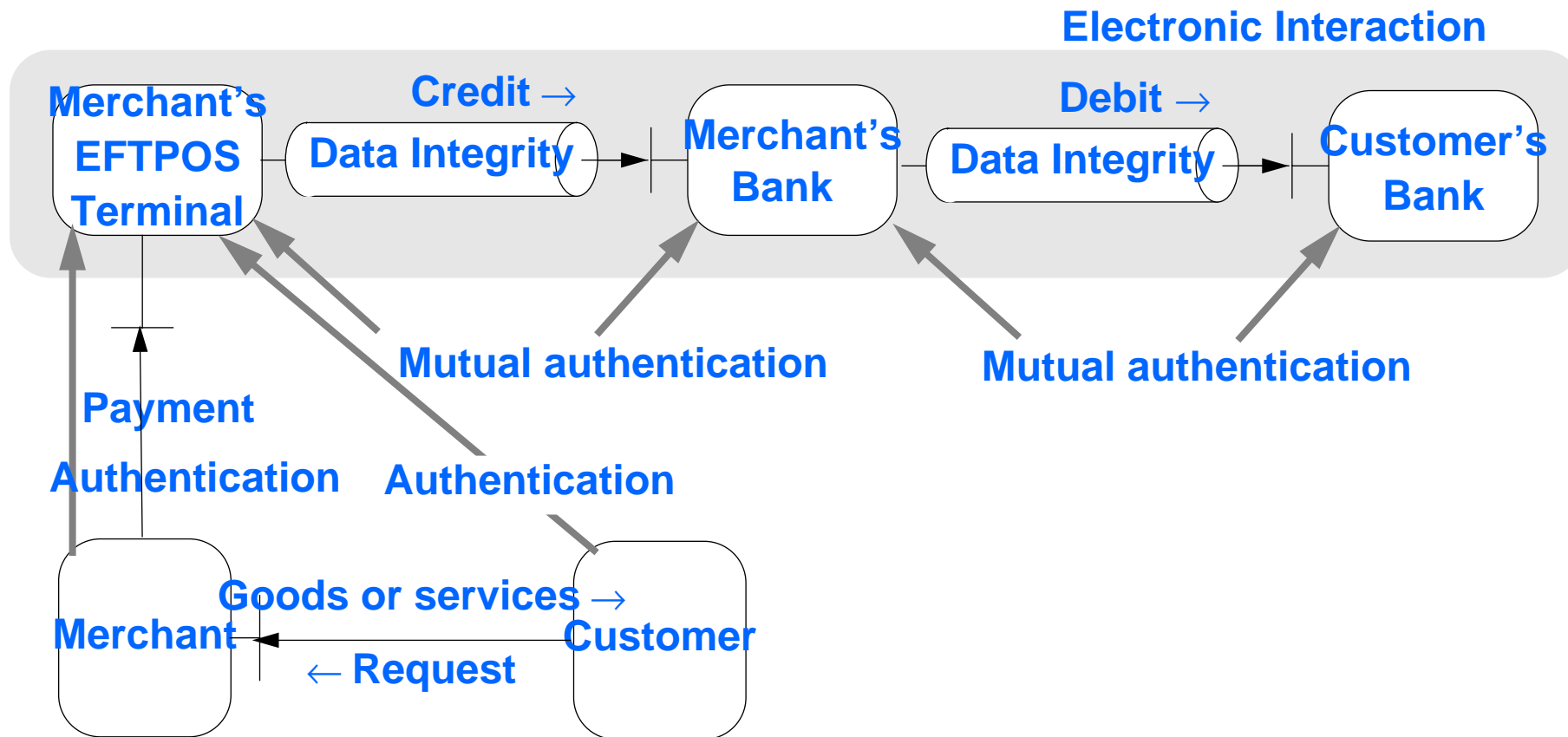


## Analysis of ATMs

- *Intended to operate in a relatively closed environment*
- *Does not involve a merchant*
  - *is not a general purpose payment mechanism*



# Electronic Funds Transfer at the Point of Sale (EFTPOS)





## Analysis of EFTPOS

- *This scenario includes inter-bank transfer*
- *Payment is still not entirely in electronic interactions*
- *Customer uses physical token for authentication*
  - *a credit card or charge card*



## Payment – when do you pay for services?

- *Payment may be*
  - after service delivery
  - during service delivery
  - before service delivery
- *Payment for services is irrelevant if access control is not enforced*





## Payment after service delivery

- *The equivalent of 'cash-on-delivery'*
- *A commercial agreement to pay for services needs to be notarized*
  - *involving a trusted third party*
- *Customer can refuse payment if services not provided*
  - *this can be difficult to discern*



## Payment during service delivery

- *Typically, a single transaction in which a small unit of service is exchanged for payment*
- *A minimum of customer identification needs to be kept by the merchant*
- *Small, frequent, units of service delivery make “black listing” violators of commercial agreements a relevant form of censure*



## Payment before service delivery

- *Commercial agreement to supply services needs to be notarized*
- *Merchant can refuse supply services if payment not provided*
- *Access control and payment can be combined in the form of a ticket for the service*



## Electronic Currency

- ***A currency is:***
  - negotiable: ownership can change
  - unforgeable: only minting and recalling change total currency in circulation
  - (often) traceable: use or otherwise in illegal transactions can be determined
- ***Transactions involving financial currency can be:***
  - ubiquitous
  - anonymous
- ***Integration of electronic currency requires***
  - federation of currencies: there will be many forms before there are a few
  - goods and services exchange for currencies: gives currency value
  - legal negotiability (long term) or sale as goods for cash (short term)



## Electronic Currency Requirements

- *An infrastructure for supporting an electronic representation of currency must:*
  - not increase the money in circulation if a representation is duplicated
  - not allow representations to be forged
  - enable a very low rate of accidental loss
  - not rely upon honesty, trustworthiness or identification of currency holders for any of the above



## Payment Infrastructure – Federation

- *Anticipate many independent groups of customers and merchants*
  - at first those groups will be closed...
  - ... for example, one group per merchant
- *How do customers from one group use goods and services from the merchants of the other groups?*



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## Interception in remuneration domains

- **Currency exchange**
  - Independent financial *interceptors* could perform currency exchange operations....
  - ...accepting currency in one form
  - ...and using it to “purchase” currency (it owns) in another form
  - ... which it can return to a customer



## Bridging the boundaries

- *If you know...*
  - which remuneration domain a service belongs to
  - the interceptors between your domain and that domain
- *... you can carry out the currency exchange for the use of the service*
- *This knowledge can be held in federated, co-operative trading services*
  - NB: ordinary distributed systems trading services...
  - .... not 'financial trading services'!



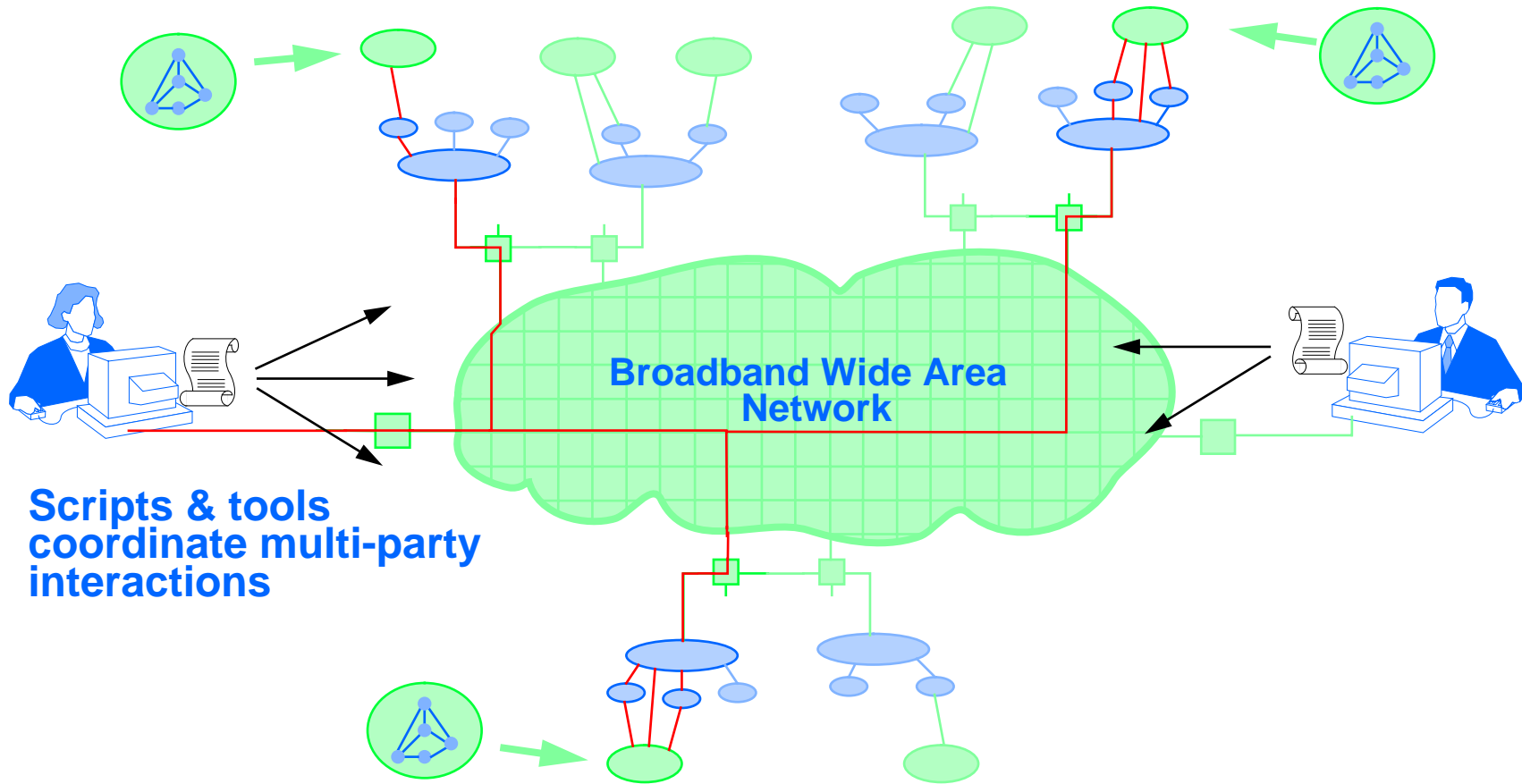


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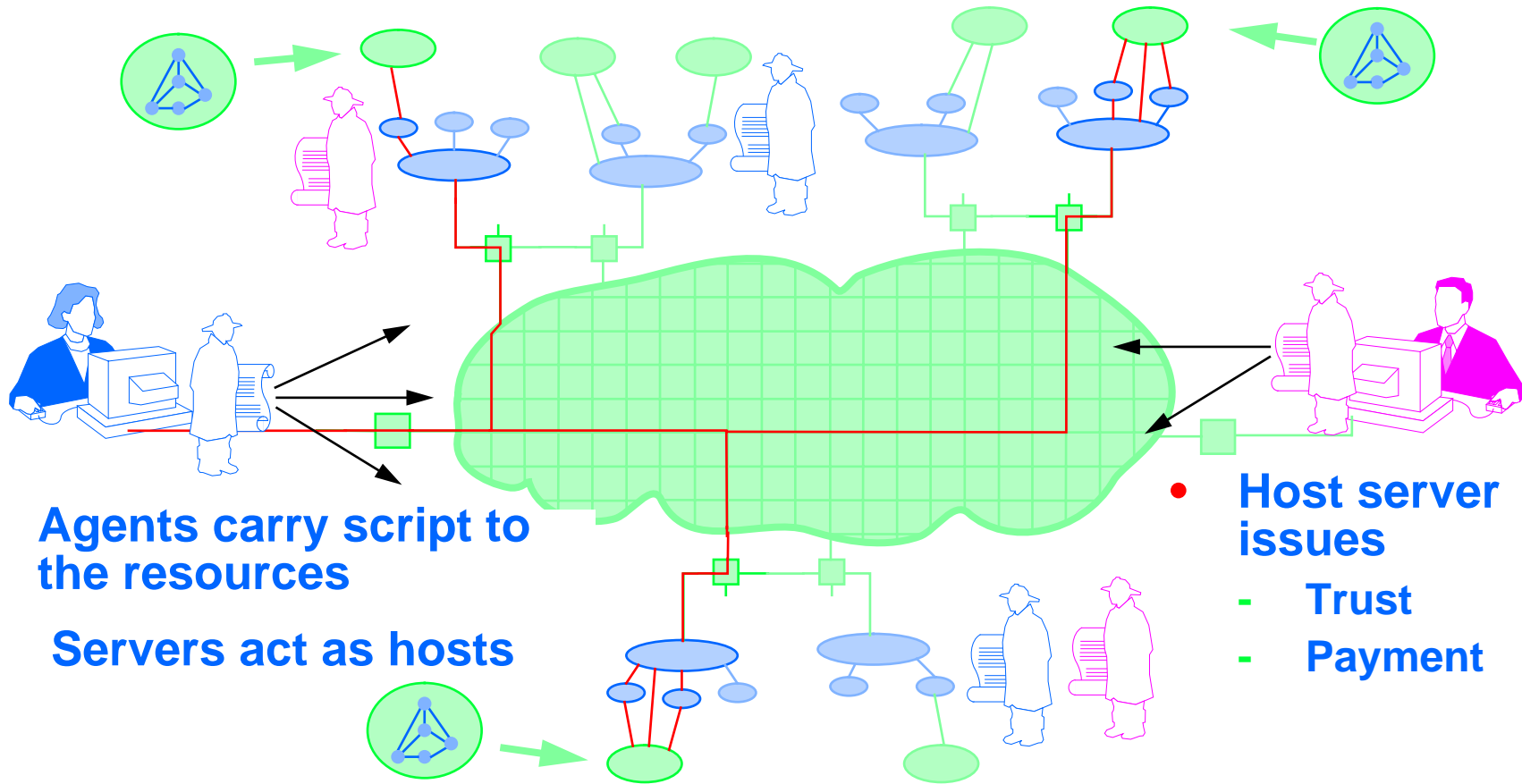
## Reducing the cost of exchange

- *For frequent use of financial interceptors, the cost of exchange can be reduced*
  - by establishing fixed (two-way) exchange rates by agreement between remuneration authorities
- *The inefficiency of use of financial interceptors can be reduced*
  - by establishing common currencies and distributing a common payment infrastructure

# Scripting and tools for service provision



# Agents



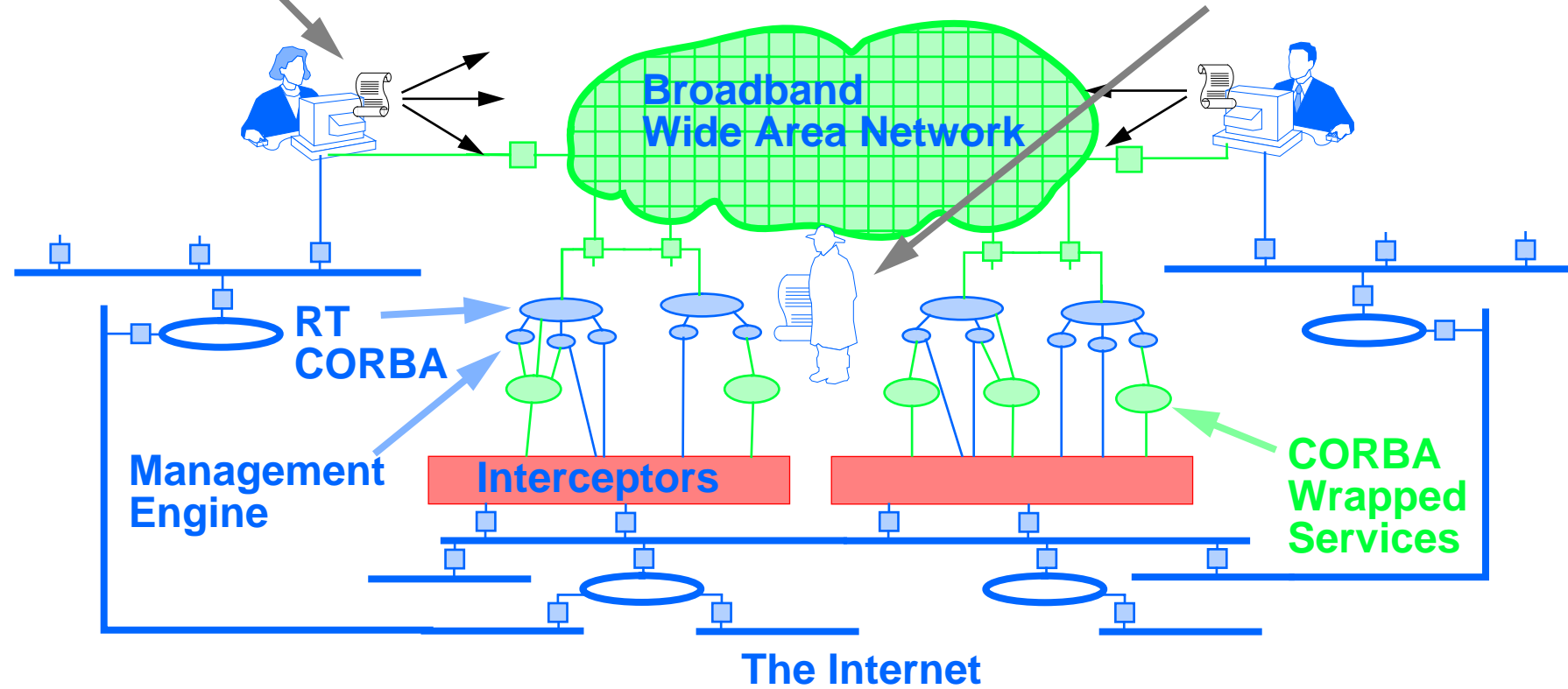
- Agents carry script to the resources
- Servers act as hosts

- Host server issues
  - Trust
  - Payment

# The "Bigger Picture"

Multi-party coordination via scripts

Autonomous agents





## Summary

- **Lack of remuneration and dependability mechanisms is holding back the provision of electronic services**
- **Distributed systems offers a natural approach to these problems**
  - **by adding new mechanisms to existing infrastructures**
  - **by exploiting the existing mechanisms for federation and dependability**
- **Intelligent agents and scripting mechanisms will allow rapid service provision**