Enabling E-services

Exploration Programmes:
Corporate Technology Explores Future Telecommunications

Next Generation Service Management Platforms:

Enabling E-Services

The fast growth of e-commerce leads to considering network commodities as a service to be offered to corporate customers through the Internet within a forthcoming business-to-business portal. Such services are now commonly referred to as e-services. Within the project MACH (MArket meCHanisms for selling on-demand IP bandwidth) the business requirements of next generation service management platforms were collected, and, to validate the concept, a prototype was implemented that allows a customer to negotiate Service Level Agreements (SLA), to automatically provide (self provisioning concept) an IP path and to monitor its SLAs over a Web interface.

The Exploration Programme "Customer Care and Service Management Platforms" deals with:
- methods and technologies supporting Customer Relationship Management (CRM), in particular technologies (Customer Contact Centre, Knowledge Management) enabling efficient customer touch points, with a strong focus on the e-channel (Web, e-mail);
- methods and technologies (Knowledge Discovery, Data Mining) that support fast recognising of market opportunities (e.g. Up/Cross-Selling) and of customer behaviour (e.g. Churn Prediction, Customer Segmentation);
- investigation and improvement of the processes and the channels for provisioning and configuration of IP-VPN services with QoS; automation of service delivery is required to increase its accuracy and to reduce cost and delivery time;
- solutions for innovative IP billing models which are crucial for successful introduction of mobile Internet services.

With its Exploration Programmes, Corporate Technology is exploring telecommunication technologies and new service possibilities with a long-term view of 2–5 years. Further, the expertise built up in the course of this activity enables active support of business innovation projects.

Next generation Service Management Platforms (SMP) have to be considered as e-commerce "enablers". They will play a key role in the new telecommunications value chain integrating content and transaction world, customer care world, and the emerging broadband mobile Internet network platforms.

The programme seeks ways to differentiate in customer relationship management and develops scenarios allowing to optimise service management processes. In service management, convergence between the e-commerce world and the traditional telecommunications world is being looked at concentrating on two basic components: the service level agreement and the bill. As an experimentation field, the focus is on mobile IP VPN services offered to small and medium enterprises.

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This article concentrates on SLA (Service Level Agreement) handling automation as a key function for next generation SMP. Within the realised prototype, the main specified element was a so-called IRM (Intelligent Resources Manager) whose role is to act as an SLA handler. As we will see, all aspects of the SLA life-cycle are integrated within the IRM: negotiation, engineering, monitoring, and reporting.

Firstly, the life-cycle of an SLA is presented. We then explain the implementation within the platform and conclude by presenting an interesting feature of the platform, i.e. the personalisation of the web interface to allow SLA tracking by the customer.

Service Level Agreement Life-Cycle Handling

1. Description

The SLA description deals with how to translate the complexity of the service parameters into meaningful terms for the customer. For the case studied, an IP path between two Points of Presence (POP) with a given Quality of Service (QoS) and for a certain amount of bandwidth was considered. A particular issue was the abstraction with respect to the QoS level modelling (class of services definition): Ensuring a given QoS means that we guarantee performances like network delays, packet loss probabilities, etc. For a typical customer, it is difficult to define his needs in terms of such abstract parameters. Three possible QoS levels were therefore defined: "Gold", "Silver" and "Bronze". Each of these quality levels corresponds to a set of specific values for routers configuration: Bronze quality corresponds to a quality level known as "Best Effort"; Gold quality is comparable with the quality level of virtual leased lines.

2. Negotiation

Based on such modelling, an SLA handler enables a customer to make service requests from a web page. In reply he receives, on a nearly real time basis, a response about the feasibility of the request and the resulting price. Here, many scenarios are possible:
- The network may already be booked to such a degree that there is no capacity left for the requested service. The customer can then send another request with a lowered QoS level or requiring less bandwidth.
- The customer may not want to afford such cost for the requested service. He can then try to get a cheaper service by lowering requirements.

This negotiation phase is an interactive one: the deal doesn't go further unless the customer agrees with the offer he receives in response to his service request.

3. Engineering

By confirming the order of the requested service the customer completes the negotiation phase and gets a unique request number that will be used later for reference and also for tracking purposes. From this moment, everything is in place for the service to be delivered. Configuration requests are directly sent to the network management platform and the requested service will be configured for the starting date. The customer may access at any time the page reporting the current status of his service order and see if the service has been configured, if it is being delivered, if a problem has occurred, etc.

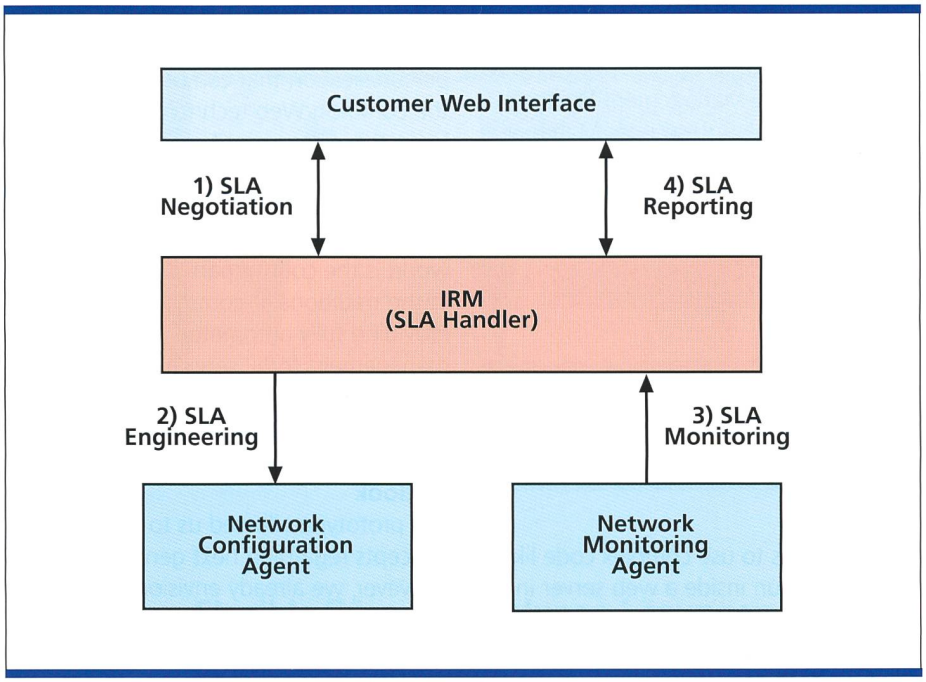
4. Monitoring and Reporting

Once the SLA is engineered and the service is running, it's important to communicate that the service is delivered. It is the role of the monitoring task to collect the network information and to aggregate it. This information is then forwarded to the SLA handler who determines potential violations of the contract. Irrespective of whether the contract is respected or not, the SLA handler reports the delivered service quality either on a periodic basis or on-demand. An example of such "e-services" which is already offered by Swisscom is the "Insight Service".

SMP Prototype Description

A multi-agent platform available from another exploration project, IMPACT,

was used in order to allow to rapidly build the SMP prototype. In this platform each component (business process) of the SMP is modelled as an autonomous agent. Inter-agent communications is used to model the information flows between components. Templates of Java agents hiding underlying communication mechanisms, an interesting result of the project IMPACT, are applied. This scheme has been specified to be highly portable and reusable. The developer only has to define the messages and the protocol between the different agents (for instance, if a message is received, then reply with some other message and forward some part of it to another agent, etc). Each agent is fully capable of the Java programming language features. Agents are independent, in the sense that they're running on different processes – different Java virtual machines – or even different hosts. The whole system doesn't crash if an agent crashes or remains locked.



Service Level Agreement Life-Cycle and its implementation within MACH (MArket meCHanisms for setting on-demand IP bandwith).

IRM Agent

The IRM agent is an SLA handler. He is mainly responsible for determining the feasibility of the service request. He is also responsible for negotiating the features of the SLA with the client, for ensuring the tracking of the different requests, for updating their status, etc. This agent has indeed a forwarding role for the orders coming from the customers to the network management layer, but it has also to handle features that a classical network management platform cannot. For instance, since network management has no view of the network with respect to time, the IRM is responsible for ensuring consistency between the different service requests with respect to the aggregate network load they imply.

Network Configuration Agent

This agent is responsible for configuring the different network elements involved in a requested service. He receives an order from the IRM to configure a given path and has to ensure that the configuration will be executed as soon as possible, since he has no view with respect to time. At the end of the service, the IRM will send him an order to release the different constraints linked to the service request which is now completed. This separation of roles between the two agents enables to work in parallel, since the IRM can handle a deal with the customer while the network configuration agent is in charge of setting a configuration regarding another service request.

Network Monitoring Agent

The task of the network monitoring agent is to get network information on a customer request to inform the customer about the current status of the service being delivered to him. The customer is then able to know, at any time, how much bandwidth is delivered and how many packets were lost or retransmitted.

Service Personalisation Thanks to Web Technologies

The service home page fulfils the classical role of an introductory entry point thanks to a picture representing the service architecture at a very high level. From here, the customer can access both, generic and specific pages:

- The generic pages are essentially the ones containing on-line help and the form for requesting a service.
- The specific pages are based on templates and are customised with respect to customer specific features. One page is dedicated to the access and to the modification of personal data like address, login and entering password. A second page is dedicated to SLA tracking: a given customer can consult all the requests he sent with their complete set of parameters as well as their current status (waiting for configuration, service terminated, service cancelled, etc.).

Some effort has been put on achieving a homogeneous and self-explanatory design for these pages by using colleagues' testing from a usability point of view.

Servlet Technology

The web site is classically hosted on an NT machine while the pages are delivered by a classical Apache HTTP server. On this technical basis, a peculiarity of the project MACH has been to use the Servlet API in order to be able to serve dynamic content pages. This well known technology is one of the powerful features of the Java environment, on the web server side. It enables developers to use the wide set of features of the Java programming language in order to process customer HTTP requests, and to build the content to be returned inside web HTML documents dynamically and in real time. For instance, less than ten lines of programming code are needed to check the password for a given login (extraction from a database and parity check), when someone has submitted it for approval from your web page, and return an appropriate answer within a dynamically created web page. The strength of this kind of technology is

Abbreviations

SMP: Service Management Platform
IRM: Intelligent Resources Manager
TOM: Telecommunications Operation Map
TMF: Telecommunications Management Forum

References

TOM: www.tmforum.org

that it enables to use complex code like C or Java to run inside a web server in order to customise a web site.

Cookies Technology

To implement the features to be offered on the described web site, this technology is associated to the use of cookies, a feature enabling a web server to let a little piece of data, the cookie, on the browsing customer machine. This simple and secure idea is one of the pillars of the electronic commerce, since it enables to know if a given customer has already visited your web site, if he prefers rock or classic when he buys music, etc. It enables to locally store updated customer preferences.

Hence, cookies and servlets were the web technologies chosen to enable us to build a dynamic personalised web site. It is important to know more about a customer in order to customise, in a broad sense, the service we want to offer to him.

Conclusions

The TOM (Telecommunications Operation Map) issued by the TMF was a good starting point for this work. TOM describes what the basic business processes involved during service delivery are and how these processes should exchange information. However, TOM is a high level generic description that needs to be refined to the services to be offered. It also lacks guidelines if one wants to go in the direction of e-commerce providing e-services, as well as a clear modelling of the customer care process if one wants for instance to CRM.

The objective of this work was to look at the requirements for providing e-services for an IP platform. Apart from the SMP description, the work focused on two aspects: the SLA lifecycle handling and the personalisation that can be obtained via the common Web technologies. We hope this collection of requirements will help Swisscom to provide e-services rapidly and to implement the e-channel. The SLA in the telecommunications world is the counterpart of the contract in the traditional e-commerce world. Providing fully automated SLA and QoS management for IP services will be one of the hottest issues for a successful introduction of IP e-services.

Outlook

The prototype allowed us to validate the concepts regarding next generation SMP. However, we already envision to add to it some new functions:

- Advanced SLA function: An interesting extension of the SLA management part of our prototype consists in predicting when an SLA violation will occur and pro-actively launch some re-configuration requests in order to avoid any disturbance for the customer.
- Self-detect and repair function: The idea is to offer the customer the ability to detect and repair occurring problems at his level himself by making available test management functions on the web page.
- Dynamic pricing function: In parallel to our prototype, we have developed an auction platform in collaboration with the LIA laboratory of the EPFL. This auction platform was first thought to be another means for negotiating the SLA. Whether it can be used as a dynamic pricing computation machine is an intersting question to be investigated next. [4, 7]

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Thomas Fayet *joined Swisscom Corporate Technology in January 1999 for achieving his Eurecom professional thesis on the MACH project. He aimed at specifying and implementing a service management layer. He graduated from Eurecom in June 1999, and went on to introduce new features to the MACH platform, with his interest focused on agents and e-commerce.*

Zusammenfassung

Das schnelle Wachstum von E-Commerce drängt zur Betrachtung des Netzwerks als Ware, die im Rahmen eines zukünftigen Business-to-Business-Portals Unternehmenskunden via Internet als Dienst angeboten wird. Das Projekt MACH (MArket meCHanisms for selling on-demand IP bandwidth) zielte darauf ab, Geschäftsanforderungen für Service Management Plattformen (SMP) der nächsten Generation zu sammeln und diese durch einen Prototypen zu validieren. Zur Konzeptüberprüfung hat das Projekt eine JAVA-basierte SMP implementiert, die einem Kunden erlaubt, sich einen IP-Pfad über eine Web-Schnittstelle (die einen einfachen Fall einer E-Commerce Plattform darstellt) zu beschaffen. Die eingesetzten Netzwerkmanagementkomponenten sind in der Lage, wirkliche IP-Router zu verwalten.

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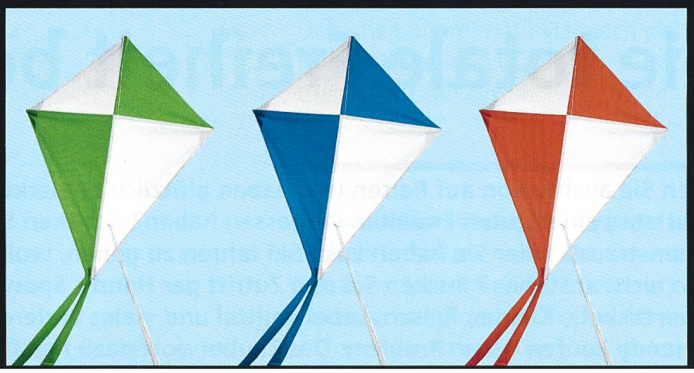

Flexible Büroverkabelungs-Lösungen im Taschenformat

R&M bietet ab sofort eine neue Verkabelungsgeneration an: die R&M freenet SOHO-Lösung, ein offenes Büroverkabelungssystem im Taschenformat, welches speziell auf die Bedürfnisse von professionellen Heimanwendern und auf die neuen Anforderungen von kleinen und mittleren Unternehmen (KMU) abgestimmt ist. Mit R&M Small Office und R&M Small Company haben wir ein innovatives Gehäuse-Konzept entwickelt, welches Design und Funktionalität bei grösstmöglicher Flexibilität kombiniert. Herzstück ist eine systemunabhängige Plattform in ansprechendem Design. Ausgelegt für 24 oder 48 Benutzer, enthalten diese Platz sparenden Hightech-Gehäuse sowohl die neuste Verkabelungstechnik von R&M wie auch modernste Aktivkomponenten von international führenden Partnern wie Cisco Systems. Der Vielfalt und den Kombinationsmöglichkeiten sind keine Grenzen gesetzt. Ob Sie nun Daten-, Voice-, ISDN-, XDSL- oder Gigabit Ethernet-Anwendungen wünschen, wir bieten die flexible Lösung für alle Büroverkabelungs-Bedürfnisse bis hin zur Erweiterung des tertiären Verkabelungsbereichs in bestehenden Unternehmensnetzwerken. Die Zukunft liegt in solch flexiblen Kommunikationslösungen. Interessiert? Dann rufen Sie uns doch einfach an!

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