

Charging Reservations – Flows and Aggregates!

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1. The Question and the Reality
2. Internet Services Business Model
3. QoS-based Internet Architecture
4. Challenges

The Question

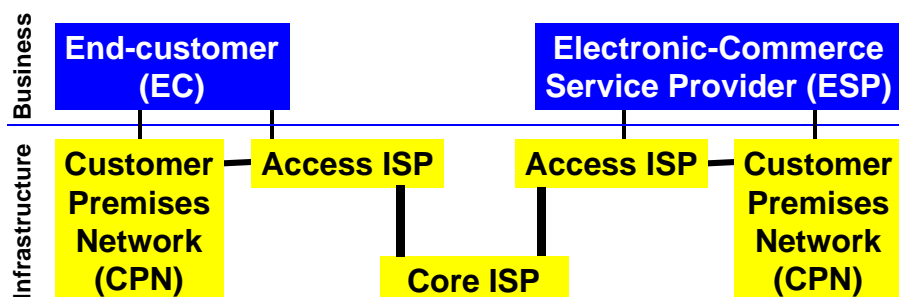
- What to charge for in the Internet, if at all?
 - **Different service levels!**
 - Quality-of-Service (QoS) is required for a wide range of applications, such as (multimedia) applications including converging audio, video, radio, television, computing, conferencing, ...
 - Some of them may need **fine/coarse-grained reservations**.
- Background: **Applications need to satisfy users.**
 - **Consequence:** Communication or network services provided are "in charge of" this satisfaction.
 - **Technology:** Different QoS management methods.
 - **Therefore:** At least same quality as known before.

Today's Reality

- ❑ There is **no** "unloaded" network.
 - Certainly not in a business-driven environment.
- ❑ There is **no** super-abundant bandwidth.
 - Certainly not in the wide area.
- ❑ There are **non-specifiable** user demands around.
 - Certainly in the time, bandwidth, and services dimensions.
- ❑ There exist **numerous** bottlenecks and technologies.
 - Certainly in access points, transatlantic links, ...

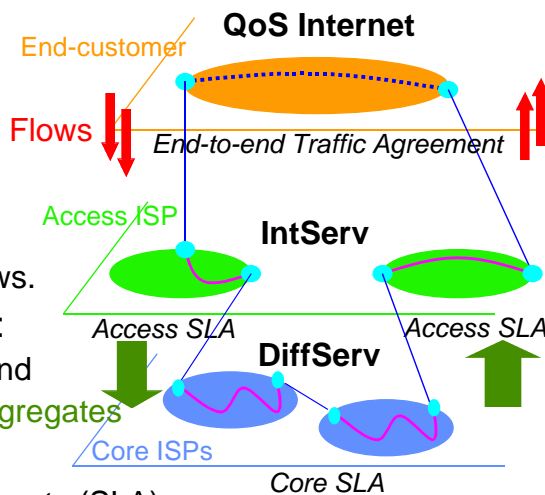
Internet Services Business Model

- ECs request (transport) services, content, products.
- ESPs offer services, content, or products.
- CPNs affiliate ECs/ESPs to a "private" network or Access ISPs connect ECs/ESPs to the network.
- (Multiple) Core ISPs form the backbone of the Internet.



QoS-based Internet Architecture

- ❑ **Network entities:**
 - End-customers,
 - Access ISPs, and
 - Core ISPs.
- ❑ **Aggregation levels:**
 - Access: flows.
 - Core: aggregated flows.
- ❑ **Chargeable services:**
 - Traffic specification and
 - QoS class.
- ❑ **Service agreements:**
 - Service Level Agreements (SLA).
 - End-to-end Traffic Agreement (EETA).



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Functional Components

Invoice April 2000

| | |
|--------------------------------|---------------|
| Internet Access for 1.5 Mbit/s | 100,00 |
| QoS Provision | 80,00 |
| IP-Telephony | |
| local | 4,25 |
| regional | 15,33 |
| international | 88,00 |
| VPN Services | |
| Secure Transmission | 45,00 |
| Secure Mail | 22,88 |
| On-demand Services | |
| Video | 55,00 |
| News Reuters | 12,00 |
| Weather Reports | 6,00 |
| Subtotal | 428,46 |
| Discount 1 (Vol) | -42,85 |
| Discount 2 (QoS) | -21,42 |
| Total | 364,19 |

Overall: "Charging"

metering

Customer ID

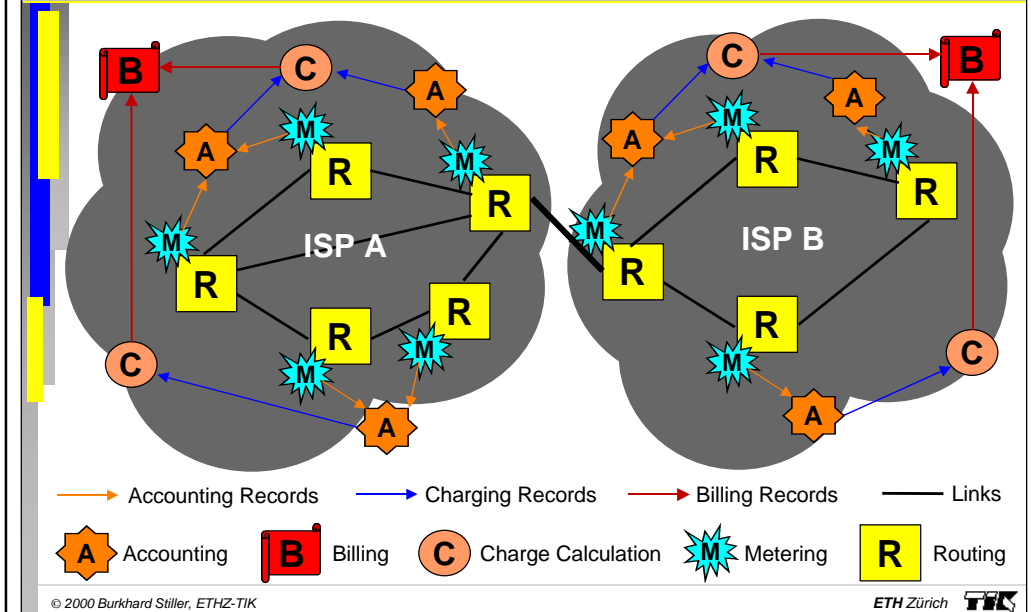
total: 12,35

Bill

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A, B, and C Components



Challenging Issues

- ❑ Follow the **services-oriented charging paradigm**:
 - Integration of transport, service, content charging.
 - Integrate and hide away different network technologies: DiffServ, IntServ, MPLS, ECN, UMTS, GPRS ...
- ❑ Support flexible and efficiently manageable **Service Level Agreements** for the Internet:
 - Short-termed, QoS-based interconnection agreements.
 - In support of guaranteed end-to-end service delivery.
- ❑ **Reservations or not, flows or aggregates ...**
 ... only the service matters, independent of the technology!