# *Basing wholesale relationships on service-oriented interconnection agreements and ensuring end-to-end quality of service*

**August-Wilhelm Jagau**

*The article presents description of relationships between telecommunication operators co-existing on fast developing market of telecommunication services. Emerging new processes are illustrated by examples of technological and operational solutions, and description of relations between modern functionality of digital telecommunications network and business practice of a new enterprise appearing on rapidly expanding market in Germany*[1].

***telecommunications organization, quality of telecommunications services, telecom operators cooperation, telecommunications technologies***

## Introduction

Being one of the new carriers in the de-regulated European telecommunications industry, RSL COM Ltd. has arrived at a cross-roads. The company, which was originally set up to sell basic telephony services, has been forced to look for new ways to respond to the challenges of an increasingly competitive marketplace soon to be dominated by the Internet, access to it, and the contents available in it. Wishing to ride high on the Value-Added Network (VAN) services wave, RSL COM too realized that a small telco could not possibly create services which provide an end-to-end value add for the subscriber and customer. Hence, it became clear that cooperations with suitable service partners would be imperative and, as a result, interconnection agreements as well as end-to-end Quality of Service (QoS) become crucial for the commercial success of the company.

After briefly sumarizing the history of RSL COM Deutschland GmbH , this paper examines key trends in the telecommunications and Internet business. It rolls on to describe how these trends are likely to influence the services and the business models of the companies wishing to successfully compete in this market. Towards the end, the paper describes what steps RSL COM have taken to become more service oriented both in terms of specifying services end-to-end and of ensuring their quality end-to-end.

Well then, the history of RSL COM Deutschland GmbH can be told in just a few sentences. RSL COM Deutschland started out as part of the RSL COM family of businesses. In 1996 the company was founded in Germany (Table 1) with the goal to offer a range of wireline and mobile telecommunications services.

The wireline network in Germany was built from infrastructure left behind by both US-Sprint and MCI when those two companies were merged into WorldCom. As shown in Fig. 1 the wireline network provided nationwide coverage in Germany and was used to offer:

[1] *The views expressed herein represent the private opinion of the author and his judgement of how developments and trends observed today may shape the telecommunications industry of the future. Hence, the views expressed herein do not neccessarily represent RSL COM Services company policy and must not be mistaken for the intention of the company to implement certain services and/or infrastructures. Thusly, the use of the RSL COM name simply serves to illustrate some of the points made.*

– call-by-call,
– pre-selection,
– Internet access (ISDN[1]/PSTN[2] dial-in, LAN[3]-on-demand fixed connections).

***Table 1. RSL COM history***

| | |
|---|---|
| 1994 | RSL COM, U.S.A, founded by: Ronald S. Lauder / Itzhak Fisher |
| 1995 | Foundation of RSL COM U.K. / RSL COM Europe |
| 1996 | Foundation of RSL COM Deutschland GmbH |
| 1998 | Acquisition of Motorola Teleco service provider of mobile airtime |
| 1999 | IPO of Delta-3 V-o-IP services built on e-commerce paradigm |
| 2000 | RSL COM undergoes major market re-positioning |
| 2001 | RSL COM Germany refocusses on VANs |

In addition, building on a business acquired from Motorola Teleco in 1998, RSL COM offered mobile airtime services (Table 2) for re-sale from the established network operators T-Mobile (Deutsche Telekom), Mannesmann D2 (Vodafone) and E-Plus (KPN).

***Table 2. RSL COM services***

| Service name | Comment |
|---|---|
| Mobile-phone services | Airtime re-selling |
| Virtual private networks | Contract-bundling |
| Efficient customer service | Free-of-charge |
| Customer-oriented billing | |

As of September 30th, 2001 the wireline network shown in Fig. 1 was completely shut down and subsequently dismantled. With this move the chapter eleven bankruptcy proceedings which had engulfed the parent company RSL COM Ltd. finally hit home in Germany too.

[1] *ISDN – Integrated Services Digital Network.*
[2] *PSTN – Public Switched Telephone Network.*
[3] *LAN – Local Area Network.*

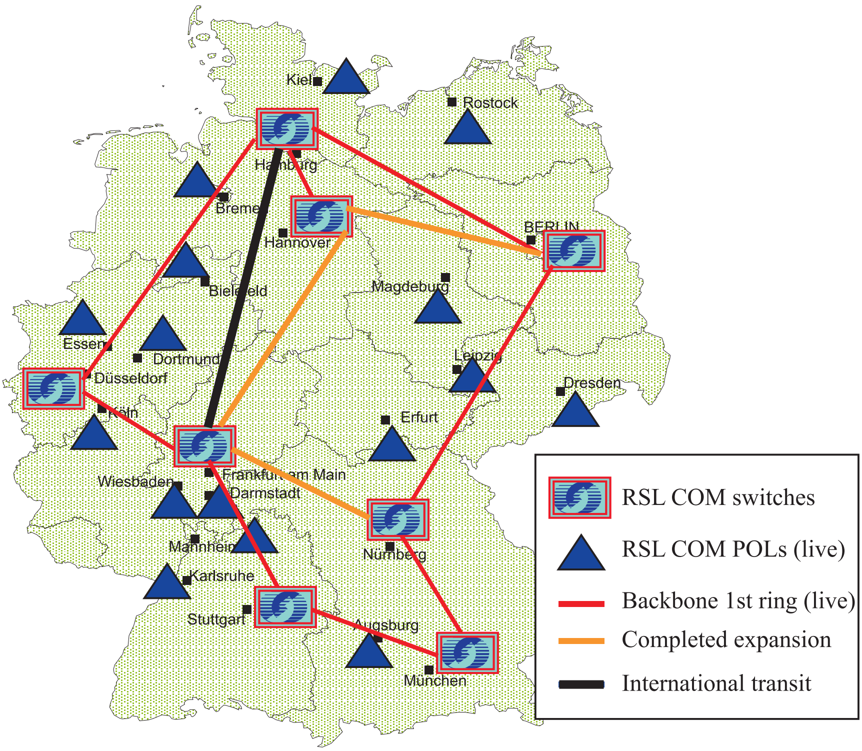



*Fig. 1.* *Former voice network of RSL COM Deutschland GmbH*

# Emerging trends and Internet developments

What remained in Germany was a steeped-in-the-wool service provider with a solid balance sheet and a number of visionary ideas. Witnessing the immensely rapid growth of the Internet in Europe and elsewhere in the world, RSL COM had developed a longing for participation in this emerging market.

The company recognised, however, that as quickly as the Internet market was evolving the network itself was just as rapidly changing its nature. Having started out with a business model of providing basic connectivity data services, the Internet during 2000 and very pronounced so in 2001 evolved toward becoming a platform for value-added data services (c.f. Fig. 2).

In fact, as illustrated in the picture (Fig. 3), the network underlying the Internet quickly developed into an infrastructure where a number of disparate service components (terminals, transport, authentication, etc.) need to be integrated so as to generate a customer value-add. In addition, any creative and competitive business model in this environment mandates IP carrier services which provide end-to-end quality of service.

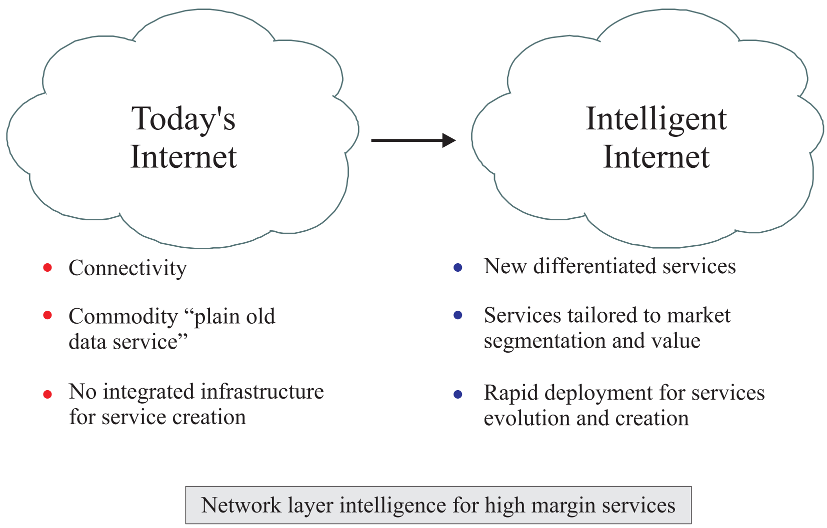



*Fig. 2.* *Changing Internet*

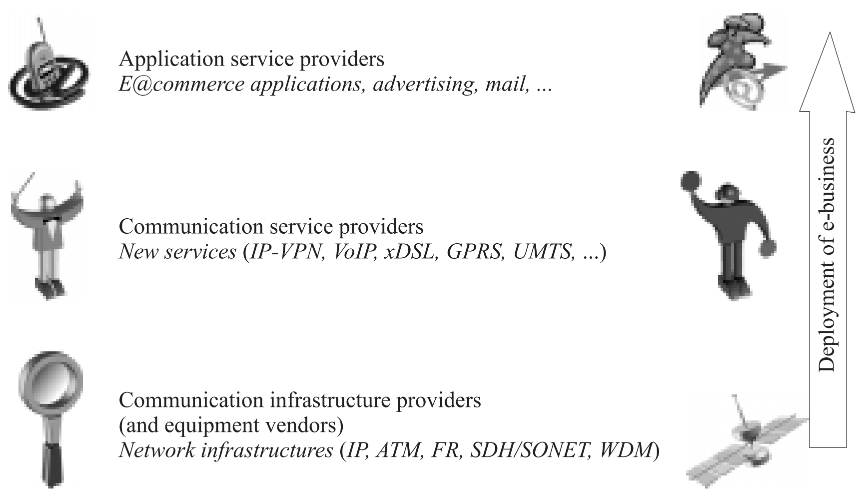



*Fig. 3.* *Tiers of IP service value-chain*
*ATM – Asynchronous Transfer Mode, FR – Frame Relay, IP – Internet Protocol, SDH – Synchronous Digital Hierarchy, VPN – Virtual Private Network*

Consequently, any player wishing to capitalize on these developments must be keenly aware of the following key trends which converge on rapidly invalidating the existing ISP business models:

- Data-transport infrastructure will be commoditized
  (just like road ways, power lines, water mains, etc.).
- Three tier bandwidth procurement provide flexibility
  long term contracts for base needs
  (seasonal) limited-term contract for add-on needs
  (event) dependent contracts for peak needs.
- Revenue sources will move away from basic services
  value added network services
  comprehensive customer care (lead times, etc.)
  customer self-provisioning.

The first two trends are direct outgrowths of the fact that there is a glut of data communications bandwidth in Europe in general and in Germany in particular. During the hey-days of telecomms de-regulation, companies sprang up literally like mushrooms and started to build transport infrastructure. In Germany alone, ten companies were busy at one time in the recent past targeting to build a nationwide optical fiber transmission network. For any of these networks to generate revenue they needed to be lit up. Once lit, operators came to realize that, on the one hand, there was serious competition for a limited amount of data traffic wishing to be transmitted, and, on the other, to produce cheaper so as to afford to lower prices more bandwidth needed to be available on lit fibers. Hence, with the cost delta required to swap out existing ADMs for more performant equipment being negligeable compared to burying the fiber, several competing optical fiber operators simultaneously upgraded their networks from SDH all the way to D-WDM.

Re-enforcing the first trend, the arrival of all packet-switched networks has distance recede from being the key cost factor. As a result, transporting packets directly from Frankfurt to Warsaw is not significantly cheaper than taking a detour through New York. As a result, with the aid of new age technologies like MPLS (Multi-Protocol Label Switching), setting up bandwidth brokerages in centralized locations like Tokyo, New York, London, Paris, or Frankfurt has become a viable business model. The bandwidth broker allows for a network operator to develop a lot more flexibility when it comes to securing transmission capacities. Rather than building their own or leasing an entire transmission network plant, a network operator now has the alternative of procuring bandwidth capacities based on actual need and at competitive prices from several alternative sources.

The third trend stems from basic hosting capabilities (floor, server, and disk spaces) too becoming rapidly commoditized. As a combined result of all three trends, operators are forced to develop alternative business models which allow them to tap into new sources of revenues. In this respect the third trend points into a promising direction as it may be summarized to suggest charging “***fees for the privilege to use telecommunications transport and hosting center infrastructures***”.

# The role of IP-VPNs in future services

If we bite the bullet and not only accept the trends characterized in the section above but along with them the need to work with VPN services also, one will undoubtedly wind up asking the question: “What is the hype concerning IP-VPNs all about anyway?” True, on the surface of things there is no direct link between (IP)-VPNs and data communications built on a service models. Moreover, to some extent, IP-VPNs are indeed being hyped. They simply will not provide panacea and help turn re-selling telecommunications circuits into a viable business model after all. Nevertheless, a large portion of the attention grapped by IP-VPNs is indeed justified. Because with the advent of the Internet at large, data communications too are finally forced to develop into a true service-product like voice telephony. Hence, they turned into a commodity, they become scalable and easy to use, and they allow for soft-provisioning[①] directly by the client applications.

Moreover, as the IP protocol is being used by just about each and every application for their communications needs (Fig. 4), it has become clear that the old “one type of connection fits all” paradigm is a thing of the past. Applications like “Streaming video” and “Text e-mails” could not be any further apart with respect to their throughput, QoS, and network reliability requirements. However, modern telecommunications networks are nevertheless expected to provide an environment which may be optimally shared even by applications with such disparate requirements like “Streaming video” and “Text e-mail”.

Step in IP-VPNs! Using the IP protocol as a control plane, IP-VPNs provide a level of abstraction which caters to individualized telecommunications services. Put differently, IP-VPNs support a telecommunications model which provides applications with direct controls for the customization of the transport services used, the service policies applied during network transit, and, last but not least, the resultant quality of service (c.f. Fig. 4).

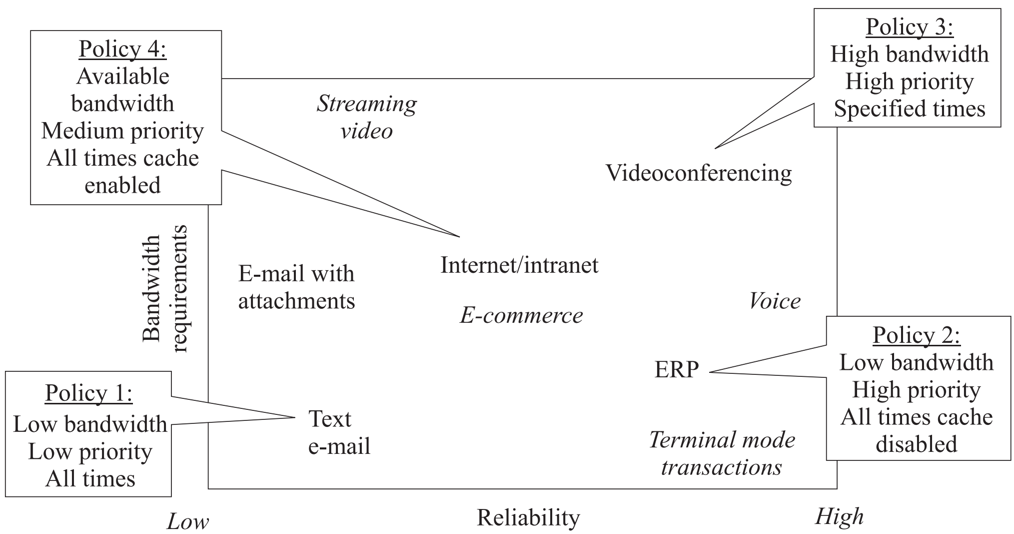



***Fig. 4.*** *Individualized services*

① *Characterizes that fact that a telecommunications service may be configured and activated entirely by SW control; there is no patching of cables nor any insertition of line card required.*

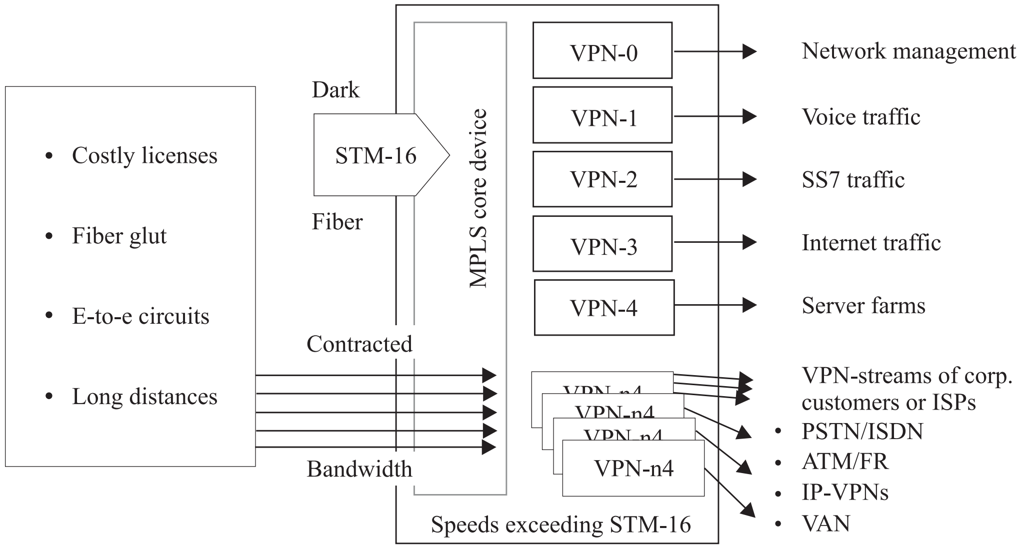



***Fig. 5.*** *MPLS – mapping VPNs to traffic streams*

With IP-VPNs applications and those programming them are given a lot of lee-way in how and when they want to use the network. There is no need to set up a connection; it is there while the application is running. If the application requires different telecommunications transport services at different times, it simply chooses the appropriate connection from those provided during application set-up. Best of all, based on the general level of services provided by the network, the application need not concern itself with low level chores such as packet re-transmission, varying network delays, packets delivered out of sequence, or routes becoming unavailable.

This is all possible because of one over-riding feature of IP-VPNs: they may be soft-provisioned end-to-end! And, hence, they may be provisioned under application control. Further, VPN services based on MPLS take application-control over the network service from the OSS[①]-level all the way to the network element level. As such they may be considered to promote the three key trends identified in Section "Emerging trends and Internet developments".

While IP-VPNs attach each application to its own individual, logical communications channel, MPLS will map each of these "application-specific" channels to a physical connection (c.f. Fig. 5). This is done in such a way that the network must not set aside fixed resources for the entire duration an application may potentially wish to use its communication channels. Instead, each MPLS Label Switched Path (LSP) simply represents a template characterizing the network resources which must be available should an application wish to transmit a packet. In case their is an active packet stream, the network is free to bind the associated LSP to an appropriate set of resources (switches,

[①] *OSS – Operational Support System.*

transmission capacities, buffers, etc.) and thusly ensure the transmission of the packet stream with the required QoS.

Hence, instead of partitioning the network resources into "physical" connections each with:

- known bandwidth,
- performance indicators optimized for voice connections,
- service levels (MTBF, MTR, etc.) really catering to the business processes of the network operator.

MPLS will promote the notion of end-to-end (Fig. 6) "logical" connections all the way from the *A*-side of the application to its corresponding *B*-side. Logical MPLS connections will hence be characterized by parameters meaningful to the application using them:

- committed goodput (e.g., CIR with frame relay),
- "bursty" nature of traffic,
- resource "competition" among disparate, concurrent traffic streams.

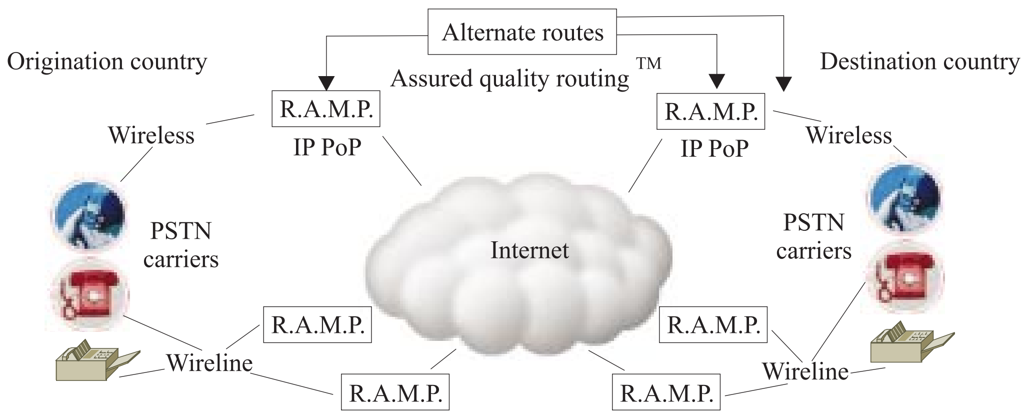



***Fig. 6.*** *End-to-end service interconnection*

Ideally and – at this time – to some extent potentially only, MPLS allows for the entire, network-wide available resources to be multiplexed between all active traffic streams. The assignment of network resources to an individual LSP is thus largely independent of the physical resources. Instead it is based primarily and predominantly on the actual needs of the application packet stream. Network resources would not be sold tied to connections and physical, geographical locations any more, but instead be parceled out on the basis of the network-wide needs of an application. This makes the network appear to the application using it as if:

– resources were available exclusively to that application,
– network performance would match exactly the needs of the application,
– resource are available exactly when and where the application needs them.

To the application using a VPN service based on MPLS, the connection between its *A*-side and its *B*-side becomes absolutely transparent and truely end-to-end (Fig. 6).

## Service level agreements

In an environment dominated by VPN data services as characterized above:

– service levels become imperative and must be enforced,
– an OSS environment will be needed to manage "qualified" interconnects,
– the buy-in, i.e. the awareness, of senior management will become imperative.

Service levels, rigorously defined service levels that is, will be the only way to control the amount of resources made available by the network to an application. Future Service Level Agreements (SLA) along with traffic conditioning agreements will specify a frame-work of resources required by and generally available to an application. Qualified interconnection agreements will be used to map service levels across network boundaries so that service guarantees may be extended truely end-to-end even across off-net connections and independent of the participating networks. In this respect, Internet peering, which provided mere connectivity, was simply the first step of a development. Finally, the concern for MTBF, MTR, and other parameters characterizing the service quality in a cross-network setting will drive to significantly extend today's networking business models. Hence the requirement for senior management to buy-in to this model of providing end-to-end telecommunications services.

## A fresh look for Teleco services

If the network and the technology from which it is built do not directly define the kind and level of telecommunications services that constitute a competitive product offering, what then is required to fully characterize those services? Well, to begin with telecommunications services for the markets of the future will require a rigorous, engineering-level specification. As a matter of illustration, the Table 3 gives a glimpse of what may have to be considered when defining the quality characteristics of VPN services, its companion Table 4 illustrates the service level issues which are applicable to each traffic class mentioned.

And while it is fine to identify such requirements by applying names to them, true engineering specifications require the decomposition of the traffic types in Table 3 into elements which capture the behaviour of the network with respect to the performance characteristics of these traffic types, aka services. Each of these elements must then be specified in terms of their semantics, their key parameters, the value domains of these parameters, and mean (standard) values for such parameters.

*Table 3. QoS requirements*

| Class of service (IP precedence) | Traffic type, characteristics, performance goals | Applications services |
|---|---|---|
| Platinum<br>SL-1-I | Important multimedia<br>Goal: V. low latency, gtd. B/W + limit | Voice-over-IP<br>Streaming video |
| Gold<br>SL-1-A | Important applications<br>Interactive, transactions, predict. traffic<br>Goal: low latency | Database applications, financial transactions |
| Silver<br>SL-2 | Important applications<br>Interactive, Xactions or informational,<br>Less predictable traffic<br>Goal: medium latency, segregated | HTTP traffic |
| Bronze<br>SL-3 | Batch applications<br>Long TCP* sessions<br>Goal: high latency, OK throughput,<br>Limited network impact | FTP traffic,<br>applications replication,<br>database back-up |
| Best effort | Everything else<br>Goal: use up remaining bandwidth | All other traffic |
| Blocked | Unauthorised traffic<br>Goal: drop, prevent network impact | |
| * TCP – Traffic Conditioning Parameter. | | |

Just like in the manufacturing business where a mass-produced factory product gets broken down into such fine detail as individual nuts and bolts, the process outlined above needs to be followed from a first, broad product description all the way to detailled configurations of all affected network element and application systems. Only then will it be possible to arrive at carrier interconnection service specifications that are based on true quality of service specifications and their rigorous mapping to service level agreements. Contrasting prose-based service descriptions, engineering service specifications amount to construction plans which entail directions for (soft) provisioning each and every network element along the entire end-to-end path used by an application. Best of all, once documented, these specifications may be modified under program control so as to capture the requirements of applications, both established and still under development. In the end, service elements engineered and documented once, are likely to be re-used and re-applied over and over again as new application-oriented services are being developed.

By the same token, virtual network operators[①] (aka VNO or cyber carriers) will only be viable if such rigorous engineering specifications for telecommunications services can be established on a broad, commonly accepted scale. VNOs depend on IT systems both for specifying the service products being sold (service catalogue) and for signalling the service content to the underlying network and server infrastructures during the provisioning process (remote end-to-end service control). Indeed, the VNOs

① *A Content Delivery Service Providers (CDSP) is one example of a Virtual Network Operator (VNO), i.e. a telecomms service provider without any significant network infrastructure to speak of.*

may wind up playing a crucial role: they use networks and servers like (commodity) infrastructures to fashion services dedicated to a specific customer strata and the individual requirements of their applications.

*Table 4. Mapping of service level guarantees*

| Number | Service level guarantees | Application class of service | | | |
|---|---|---|---|---|---|
| | | 1-I | 1-A | 2 | 3 |
| 1 | Service delivery lead-time | • | • | • | • |
| 2 | Fault clear time | • | • | • | • |
| 3 | Network availability | • | • | • | • |
| 4 | Round trip delay | • | • | • | – |
| 5 | Packet loss | • | • | • | – |
| 6 | Jitter | • | – | – | – |
| I: iso-chronous<br>A: asynchronous | | | | | |

Summarizing the above thoughts, we conclude that a telecommunications operator, wishing to be service-centric and to provide a true value-add both to a customer and his applications, must become very software oriented and strive to meet the following objectives:

- become a “virtual network” operator; i.e.:
  - offer all features of a facilities-based carrier,
  - remove all network infrastructure “dependabilities” for total (remote) SW control,
  - assume “end-to-end” cross-network carrier and service responsibility;
- create OSS-centric operations featuring:
  - automated, integrated service provisioning,
  - automated, rule-based service monitoring,
  - rule-based interfaces to billing systems,
  - automatic fault processing particularly at macro-level (long-term) processing level;
- serve customers to the extent that:
  - network and service policies reflect roles with respect to customer organization,
  - “role” truely defines actions that customer will perform or is allowed to perform,
  - sales manager can sell directly from authentic service catalogues (services broken up into components which – put together properly – may amount to web-bowsing, e-mail, application databae access, subscriber management, access control, address translation, fire wall operations, etc.),
  - policy servers encode for cross-network usage whom services, their components, and their use-policies apply to.

The third objective like none of the other two embodies the freedom brought to customers and how they will be using telecommunications services downstream. Achieving the third objective actually implies the customer is given controlled access to and use of a (commodity) telecommunications infrastructure without the operator really knowing (or careing) how the available resources are actually being used at any particular point in time.

**Old world**

- One-size-fits-all
- Circuit switched & distance pricing
- Carrier defines (comms.) services
- Slow, complex innovation
- SPs are mere resellers

**New world**

- Personalized and occupation-specific applications
- Packet switched
- Value pricing
- User defines comms. services
- Breakneck innovation

Custom network services will drive differentiation, loyalty, and growth.

***Fig. 7.*** *Telecommunications are a changing (Idea: Ranjeet Wilkhu, edge2net)*

Hence the pending, sweeping changes required for the telecommunications world to become service-centric require for network operators to adopt radically new business models (c.f. Fig. 7). Only if they do, they will be able to answer to the diverse and innumerous requirements put forth by the great many disparate applications populating the Internet even today and definitely tomorrow. In the long run, customers are likely to perceive the flexibility and ease with which they can build, install and operate network-centric applications as the only value-add provided by telecommunications services. This then will favor **true** service providers and cast pure network and server infrastructure operators by the way-side.

## The impact on operational support systems

The previous section pitched service specifications which are subject to similar engineering requirements as construction plans in the manufacturing business. Like the manufacturing business where assembly line tooling and process organization create a very structured and reliable production environment, data communications too will have to search for similar methods to achieve end-to-end and highly reliable service provisioning results. Moreover, as per the conclusions drawn in the previous section, we will also have to look for novel concepts to handle the service diversity in a single, uniform network infrastructure.

One such way has a network operator deliberately partnering with resellers. The operator would be responsible for service provisioning, while the resellers take charge charge of marketing and subscriber activation. The benefits resulting from this cooperation are quickly illustrated by referring to the drawing in Fig. 8. Unlike the very homogeneous telephone networks of the past, today's networks – particularly if they integrate voice and data services – are characterized by a multitude of diverse and different network elements.

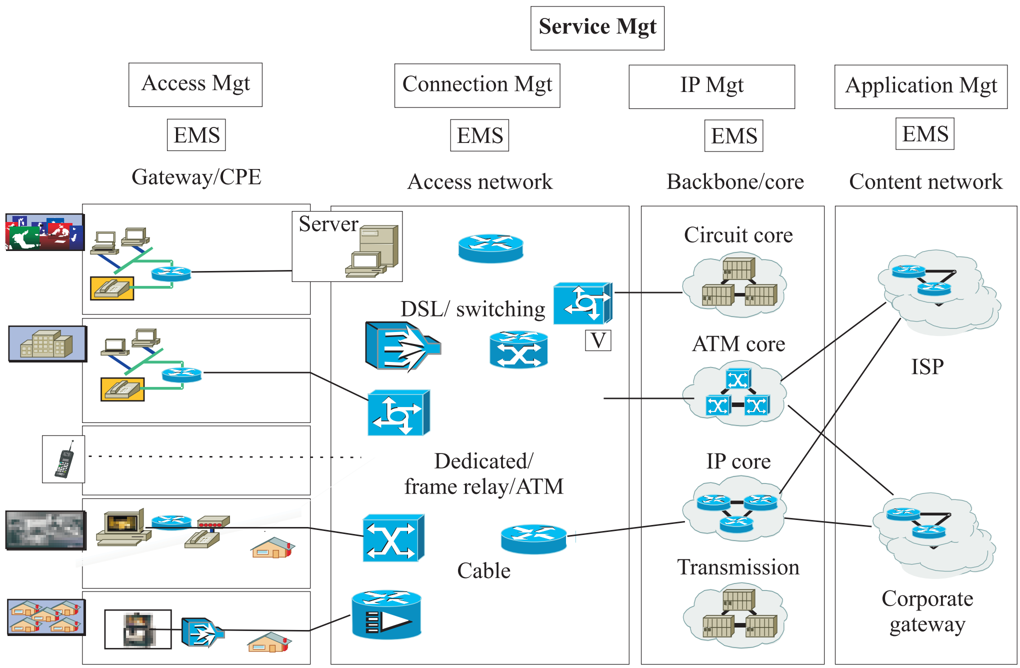



*Fig. 8.* *Diversity of network elements*

Assuming for a moment that an operator focusses on a specific part of the network – access for instance – they will still be forced to pay attention to the other areas shown in the picture. Since subscribers using the access network will undoubtedly want to use some sort of application, transport services, content access, and contents themselves need, hence, to be bundled into the access service for a service that really sells. Thus, while the operator is interested in providing a uniform infrastructure used by a great many subscribers, the data communications marketplace calls for diverse and individualized service offerings catering to specific application needs. Most likely this disparaty can be overcome with the help of service automation only. And this is where service management platforms enter the picture. Far from being panacea they are nevertheless seen as critical when service automation needs to be brought to bear in the areas shown in Table 5.

***Table 5. Data communications service areas***

| Service areas | Functions |
|---|---|
| Smart networks | Will manage themselves as much as possible,<br>requiring little operator support |
| Component based software | Is essential for meeting timescale and flexibility requirements |
| Common message busses | Integrate component based applications |
| Work-flow systems | Will extend control process flows across companies<br>(creating comprehensive application environments) |
| Business functions | Will be divided into real-time support and off-line<br>Data warehouse applications;<br>must be accessible irrespective of location |
| Common Internet portals | For customers and network operators to access<br>management capabilities |
| New applications | Will be integrated via commonly shared business objects |

Rather than discuss all the detailled implications of having to manage the combined great diversity of network element hardware and data communication service areas, let us focus our attention back on the customer needs. The customer and definitely the subscribers want to be shielded from all the complexity and the in-numerous service details. The subscribers simply demand comprehensive services and require a high level of quality.

Before this backdrop, the questions of how to define service quality and subsequently striking up associated service level agreements which warrant their name becomes no mean feat. True service level agreements that mirror both the diversity of today's networks and data communications service requirements should be engineered to include three sections (Table 6).

***Table 6. Basic SLA-requirements***

| Service agreement section | Specify |
|---|---|
| Service Availability Management (SAM) | The services a customer should receive,<br>identifies service components,<br>defines on-net vs. off-net service components,<br>specifies accessability, availability, and reliability |
| Service level guarantees | Traffic conditioning rules (e.g. packet classification,<br>associated per-hop treatment) specifies resources<br>provisioned for a particular service |
| Service provider responsibilities | Network features (throughput, loss rate, delays and jitter)<br>times of availability,<br>method of measurement,<br>consequences when service-levels cannot be met,<br>costs involved |

While the claims laid down in Table 6 are comprehensive and immediately agreeable, one should be keenly aware that mayor hurdles must be overcome for their implementation. Apart from telecommunications traditions and incumbent operator inertia, Fig. 9 re-iterates the complexity implied both by the aim to integrate systems and network operations on the one hand and by the objective to provide seam-less data communication services on the other.

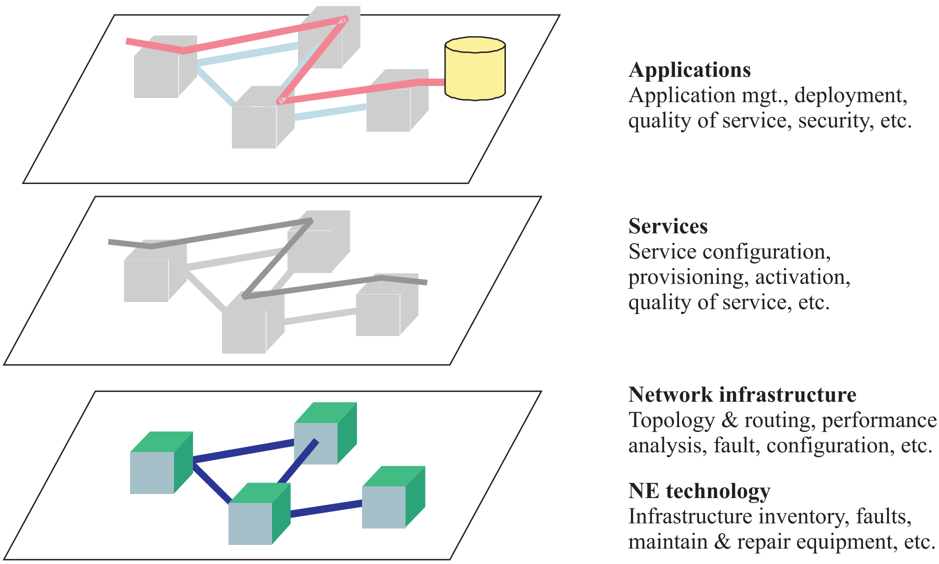



***Fig. 9.*** *Multi-tier network operations*

The lesson to be learned from what was said above is that network or better yet telecommunications operations must go beyond simply monitoring network elements working. Instead operations must provide the common braid between network hardware elements and the value-added-networking services riding on top of all these systems. This then calls for an OSS environment which shall have these objectives:

- Direct mapping of data communications services onto business processes, simplifying service provisioning and activation.
- Facilitating business re-engineering of processes, emphasizing simplicity and re-use.
- Application integration via common, network-aware business objects.
- Uniform management of applications, servers, and network elements.
- Facilitating the use of distributed management applications.
- Support for object-interfaces to network elements.

Everybody will probably quickly agree that this leads to an OSS environment made up of several components and structured as shown in Fig. 10. Yet, to support a whole-sales model of telecommunications services one must go beyond the architecture shown and logically partition the entire network infrastructure. As a result each whole-sales customer can make believe that they have complete control over a certain section of the network service resources.

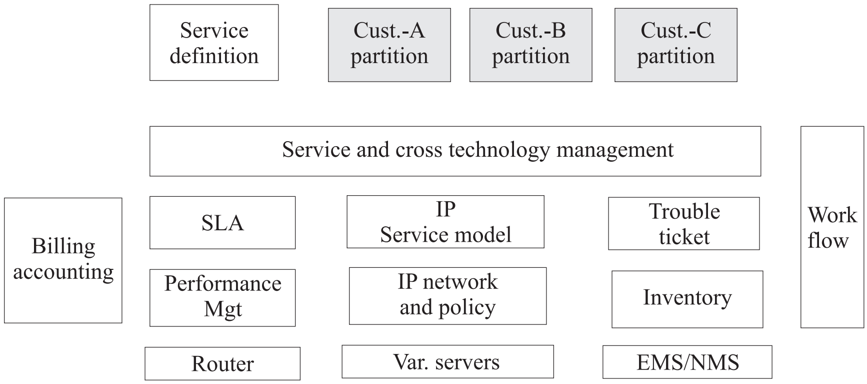



***Fig. 10.*** *OSS-architecture optimized for services*

In particular, this will also mean that access to the OSS environment is provided through logical, customer-specific views, each representing a virtual partition of the network resources. Such customer control consoles (shown als grey boxes in Fig. 10) will enable each customer to activate individual subscribers, to assign custom set of resources required by the individual services provided to these subscribers, and to monitor the use of such services. The role of the operator in this context will be focussed on setting aside on the "Service definition" console the general amount of resources which may be consumed by the customers and their services. Or put differently, the operator is free to concentrate his efforts on infrastructure development.

# Business documentation redefined

By the same token, the service re-seller – using the "Service definition" console of Fig. 10 – frees up the resources required to put an emphasis on product development and service provisioning. Recalling what was said in Section "The impact on operational support systems" about engineering SLAs (c.f. Table 6) the approach to product development in a services oriented environment ought to be completely revised. Both the operator wanting to whole-sale network resources and the service-provider wishing to sell telecommunications services that provide a high degree of value are required to dynamically and individually respond to the needs of specific customers. In other words, at least the service-provider ought to strive at implementing a tight integration of the services offered with the business processes of targeted customers.

The approach, which is most likely to attain this objective calls for a structured specification where each service is described as a set of discrete components (c.f. Section "A fresh look for Teleco services"). These service components may be standardized and thus be implemented directly using the available network and system element hardware; hence catering to the vital needs of the infrastructure operators. Moreover, service components, if properly defined and specified, may be recombined time and again into services which flexibly support customer business processes. In this context, service development targeting a specific market segment is being transformed into the analysis of the applicable customer business processes and their mapping to standardized network service components.

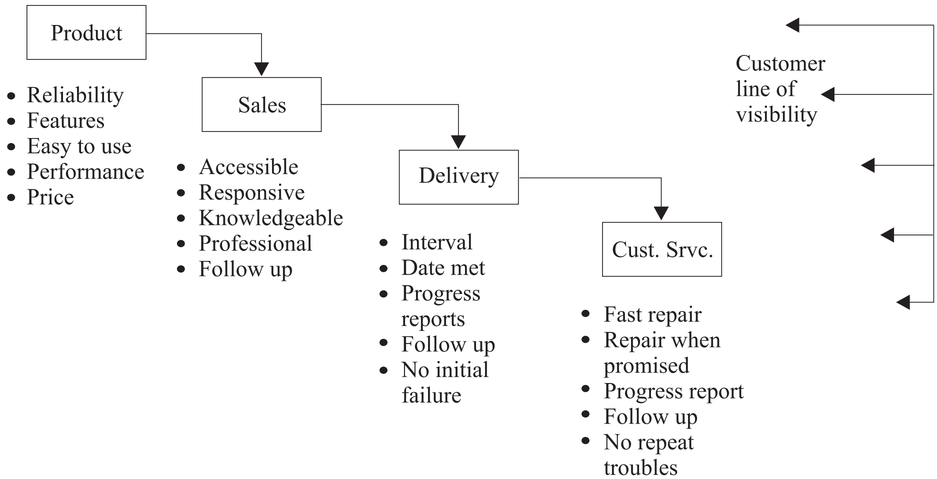



***Fig. 11.*** *Telecommunications business processes [3]*

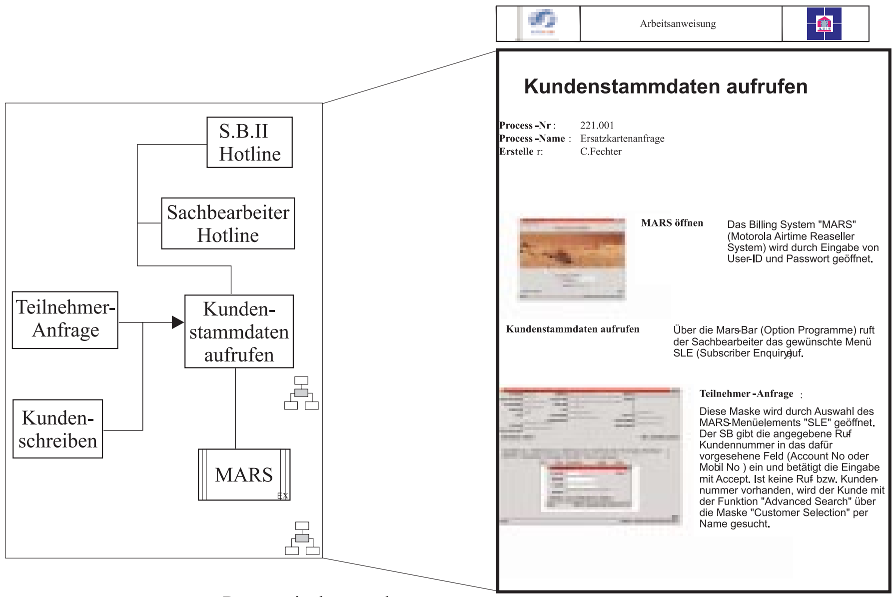
In fact, as shown in Fig. 11, even more important than the network components may be the integration between the procedures followed by the service-provider and the business processes of the customer. Take the **sales** phase for instance: unless the sales representatives understand the full implications of the services being sold they will be hard pressed to meet the customer expectations in terms of professionalism, responsiveness, basic industry-specific know-how, and perspectives for future development.

The realization that not only the network and associated systems but the business processes of the customer too directly influence the nature of the data communications services has far reaching organizational and operational consequences. Their business processes, in the end, constitute the competitive viability of the service provider.

Hence, the more imbued the organization is with the service idea, and the more process related information is made available to each staff position, the better. RSL COM Germany, for instance, have responded to this challenge by pioneering the idea of a *Process IntraNet*. As the name already implies, the *Process IntraNet* brings online all business process and service documentation that is needed in the daily business. Its key features are:

– available to all staff,
– provides process overview,
– shows immediate work-environement,
– comprises up-to-date work instructions,
– used to manage IT application changes and developments,
– guides and structures product launches.

As an example, consider the prototype of an online work-sheet as shown in Fig. 12. To the left of the picture the structured activity diagram is shown which stores the actual information needed to document the activity “Kundenstammdaten aufrufen” (Retrieve Customer Master Data) shown in the




Prototypical example

***Fig. 12.*** *Activity diagram: work-sheet translation*

center. Using a suitable compiler, all information relevant for online staff is gathered and assembled automatically into the work-sheet shown on the right.

The work-sheet is stored as an MS/Word file and linked with a graphical description of the process flow. Hence, using a browser to peruse the process in the intranet, a staff individual must merely click on an activity to call up work-sheets like the one shown in Fig. 12. Incidentally, the use of MS/Word to hold compiled work-sheets produces the added benefit of the process change management becomming significantly simplified. Using basic Word commands annotations may be made which describe modifications and/or additional information desired to be available online. Rather than simply storing the changed Word file, the IntraNet is configured such that, if the staff individual so desires, the modified work-sheet gets mailed automatically back to the process documentation department.

This continuous feed-back from staff personnel has proven invaluable for keeping the business processes up-to-date and accurate. Also, by turning around process modifications quickly, the *Process IntraNet* can be kept up-to-date too. This is, of course, the key to its success as a tool supporting day-to-day operations.

The above example has been included to drive home the point, that data communications services are not just a matter of providing an appropriate OSS environment. Instead, coping with the VAN services value chain of the future is an information problem which engulfs the entire organization: at both network operators and service providers. In Fig. 13 the shown service components are positioned next to boxes highlighting key business issues. Clearly, some of these issues are strategic, yet all of them give rise to information which needs to permeate the organization as part of either business processes or OSS systems.

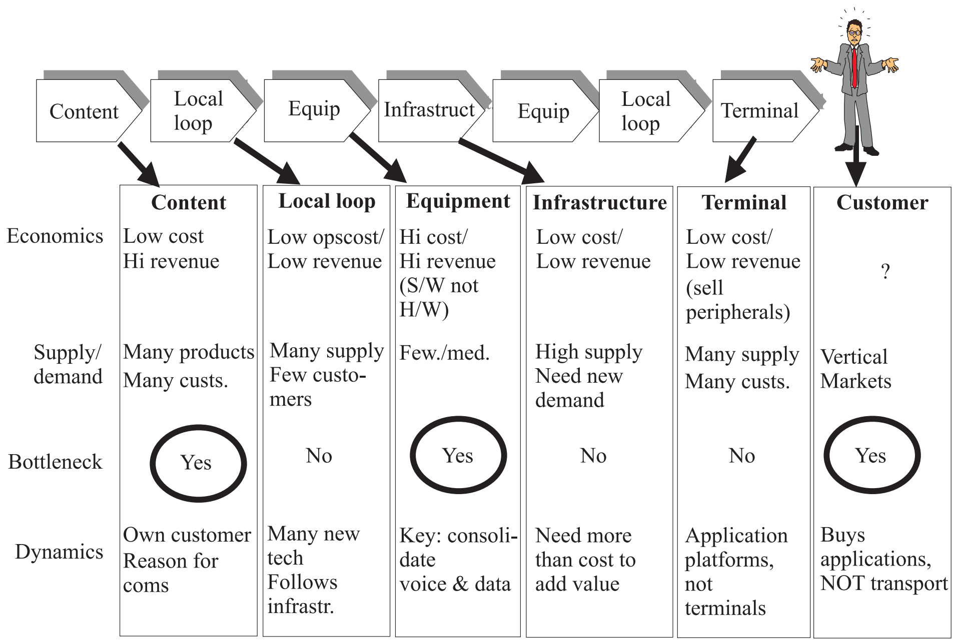



*Fig. 13.* Service value chain (Idea: D. McGlinchey, Carrier 1)

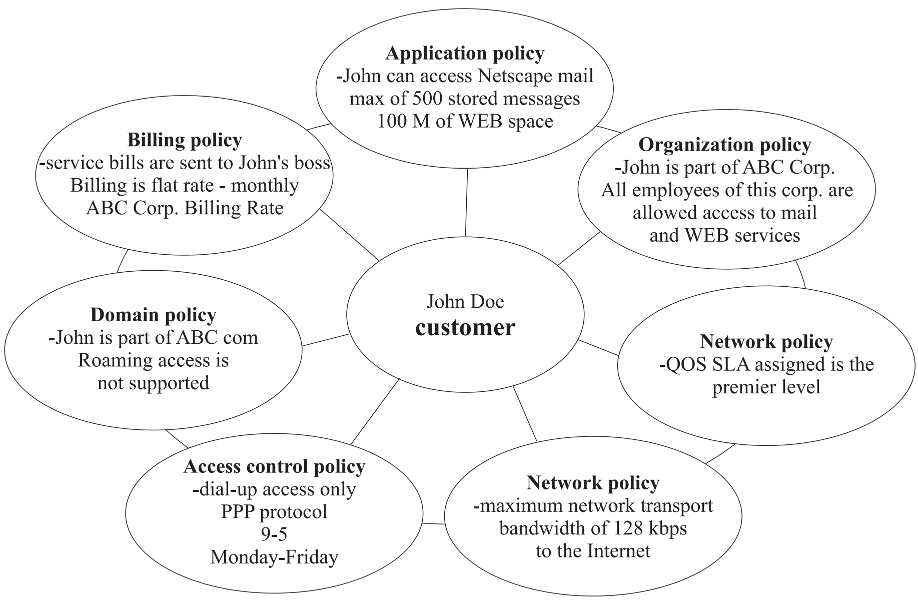



*Fig. 14.* The customer – the focus of our attention

Accepting this fact leads us to conclude that the sharing of responsibilities between operators and service providers may also be put in the following way: based on the idiosyncracies of the telecommunications value chain (c.f. Fig. 13) the network operator or infrastructure provider should focus on providing service components which solve some of the issues and bottlenecks characterized in the picture.

Meanwhile, the service provider, using standard components from the areas of billing, access, transport, application content, etc. (termed policies in Fig. 14), should focus his attention on the needs of customers in a specific industry segment. Hence, customers who expects the service provider to fully understand of both the requested network and associated application services, and who expects the service-provider to exert end-to-end control over these services.

## Conclusion

RSL COM as a service provider has made serious in-roads at documenting their business processes in novel, integral ways. In principle, this enables the company to remotely control network and service infrastrucures; a key feature for building value-added network services from components provided by very diverse service partners (black ovals in Fig. 15). As a result, RSL COM is well positioned to enter into whole-sales agreements with a diverse set of re-sellers (grey ovals). Operating their OSS environment solely as a platform for services and users meeting, the company would bring value to

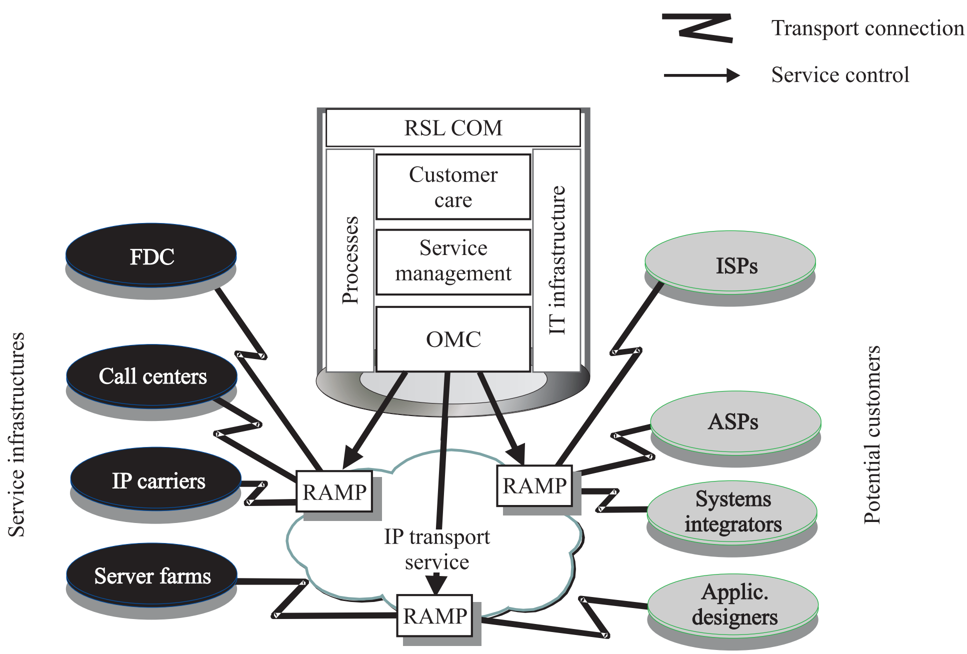



*Fig. 15.* *Control of network and service*

the table because their are in full control of end-to-end service integration, all operations business processes, and the flow of information required for service provisioning as well as activation.

Transforming the old RSL COM Ltd. so as to truely meet these objectives will let shine the company vision of the newly incorporated RSL COM Services GmbH:

- We want to be a Content Delivery Service Provider (CDSP).
- We will only own the facilities that guarantee QoS, application differentiation, and low cost of service.
- We will retain transport and application services from qualified partners.
- Our competitive edge shall be service integration and agility when interfacing with customer business processes.
- As a CDSP we deliver a multi-tiered value proposition to our customers.
- We will empower subscribers by focussing on customer services!

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## August-Wilhelm Jagau

August-Wilhelm Jagau, Ph.D. (1954) – by education Computer Scientist, graduated from UCLA in 1973. After working for US hardware manufacturers in the greater Los Angeles area, he joined BASF AG, Ludwigshafen, in 1986, where he was responsible for designing and implementing the BASF IntraNet, one of the first industrial router-networks in Europe. In 1997 he joined o.tel.o communications GmbH, where he was engaged in directing the design and implementation of the next generation o.tel.o IP-VPN backbone network. Since July 1999 he is employed as a senior project manager by RSL COM Services GmbH, where he is in charge of co-ordinating the IT requirements of all activities in conjunction with service provisioning and assurance. In this position he has been seeing through a "business process re-engineering" project to help re-position RSL COM Services GmbH as a content delivery service provider. Recently, he was responsible for co-ordinating the introduction of mobile number portability (MNP) at RSL COM, which became available in November 2002. Dr. Jagau will leave RSL COM in January 2003.
e-mail: au-wi.jagau@ieee.org