Services Foundation

MSc in Management - Services Science

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Lecture 5: Summary

Services Composition

- Static Services Composition
  - Orchestration
  - Choreography
- Dynamic Services Composition
  - Semantics
- Languages

Outline

Service Level Agreement (SLA)

- Definition
- Service Level Management
- SLA – Types and Contents
- SLA – Examples and Templates
- SLA – Paper vs Electronic
- Dynamic agreement
- Dynamic pricing

Telemanagement Forum

http://www.tmforum.org/SLAManagement/1690/home.html

Quality of Service (QoS)

Quality of Service (QoS) is any information that describes how well a service performs.

[Buchholz et al]

Important:

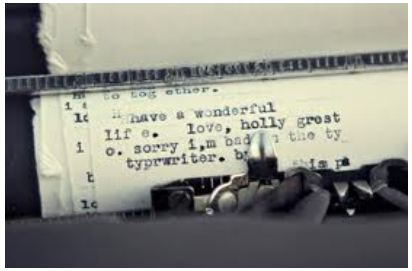
Quality of service impacts on the application provided to the user (satisfaction)

Quality of Service

- QoS as perceived by user
  - Time to respond (2s vs 30s)
  - Sound/Image not synchronised
  - Quality of results provided

Quality of Service

- Perceived quality of service from user
  - Dependability: Availability, Accessibility, Safety
  - Time to respond
  - Quality of image/sound
  - Accuracy
  - Robustness
  - Security
  - Cost



- Linked with satisfaction and value associated by the user

Service Level Agreement

Service Level Agreement (SLA) is a part of a service contract between customer and service provider where the level of service (QoS) is formally defined

Examples

- Delivery time, Performance, Availability, Uptime, Speed, Accuracy, Response, Security
- Reliability
  - MTBF: Mean Time Between Failure
  - MTTR: Mean Time To Repair
  - Response time

http://en.wikipedia.org/wiki/Service_level_agreement

SLA and SLM

Service Level Agreement (SLA)

- Clearly defined levels of service
- Levels must be capable of measurement
- Levels must be relevant to the effective performance of the service supplier.

Service Level Management (SLM)

- Agreed levels of service
- Agreed method of monitoring performance
- Agreed method of dealing with exceptions and changes

Service Level Agreement

Target SLA

- Expected SLA (average value)

Minimum SLA

- Minimum below which penalties may apply

Origin

- Telecom operator (network, wired, wireless)
- IT: service provider for computing, storage, data transport
- Now: all departments (of a business) use SLA with their internal customers (other departments that use their services)

SLA - Types

Customer Based SLA: Agreement with an individual customer group, covering all the services they use.
Ex: SLA between an IT Service Provider and Finance Dept. of a large organization for finance system, payroll system, billing system, etc.

Service Based SLA: An agreement for all the customers using the services being delivered by the service provider.
Ex: email system for the entire organization.

Multilevel SLA: The SLA is split into the different levels, each addressing different set of customers for the same services, in the same SLA.
Ex: customization of service

SLA - Types

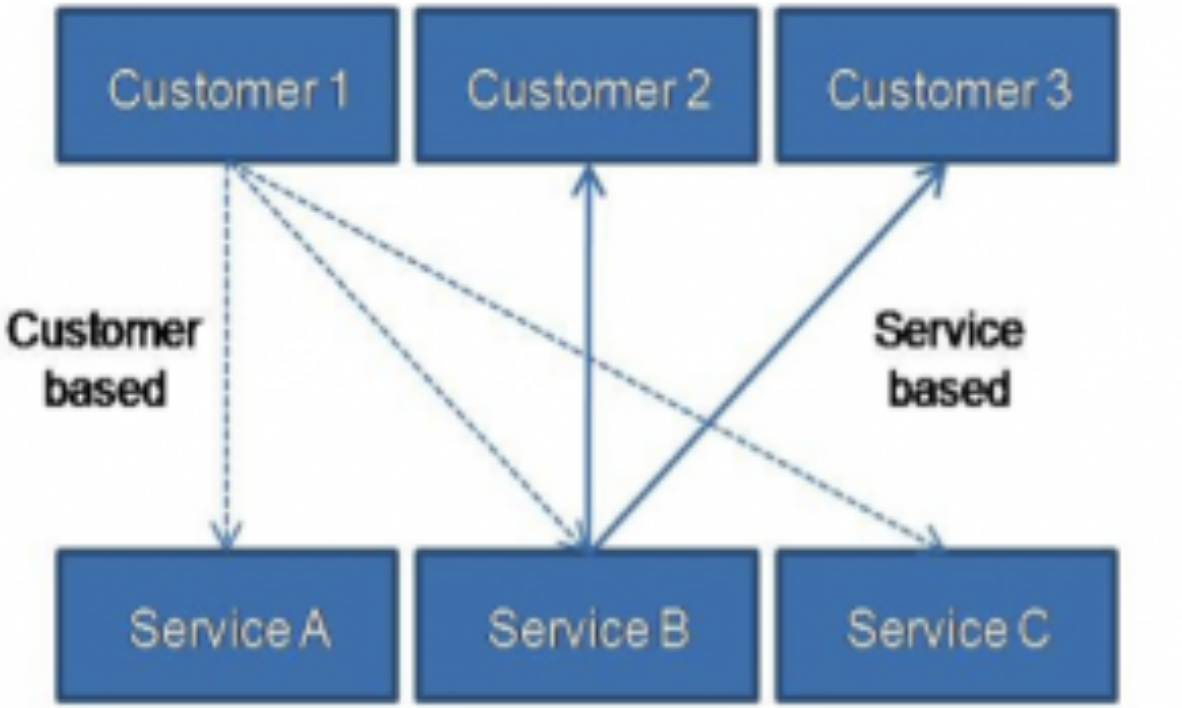
Corporate Level SLA: All generic issues are covered (same for the entire organisation).
Ex: Passwords, ID Cards

Customer Level SLA: covering all service level management issues relevant to the particular customer group, regardless of the services being used.
Ex: Financial department needs higher security measures

Service Level SLA: covering all service level management issue relevant to the specific services, in relation to a specific customer group.
Ex: The email services for a particular department needs encryption and secure backups.

http://theartofservice.com/itil-service-level-agreement-structure.html

SLA - Types


Customer 1
Customer 2
Customer 3
Customer based
Service based
Service A
Service B
Service C

SLA Management

Any SLA management strategy considers two well-differentiated phases:

- Negotiation of the contract
- Monitoring of its fulfillment in real-time.

SLA Management encompasses:

- SLA contract definition (QoS)
- SLA negotiation
- SLA monitoring
- SLA enforcement, according to defined policies.

SLA - Content

What Should The Service Level Agreement Cover?

- Introduction and Purpose of the Service
- Services to be Delivered
  - what functionality costs how much, when it is provisioned with a defined quality
- Performance evaluation and reporting
- Problem Management
  - QoS-parameters, fees and penalties for violating service guarantees
- Fees and Expenses
- Customer Duties and Responsibilities

SLA – Verizon (US Telecom company)

Enterprise Mobility Dial Access Corporate Level SLA

These SLAs apply only to Customers executing an agreement for Enterprise Mobility Dial Access with Co

The Global Network Accessibility, Global Network Login Success Rate, Global Network Throughput, and Average
Company-designated Points of Presence ("POPs") in the Company's Dial Access Network ("DAN") and certain thi
("Extended DAN").

Global Network Accessibility SLA

Global Network Accessibility SLA Scope:

The Global Network Accessibility SLA is that the percentage of successful dial-up connections established betwee
("RDTs") and Company rotary groups ("RGs") for a given number of attempts shall equal or exceed 99% for the D.

Global Network Accessibility SLA Process:

RDTs dial at random into each RG on a continual basis. Global Network Accessibility for a month is determined by
successful test connections across all tested zones for that month by the total number of test calls across all teste
multiplying the result by 100%. The calculation of Global Network Accessibility utilizes a weighted average associa
weighted average may be adjusted once each quarter, based on the number of billed hours through each zone tha
number of billed hours through all zones. Testing zones are determined solely by Verizon Business and may be ac
purposes of calculating Global Network Accessibility, a successful connection is any connection attempt that did n
and the Extended DAN are tested separately.

Global Network Accessibility SLA Remedy:

See below.

Global Network Login Success Rate SLA

Global Network Login Success Rate SLA Scope:

The Global Network Login Success Rate SLA is that the percentage of successful PPP sessions established betw
number of attempts shall equal or exceed 95% for the DAN and 85% for the Extended DAN.

Global Network Login Success Rate SLA Process:

http://www.verizonbusiness.com/terms/us/products/dial/corporate/

SLA – Amazon

Simple Storage Service (S3)

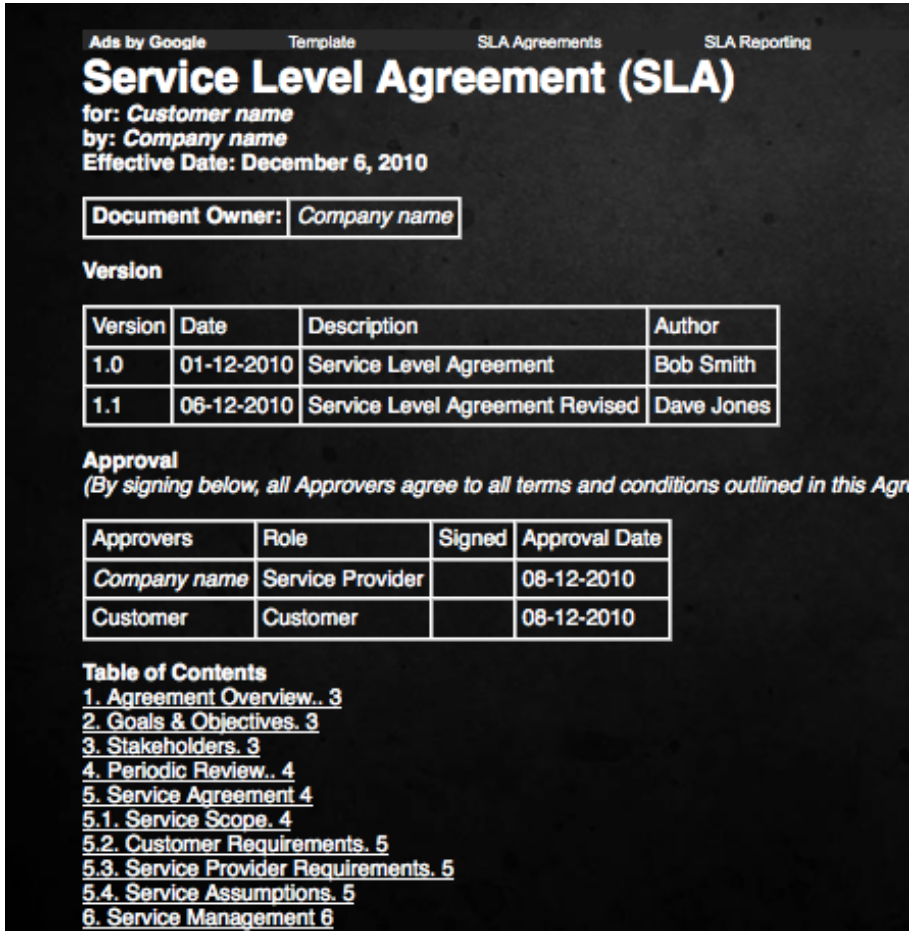
- Unlimited storage through a simple web services interface
  http://aws.amazon.com/s3/

SLA

- Monthly Uptime Percentage
- Metric: Error Rate
  http://aws.amazon.com/s3-sla/

http://omer-rana-blog.blogspot.com/2008/08/slas-and-complexity.html

SLA Template



Ads by Google Template SLA Agreements SLA Reporting

Service Level Agreement (SLA)

for: ***Customer name***
by: ***Company name***
Effective Date: December 6, 2010

Document Owner:	*Company name*

Version

Version	Date	Description	Author
1.0	01-12-2010	Service Level Agreement	Bob Smith
1.1	06-12-2010	Service Level Agreement Revised	Dave Jones

Approval
(By signing below, all Approvers agree to all terms and conditions outlined in this Agr

Approvers	Role	Signed	Approval Date
Company name	Service Provider		08-12-2010
Customer	Customer		08-12-2010

Table of Contents

http://www.slatemplate.com/

SLA – Electronic Agreement

Current situation:

- SLA – Paper-based

Research:

- SLA – Electronic agreement
  - Dynamic agreement (by a software program)
  - Dynamic pricing
  - Penalties

SLA – Dynamic agreement

Motivation

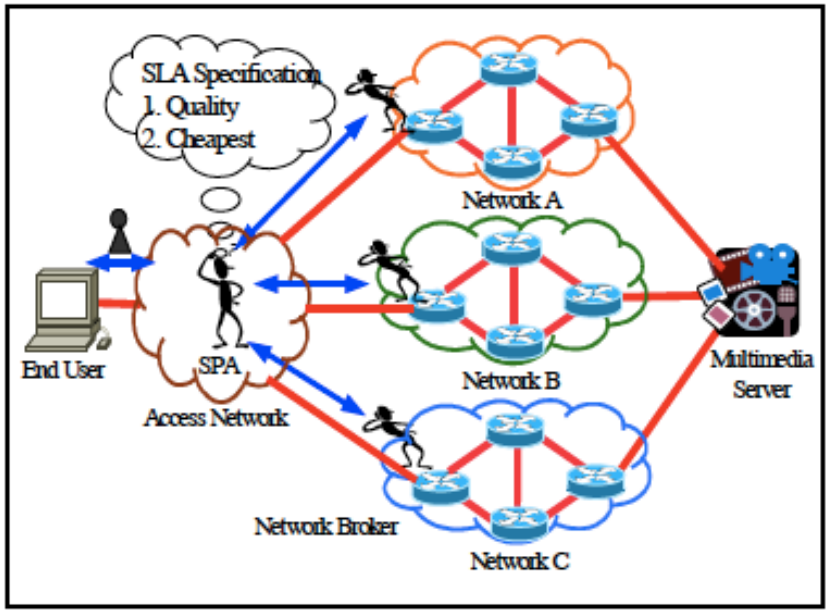
- Negotiated Services:
  - Resource provisioning services
  - Providing higher level services (e.g. grid)
  - Requiring use of various resources (computing nodes, network, connections, storage areas, …)
- Resource consumption evolves in time
  - It may depends on the successful completion of previous tasks or current use of resources
- Maximize customer satisfaction and service reliability without over-provisioning the service

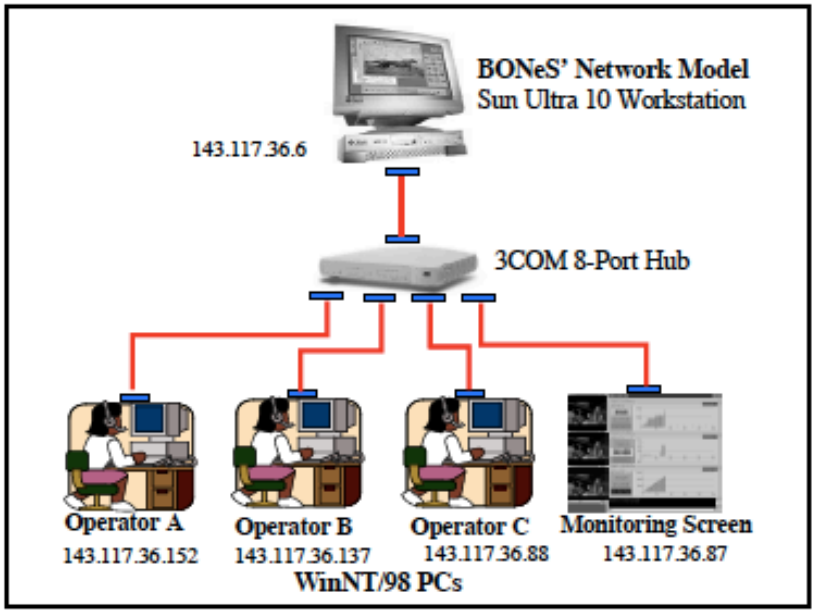
SLA – Dynamic agreement

Solution

- Software Orchestrator / Negotiator / Autonomous Agent
  - Communicates on behalf of customers with several local resource managers to negotiate and create dynamic SLAs.
  - QoS (level of service) + price
- SLA negotiated before service is provided
  - Before each session
  - Before each transaction

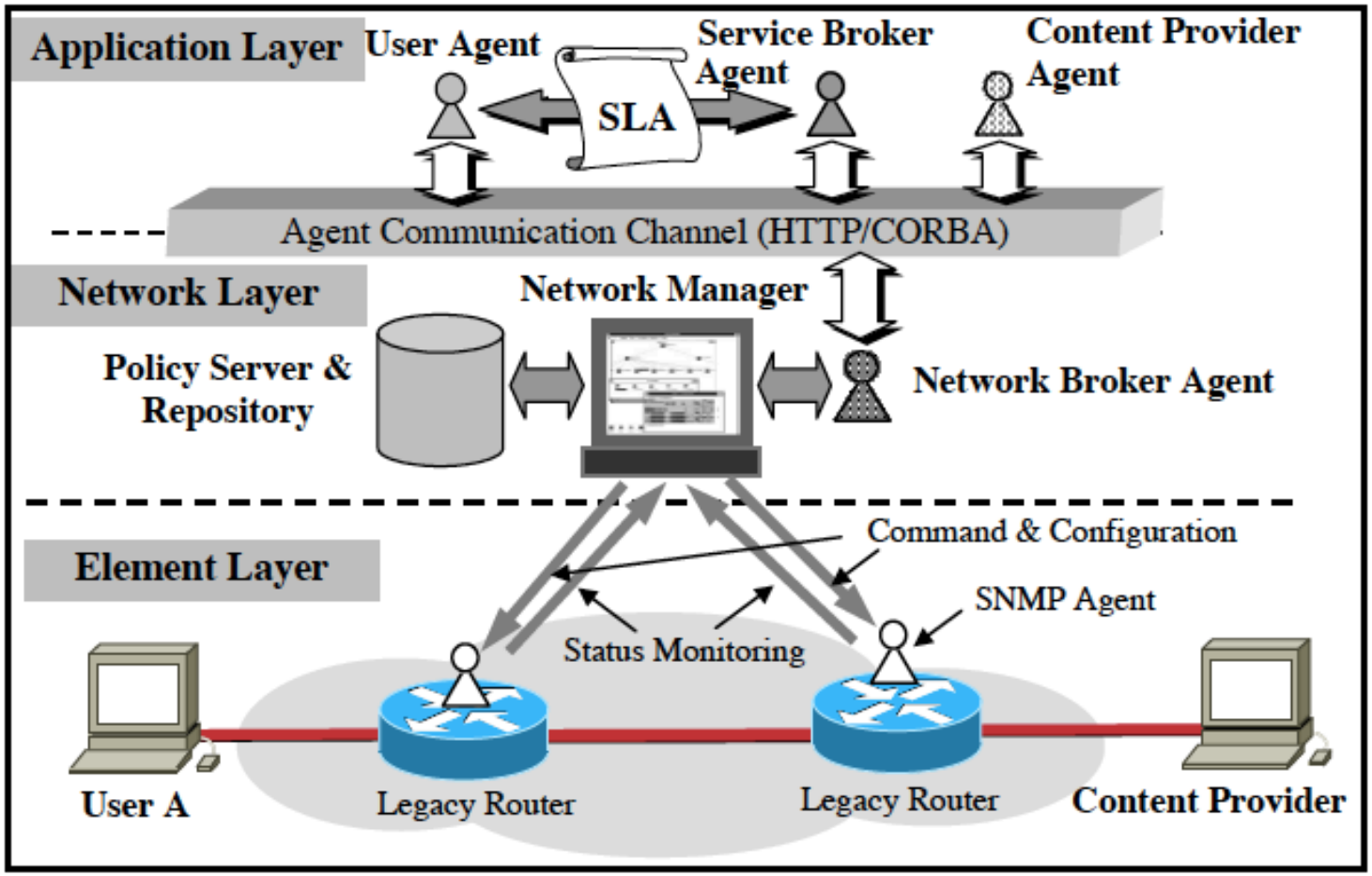
SLA – Dynamic Agreement





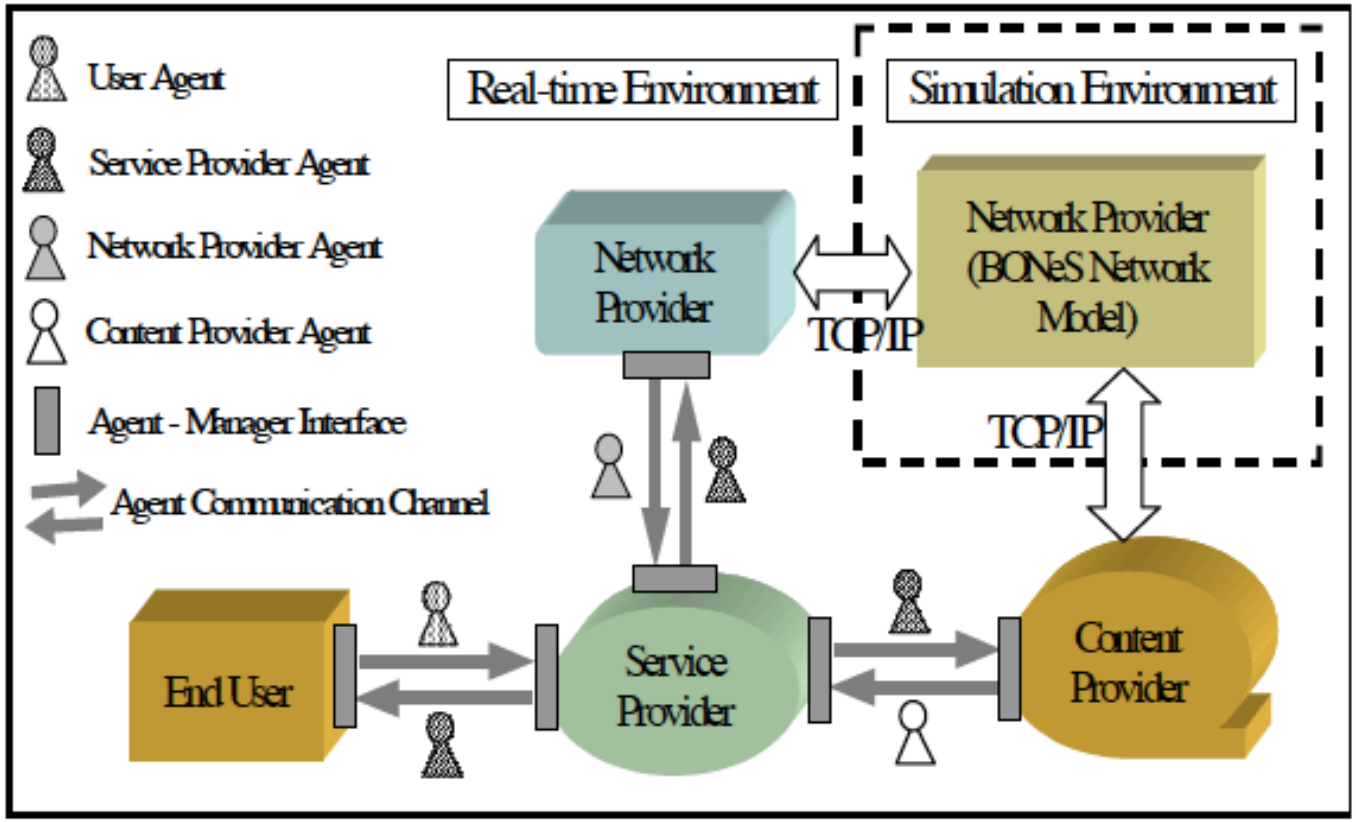
[Chieng et al.]

SLA – Dynamic Agreement



[Chieng et al.]

SLA – Dynamic Agreement



[Chieng et al.]

SLA – Dynamic Agreement

User Agent – SLA Metrics

- Best Guaranteed Bandwidth (Highest priority)
- Cheapest Price (Second priority)
- Session time start, session length
- Price

Service Provider Agent – Billing/Pricing Metric

- Bandwidth selling price
- Bandwidth cost and operation cost (maintenance, etc.)
- Guaranteed Bandwidth
- Session Time

Competition among Service Provider

- Dynamic price + dynamic usage of bandwidth (adaptation)

[Chieng et al.]

SLA – Dynamic Pricing

Service Provider – Billing / Pricing Metric

- Cost of service (purchase cost, maintenance cost, risk)
- SLA agreed (e.g. tight vs loose time constraint)

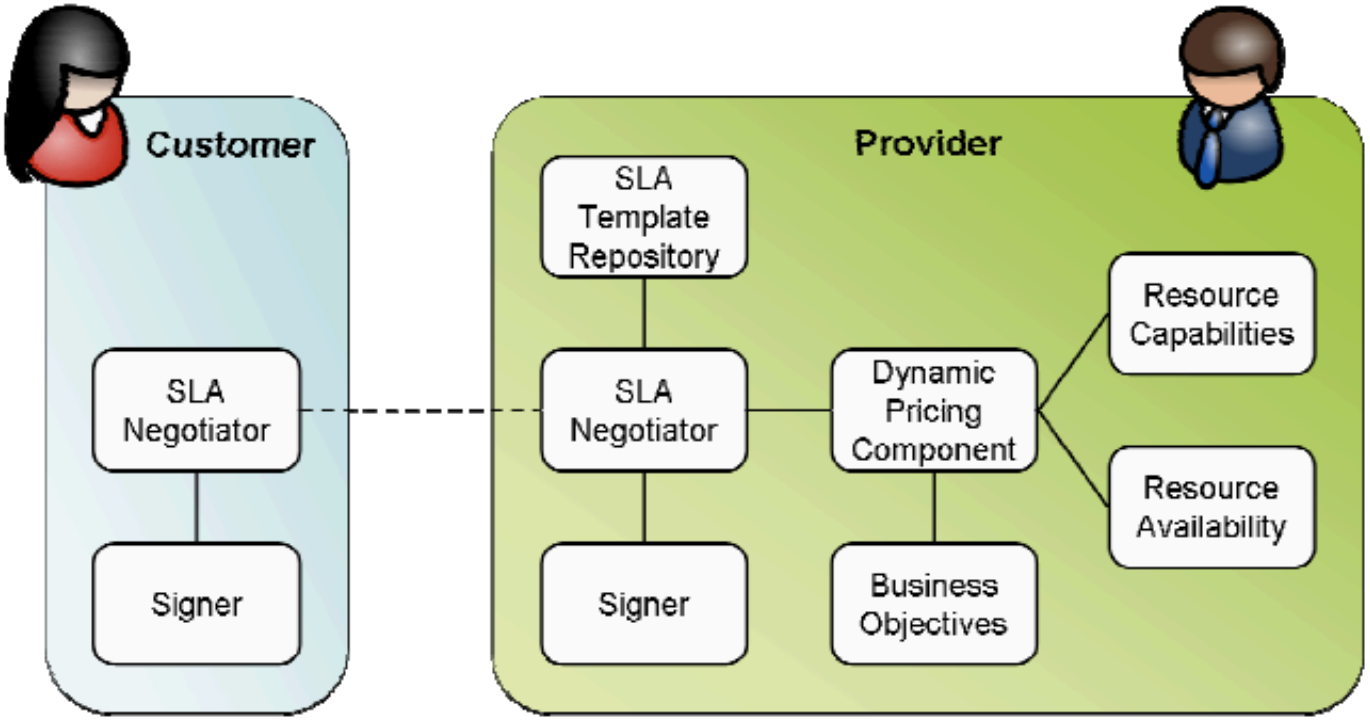
Dynamic pricing

- Provider calculates price in real time based on:
  - the current state of the marketplace (supply and demand),
  - historical data to predict future supply and demand
  - the provider's business objectives and risks
- Price can change every minute in a highly dynamic marketplace similar to stock markets.

Once SLA has been established the price is fixed between the service provider and customer (for that session)

[Hasselmeyer et al.]

SLA – Dynamic Pricing



[Hasselmeyer et al.]

Best Effort Service

Best effort

- Service provider does not provide any guarantees that:
  - Data is delivered
  - User is given a guaranteed quality of service level
  - User is given a certain priority

Recommended Reading

[Hasselmeyer et al.] Peer Hasselmeyer et al. Negotiating SLAs with Dynamic Pricing Policies
http://www.hasselmeyer.com/pdf/socinside07.pdf

[Chieng et al.] David Chieng et al. Agent-Enhanced Dynamic Service Level Agreement in Future Network Environments

[Pichot] Antoine Pichot et al. Dynamic SLA-negotiation based onWS-Agreement
http://www.coregrid.net/mambo/images/stories/TechnicalReports/tr-0082.pdf

[Buchholz et al.] Quality of Context: What It Is And Why We Need It. Thomas Buchholz, Axel Kupper, Michael Schiffer.
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.147.565&rep=rep1&type=pdf

[Chalmers et al.] Survey of Quality of Service in Mobile Computing Environments. Dan Chalmers, Morris Sloman
http://www.informatics.sussex.ac.uk/users/dc52/Papers/QoSSurvey-IEEECS.pdf