Lucent Technologies
Bell Labs Innovations

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LUX

[lux *latin :* light]

Lucent Technologies Customer Magazine

Creating Value Through True Convergence™





Patricia Russo

Chairman and CEO
Lucent Technologies

Dear Readers,

Communications used to be about bringing people to the network. Now it's about bringing the network to people 24 hours a day. They want access at home, work and even when they are "off line." They are demanding access to communications services from a wide range of locations over an ever-increasing variety of devices – telephones, PCs, mobile phones and PDAs. People who used to make business and personal calls primarily from the office or home now make them from cars, grocery stores, shopping centers and other public places. One device now may have multiple utility. For example, cell phones are now used for e-mail and other Internet applications, including playing games. But even that is not enough.

People want these experiences to be richer and more integrated. They want to be able to take pictures and e-mail them to family and friends as an instant postcard. They want to download songs and videos, then play them. They want to update their business contacts from their car or a park bench. They want a single way to sign on, a common set of contacts for every service, and "access aware" information delivery. They want their unique service profile to find them, not just the particular device they use, wherever they are, day or night, in business life or on personal time.

And there are also things they don't want, such as spam and hackers. Privacy is becoming an increasingly important issue for end users, and Bell Labs scientists are responding. For example, Bell Labs researchers have developed a prototype "personal privacy shield" for managing mobile phone location information that lets users of devices such as cell phones precisely control how their communications is shared and with whom. Finally, they do not want more complexity in their lives, especially when it comes to their communications experience. Even with the proliferation of all these new access devices, services and even networks they ride over, users want the communications to be simple, manageable, and non-intrusive in their lives.

So, technology has to be facilitating, not debilitating. Just as end users are redefining the kind of communications experience they want, Lucent is redefining convergence as the way to help service providers deliver it. For Lucent, the vision of convergence starts with reducing the complexity. We are working hard to de-layer every aspect -- from design to supply to installation, management and service delivery. Our vision centers on products, services and software integrated across three layers of the network – the transport layer for end-user access, the services control layer to manage the network, and an applications layer to rapidly deploy new services.

Sincerely



Patricia Russo

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For more information, please visit www.lucent.com/convergence



Market Environment and Customer Challenges

» Top-line growth, reduced operating expenses, new services

In the first years of the new millennium, the predominant focus of the telecommunications industry was on financial efficiency: lowering capital expenditures and operating expenses, and freeing up cash flow.

As the market has begun to stabilize, several layers of complexity have been added to service providers' challenges. Optimized CapEx and OpEx have become table-stakes to success. Now, service providers, large and small, must simultaneously find ways to offset the declines in traditional sources of revenues and drive top-line growth. To achieve this goal, service providers must find new ways to retain and attract demanding and sophisticated new-age customers in search of simple and personalized communications experiences.

This means not simply delivering low-cost Voice over IP to the end-users, but creating Value over IP™ for themselves and their end users. Service Providers require a true next-generation network, built on an open-standards architecture and able to support "always on", access-agnostic and device-independent services. Beyond the network architecture, service providers need a trusted partner they can rely on to find the most optimum transformational path to this new architecture. They need this trusted partner to define the unique business model that optimizes their capabilities and makes them relevant in the new converged marketplace, to evolve to this new business model and to build upon it a continuously evolving combination of meaningful end-user services.
The challenges facing network operators differ by region, by the company's size and the size of their marketplace, as well as by their area of focus and differentiation. But there are certain themes that impact all of them:

- Revenue Preservation
- Revenue Expansion
- Brand Extension
- Operational Efficiency
- Speed-to-Market Cycles

Convergence
For years convergence was long on vision but short on market delivery. Until now, that is, because times are changing -- and fast. Today that vision has collided with market realities, perhaps not the way we expected, but convergence is now beginning to deliver real benefits to the market. Every participant in the market for communications has his or her own definition of convergence. The definition depends on the customer's legacy base and their unique competitive landscape. If your strength is in optical, then it is Ethernet over Optical. If your strength is in wireless, then it is Data over Wireless. If you have both Data and Voice capabilities, then it is the addition of Video. If you can provide all three, then it may be the addition of content.

All that complexity leads to an unmanageable tangle of options for the end user. How do they choose a provider? How can they find the services and solutions that are right for them? And, perhaps most importantly, how do they make sense of all the choices? In the next decade, communications technologies will anticipate and respond to these needs, simplifying the end-user experience while offering astounding new services that will drive consumer demand. In the next decade, socially responsible communications technologies will deliver safe, reliable, secure services that respect the uniqueness and privacy of the individual. Lucent views this new market reality, both the ability to anticipate the need and to respect the individual, as Convergence. And because every consumer will leverage this new market reality uniquely, Convergence has no single definition.

Lucent considers Convergence from the end-user perspective. Lucent tries to "walk in the shoes" of its customers in order to relate to the end user's dilemma and to provide network solutions that bring simplicity to the end user experience. Lucent's Next Generation Vision is to increase the personal utility and professional productivity of the end user through simple, seamless, secure, personal, and portable lifestyle communications by creating Value over IP™. Value over IP™ enables a provider to create a seamless lifestyle communications experience that brings the full capabilities of the network directly to the individual.



Customer Strategies and Lucent Relevance

» Value over IP™: the ultimate differentiator for service providers

Each service provider has a unique approach to convergence, driven by its unique set of competitive advantages, legacy assets and individual challenges. There are three key market strategies employed by service providers today. And Lucent has a comprehensive set of solutions — products, services, software and marketing support — to help service providers achieve a true, converged communications network capable of delivering a seamless, personalized lifestyle experience to subscribers.

Virtual Bundling

Many service providers have realized their need to address end-user demand for one-stop shopping for voice, video and data through virtual bundling, the combination of services from several disparate networks through separate devices. Virtual bundling provides end-users with a converged experience on legacy networks. The advantage of this solution is clear: it extends the operator's brand into new market segments and new service areas; allows them to collect additional revenues not possible on their own network; and creates more stickiness with their customers.

The challenges associated with this solution are equally clear: (a) for service providers it is very difficult to sustain margins; and (b) for the telecom industry it is hard to maintain the overall size of the market. Over the past 10 years, there has been a slight, but real, decrease in consumer spending on telecommunication services. From country to country, predominantly in the developed world, the percentage of a consumer's budget that is dedicated to telecommunication has been flat or reduced. People are getting more for less. The virtual bundling model continues that trend of decline. Just ask yourself: when you move from three service providers to one, do you ever pay more for the combination? The answer is a resounding "No". But what happens behind the scenes? The network environment has become more complicated due to inter-player arrangements. The combined services pool has not changed. The cost of running the services for the industry has most likely increased. The overall spend, however, has decreased, leading to slimmer margins for the providers of these services. Further, each application for the end user is iron-chained to the device and the network. No sharing of applications, network data or user profiles is possible. Therefore, no seamless lifestyle applications are possible. So, while there is great value in pursuing this approach today, in the long-term, the service provider must find another way to create a converged experience for its customers in order to grow the overall market opportunity for itself.

Lucent agrees that service providers must implement the applications required by the current market environment. Virtual bundling is an important strategy for Lucent customers. To achieve our customers' objective, Lucent offers a comprehensive portfolio of best-of-breed solutions to support the service providers' Virtual Bundling strategy. These solutions include Lucent's market-leading access products (spread spectrum, triple-play-ready, broadband, among others), cutting edge OSS software, and the capabilities our Lucent Worldwide Services organization.

Network IP

In addition to rolling out new services through virtual bundling, service providers have also focused on driving costs out of their networks. Within the framework of the provider's journey towards convergence, Lucent has dubbed this stage "Network IP". The primary objective of Network IP is to achieve operational efficiencies through physi-



cal changes to the network, specifically IP/MPLS enablement of the network core and implementation of next-generation Optical solutions. This strategy allows service providers to leverage the strength of each individual legacy network, while unifying the operating environment and systems management. Network IP maintains the old paradigm of point-to-point communications and does NOT create an environment for seamless lifestyle experience in a device-independent, access-agnostic network architecture.

The Network IP stage creates some challenges for service providers, especially those who do not see the transport business as their core strategy. Optimized CapEx and OpEx combined with ruthless competition results in a continuous decrease in the price of voice. This cycle, instead of creating opportunities for the service providers, reduces the overall size of the communications market. Therefore providers must find a path to leverage the optimized operating model and grow the market at the same time.

Lucent recognizes the criticality of the Network IP strategy for service providers and is best suited to support service providers in it. After a relentless and very successful three-year campaign to drive down our own operating costs, Lucent understands the need for fiscal efficiency better than anyone. Lucent has a complete portfolio of products and services to IP-enable the optical and core layers of the network. This portfolio includes a market-leading metro and core optical suite, an IP/MPLS core and edge suite developed in partnership with Juniper, a multiservice edge switch, cutting-edge OSS software, and the capabilities of our Lucent Worldwide Services organization.

Value over IP™

While Virtual Bundling and Network IP may be fundamental to a service provider's business model today, Lucent believes that these strategies must be executed within a framework of a long-term vision that is focused on building a converged next generation network and a converged next generation business model. It is Lucent's mission to help providers create Value over IP™ through a network that brings services to the end user in a manner that is seamless, simple, secure, personal, and portable.

Lucent delivers Value over IP™ through complete convergence across services, across networks and across organizations. Value over IP™ enables a provider to create a seamless lifestyle communications experience that brings the full capabilities of the network directly to the individual. For the service provider, Value over IP™ means an ability to attract and retain high-value customers by ushering in new services quickly, easily and continuously. For the end-user, Value over IP™ means the arrival of the blended lifestyle services that they already demand in their communication experience. The relationship between the end-user and service provider is no longer based on stickiness, but rather on *loyalty.*

Neither the traditional switched network nor its current IP version are designed to roll out highly integrated, deeply customized services quickly or cost-effectively. Providers who want to drive value to their IP networks need to look to a new service-enabling architecture: the IP Multimedia Subsystem (IMS).

IMS is an open standard architecture that allows the creation of an always-on, access-agnostic and device-independent network. Lucent believes that acceptance of IMS will be the juggernaut that will lead providers to create true value for their end users by ushering in new services with great speed and ease. Networks designed on the principles of IMS will be brought to the end user in a manner that is seamless, simple, secure, personal, and portable.

Lucent creates Value over IP™ for service providers through our Accelerate™ Next Generation Communications portfolio. Through the Accelerate™ portfolio of IMS-enabled, Bell Labs anchored best-of-breed integrated next generation solutions, Lucent helps our customers to build and sustain market leadership in convergence. The Accelerate™ portfolio enables new, personalized end-user services at home, at work and on the move. Examples of new services include:

- Seamless presence-enabled services (e.g., Active Phone Book)
- Multi-media content services and messaging (e.g., Instant Messaging with Push-to-Buddy List)
- Interactive gaming



A conversation on convergence

and what it means to service providers and end users

John Giere
Chief Marketing Officer
Lucent Technologies

John Giere, Lucent's Chief Marketing Officer, recently spoke to Mike Cansfield, Research Director for Ovum, a telecommunications and IT market analyst and consulting firm, about the challenges and opportunities brought about by the convergence of technologies, networks, applications and services.

Ovum: Convergence is a current industry buzzword, why is it so important and what does this mean for Lucent?

Giere: At the highest level, convergence is about disaggregation – pulling apart – of the network from the core to the customer. It's happening at every element, at different paces. Networks are opening up. Intelligence is moving to the core, and in some cases, moving out to the edge. What you have to do is manage that convergence in three key areas: services, segments and software.

- Services means not just providing voice and voicemail, but services that combine a variety of applications, such as video and messaging.
- Segmentation is happening most visibly at the high-end consumer and enterprise level. The requirements are different, but we see the emergence of the "pro-sumers" – the professional consumers – who are blending their personal and professional lives. Consumers want a single device (such as the Blackberry™) with access to multiple applications. Enterprises want simple networks that allow multiple-access devices.
- Convergence of software allows a provider to collapse networks and systems and converge into one area.

Every service provider has his own viewpoint and migration path, but everyone is heading towards convergence and wants to utilize the convergence of services, segments and software in a disaggregated network. Networks will need to be designed so that people can decide how to blend services to suit their lifestyle at work and leisure.

Ovum: How does Lucent define IMS?

Giere: IMS (IP Multimedia Subsystem) is a standards-based, open architecture that enables operators to deliver converged multimedia services across different devices and networks. If you were designing a house, think of IMS as the developer's framework or "shell" that you could then customize to suit your tastes and needs. Within the IMS framework, the solution is tailored to meet the specific requirements of the customer.

Ovum: If IMS is an industry standard, what does Lucent offer that is different from other vendors?

Giere: We've spent a lot of time defining how we differentiate ourselves in an open standards-based world. To continue the house analogy, Lucent is the designer that turns an empty frame into a home. It sounds easy, but if you've ever built a home, you know it isn't!

Our approach to IMS starts with Bell Labs and our patented algorithms for database management. This is all about sorting, filing and retrieving software and applications and delivering them in real-time to different devices across different networks. Bell Labs end-user management capabilities enhance the IMS standard so that Lucent can help service providers meet subscribers' needs for converged services that are personal, seamless, simple, portable and secure. Some examples are:

Simple - Lucent's Bell Labs has developed an innovative approach to data management by providing a single point of data access across different access networks. This technology integrates the myriad databases that keep track of each subscriber's location, choice of device and service preference within each network, so that all the data across the networks is transparent to the application.

Seamless - Lucent's Bell Labs invented technology – compliant with Global User Profile standards – that allows subscribers to build a personal profile and service preferences that follow the end user from one network or service to the next. This capability is at the core of bringing the network to the end user.

Secure - The X.805 standard network security framework, conceived and created by Bell Labs and adopted by the International Telecommunications Union (ITU), is a major step toward the creation of a systemic approach to the assessment and improvement of network security.

Portable - Lucent's Bell Labs developed unique technology to provide subscribers with access to voice and data services, information and messages when roaming outside the home network.

Personal - Lucent's Bell Labs created a rules engine that acts as a policy decision point, logically sprinkled throughout the network. It supports broad per-



Mike Cansfield,
Research Director, Ovum

Mike Cansfield Research Director is responsible for leading Ovum's research into the wireline sector and managing relationships with key clients. Mike specializes in broadband, convergence (fixed/mobile, IT/Telecoms, voice/data/video), telecommunications business development, and alliance/partnership management.

sonalization, or the network's ability to behave in the way each individual user requires based on a personalized set of rules and behaviors.

Looking further forward, Lucent is working on creating a fluid communications experience. The ultimate goal is an adaptive network or learning network that learns the user's preferences. For example, when you drive home from work every day you'll automatically get the traffic update.

Ovum: Does IMS enable an operator to offer any services that can't be implemented in any other way?

Giere: Yes. IMS enables an operator to offer blended lifestyle services; to take a one-dimensional service and add attributes. Currently, different services are provided from individual silos, but IMS provides a single silo where all services are located. IMS can change the communications experience forever. And the motivation for operators is that traditional services are under margin pressures and revenue erosion.

Ovum: Does Lucent view IMS as a mobile or wireline convergence solution, or both?

Giere: Both, and cable too! We come at it from the end user. IMS is about increasing customer loyalty and generating new revenues. You need to introduce new services to do this and IMS makes it possible. Cable operators in the U.S., for example, have shown that bundled offers increase customer loyalty by 57 percent, and packaging and bundling lead to increased revenues. To be successful, operators have to create a new communications experience that provides productivity to their customer's professional life and usefulness in their personal life.

Ovum: Lucent talks about driving "Value over IP." What does this mean?

Giere: If the perception is that VoIP is free, then value has to be driven back into it. Driving value back into IP is all about offering a mix of blended lifestyle services that are of value to the customer because they are adaptive and responsive and justify a premium. And Value over IP™ means that you have to partner in new and different ways to bring that value to the consumer and the operator. You have to do demand creation -- segmentation and device configuration -- so that new services can be created and marketed successfully.

Ovum: Which are Lucent's key markets for IMS in Europe, and why?

Giere: All markets are important. There are a lot of interesting developments in Europe right now. There are the Innovators, the Leaders and the Emerging Markets.

- The Innovators (Scandinavia, UK, The Netherlands and increasingly Spain). These countries have often led in new technologies, and so there is a lot of trial activity going on in these markets in convergence and IMS.
- Leadership markets (Germany, France, Switzerland, and Italy). These operators tend to have fixed and mobile operations and recognize the importance of convergence.
- Emerging markets (Poland, Slovakia, Hungary). They are aggressively modernizing and skipping technology generations. This category can also include longer-term prospects, too.

Ovum: When can we expect to see Lucent's IMS solutions available in the market?

Giere: In December we announced IMS wins with mm02 in the UK and Sprint in the US (see page 15).We have a series of trials underway that fit the IMS architecture. Lucent is the first out in the market with a complete IMS solution, starting with a common softswitch for wireline and wireless networks. Our IMS portfolio includes the Lucent Compact Switch, Lucent Session Controller, Lucent Network Gateway, and the Lucent Unified Subscriber Database Server.

At the application layer, we offer blended lifestyle services, such as Live Wire, which gives you the ability through a wireless device to choose music, news, and video "on demand." Another service is "Portable Travel Agent," which lets you see what concerts and restaurants are available anywhere in the world through your mobile device. ■



Blended Lifestyle Services

» ARPU increases with lifestyle services

IMS is a services-driven architecture that strives to equip operators for success in their target user segments. It enables service providers to generate significant and sustained revenue from services that meet the needs of end users.

What are the specific benefits of deploying an infrastructure that can link any application server to any end device anywhere, and deliver highly personalized features? For end users, it's the ability to communicate anywhere, in any form they choose; and that capability suits their needs today. A key finding of Lucent's primary market research among consumers is the requirement to focus on services that deliver value by meeting their particular lifestyle needs, i.e. services that offer real value by making routine, daily tasks easier to carry out. Typically, these are services that add convenience, efficiency and ease to users' communications packages. Such services then quickly become integrated into the daily lives of end users, leading to increased voice and data traffic on the service provider's network along with corresponding opportunities for revenue generation and subscriber retention. We call these services "lifestyle services". In order to deliver on this promise, the services must be very easy to discover and use, and provide a high degree of service quality wherever and however a user might want to access them. And if their current provider doesn't offer them, respondents indicate a willingness to switch to a provider who does.

According to this market research, residential consumers are most interested in the services that increase convenience, security, time efficiency and control. Users want the ability to determine when they communicate and with whom, how they get alerted to specific events, when they can and cannot be reached, and in what mode. They also, of course, want to be entertained; entertainment content of all types will be an important value-add to any service portfolio.



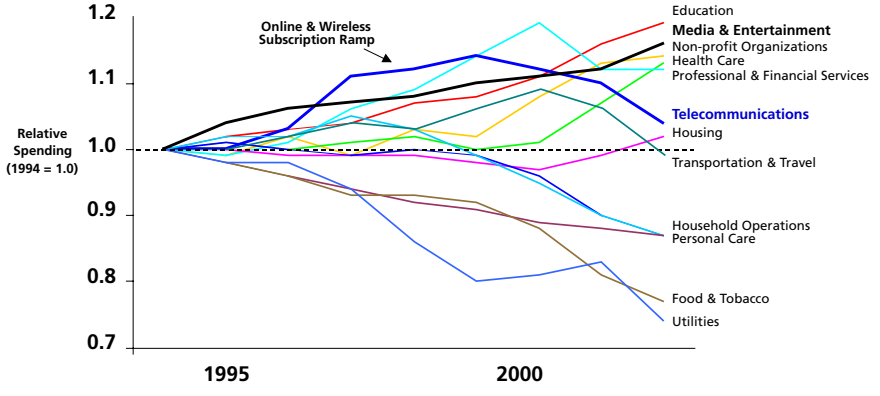
"Today, VoIP is on everyone's lips. In actual fact this is only the first step towards converged voice and data services. The development will peak in personalized services that allow each customer to tailor their communication to their own needs."

Georg Benzer
CTO at Arcor

Everything in the current communications environment – from camera phones and Wi-Fi hotspots to music downloads and online gaming – has demonstrated to users the value of a rich, interactive communications experience, and they are ready to pay for features that will port those attributes to their everyday phone usage. Communication is rapidly evolving into a "lifestyle service" that makes daily business easier, more efficient and more enjoyable, and Lucent's solution for Next-Generation Networks makes a large stride along that evolutionary path. That's good news for providers with the infrastructure to support such enhanced services. Because they are not easily replicable, these higher services lift an operator out of the low-margin table stakes game of selling 2.5G voice, where pricing is a race to the bottom and churn is an ever-expanding percentage. In this envi-

Relative Growth in Household Expenditures by Category

To offset the declines in telecommunications spending, service providers have to offer new revenue-generating services to the end customer.



Source: U.S. Department of Commerce, Bureau of Economic Analysis, Dean & Company Analysis



ronment, services that allow a more complex communication experience and reflect users' preferences by morphing content to suit context (home, car, office) and access (POTS phone, desktop, PDA, mobile phone) will exert a stronger retention on existing subscribers through true loyalty. ARPU will rise as providers move away from the fixed-cost business model of functions such as voice messaging to a usage-based rate for more fully featured multimedia services.

In the best cases, such services will offer opportunities to poach market share from competitors – a considerable advantage in a market saturated with wireless and cable TV, where all players are now competing for the same consumer spend. Proprietary market research conducted by Lucent finds that residential and enterprise subscribers are willing to pay now for the added value of the integrated services available with the IMS-based network solution.

Providers will do best by offering enhanced IP services after carefully micro-segmenting their markets. Service providers must create the right bundles and target the correct market segments: e.g. large and small enterprises, teen markets, and others. They must bring these services to market in the appropriate targeted fashion and create communities of interest around the services. In the professional segments, they can do this by starting with the more complex bundles including IP Centrex, portal applications, etc. On the consumer side, they can start with the simpler services and drive up the curve. With IMS, we can take a service for which the market is already conditioned – e.g. gaming – and blend it with another service, presence, to add value.

--djk

VIPcentre Network

The best way to find out what blended lifestyle services are all about is the real-life demonstration.

See Lucent's convergence story brought to life through a series of end-user application demonstrations in Lucent's Global Customer Briefing Centres.



The demonstrations show how the Lucent IMS Convergence Solution supports 3GPP/3GPP2 IMS standards-driven solution capabilities linking IP devices and IP networks via SIP to bring in new multimedia applications for wireline and wireless customers. It highlights ''Blended Lifestyle Services"--a suite of IMS-based applications showing how end users can seamlessly access a broad range of communications and services from anywhere -- at home, at work and on the move.

Just contact your Lucent Sales Representative or Lucent Business Partner to schedule a meeting.

Examples of end-user applications shown in the VIPcentre are:

- iLocator
- Ecrio
- IP Centrex
- Triple Play
- Network IP Centrex EBS
- Voice/Video/Data Services
- Mobile IP
- IP VPN Access
- Unified Messaging
- Call U Back
- Video on Wait
- Shared Steaming Video
- Active Phonebook



Active Phonebook shown on a WiFi handset

A new communications experience

» How the end user can use "blended lifestyle services" to help manage the demands of their everyday lives.

In the same way that people's buying habits have become more individual, communication profiles have also changed. End-customers are either using service bundles geared toward specific target groups, or putting together the services that they want from a multifaceted offering – even spanning multiple service providers. The following examples are intended to illustrate which lifestyle services are conceivable on mobile terminal devices.

Live Wire:
Provides the ability to select any kind of media – music, news, short videos, TV or books "on demand" through a wireless devices.

Home Security:
Allows you to connect to your current home security system through your mobile device and receive up-to-the-minute information and live video.

Portable Travel Agent:
Provides the ability to access details of concerts, sporting events, attractions, restaurants, hotels, and directions anywhere in the world through your mobile device.

Activity Agent:
Input your activities for the day and Activity Agent provides a schedule using information such as traffic and roadwork updates, and opening hours and special promotions at your favorite shops.

More Than Words:
Allows you to design a personalized multimedia message to send to anyone, anywhere using your own handwriting, drawings, photos, and video and audio attachments.

My Mobile Planet:
You can actively participate in online communities of your choice: send and receive video feeds, photos, sound bites; and participate in instant messaging chats and bulletin boards.

"Teen and Fun"



Example: Claudia, 15 years old, pupil

For Claudia it is important to be permanently in close contact with her friends. A combination of iLocator and ActivePhonebook notifies her proactively via cell phone about which of her friends are nearby. At the same time she receives information on her display about their availability. In accordance with a preset profile she allows a limited amount of advertising information to be sent to her from selected companies. This can be in the form of text messages or video clips. In return she receives club points for her community, which she can exchange for ring tones, for example. While waiting for the school bus, she passes the time by viewing the latest video clips of her favorite groups. After school she enjoys interactive multiplayer gaming (see scenario on the opposite page) with her friends.

"Best Ager"



Example: Michael, 62 years old, retired

Michael uses his free time primarily for cultural trips. When visiting new towns and cities he uses his PDA as an audio guide, as he is accustomed to from museum visits. Thanks to the iLocator his PDA identifies where he is and offers information about the respective building in audio, video or text format. In general Michael places value on ease of use. He finds voice control and simple user guidance important. A central aspect for him is the subject of health. His PDA has an emergency key (push-to-talk) that connects him directly with his regular doctor. Moreover he receives news updates about health topics that interest him.

"Mobile Worker"



Example: José, 32 years old,
field employee for an insurance company

In José's eyes, the key criterion for selecting the service is productivity. Since he is on the road a lot, he frequently uses navigation services, his network-based scheduler, and - when he goes abroad - translation aids. Equally important for him is permanent, secure access to the corporate network, so that he can call up the latest customer data and tariffs. Moreover he has subscribed to a news service, which provides him with updates on an ongoing basis about his key customers and his competitors. But he also solves other everyday problems using his service: when the fuel gauge in his car nears the minimum, he is automatically notified about the nearest gas station (machine-to-machine communication).

"Family Business"



Example: Amanda, 37 years old, mother

As mother of an 11-year-old daughter, Amanda would like to be notified when her daughter leaves a defined area, such as the way to school. In this case she automatically receives an SMS text message and can contact her daughter immediately by pressing the PTT key or via IM. When shopping she receives information about special offers from selected shops nearby via electronic coupons, which she can cash in immediately. She pays small amounts using her cell phone. On vacation she can monitor her house on her cell phone via live video.



Consumer-to-Consumer Scenario: "Multiplayer Gaming"

Let's take a look at Claudia and Wai. They are keen gamers and are subscribers to the "MegaGames" service. They are currently relaxing in the park and decide to play a game together. They select "Treasure Hunt" from the list of games to play, their current positions in the game are automatically shown (high scores etc.) and their presence within the game is registered. After a few minutes of playing they are challenged by Bobby, a player from their closed user group of friends. They accept his challenge and Bobby joins the game. [1]

Whilst playing the game the friends use PTT to talk and taunt each other's playing skills. [2] With Bobby being part of the "Friends" group he can gain extra "power-ups" by physically moving nearer to his friends during the game, using location indications provided by the game itself. He uses this to increase his score and to join his friends in the park. [3]

Another player requests to join and the friends allow him to do so. After a few minutes the new player requests to set up an IM session with the group of friends; because the new player is not part of the "Friends" group the request is filtered through the gaming network to ensure that the friend's contact details are not shown. [4]

The new player is not known to the friends so they decline his offer but continue to play the game. Claudia wins and gets a new high score. The score is automatically registered on the gaming server for all subscribers to see. Claudia is happy with her score and knows it will register her for the monthly team championship, as well as get a lot more players challenging her over the next few days. [5]

[1] *Value of presence and closed user groups in the context of Multiplayer Gaming*

[2] *Multimedia services incorporating simultaneous voice and data*

[3] *Importance of location data as a way to enrich end-user services, plus secure access to network-based information*

[4] *Mobile Service Security and personal data protection*

[5] *Driving increased revenue by promoting regular use of services through competitions*

Business-to-Consumer Scenario: "Customer Service"

Businesses need to find ways of continually improving the customer service they provide in order to differentiate themselves from their competition, build a positive reputation in the marketplace and develop customer brand loyalty. Similarly, if consumers need product support they want the business to be responsive to their needs and to get them up and running as quickly as possible, without repeat visits.

Let's take a look at Sally. She has just realized that the heating is not working in her house. She calls her service company for help. Once answered, the customer services rep talks Sally through how to check some basics on the boiler. He starts a video call to Sally to see if he can spot anything obviously wrong with it, as well as to ensure that she's following his instructions OK. The rep talks Sally through resetting the boiler to see if this will help. Sally tries but this doesn't seem to solve the problem in this case. The rep then locates his service engineers who are currently on call using his iLocator service. Two of them are near where Sally lives, so he sends a Push to Talk message asking if one of them can go and help Sally out. One of the engineers is just about to finish his current job, so he PTTs to say he'll be there in about 15 minutes. The customer rep lets Sally know to expect the service engineer shortly. Once the service engineer arrives at Sally's house he connects to his corporate intranet, using his PDA and 3G connection, and quickly downloads the test manual for her particular boiler. He then uses this to identify and fix Sally's fault. He leaves Sally a satisfied customer, as well as having minimized the cost to his company of rectifying the problem with the boiler.

Delivery of services regardless of device or access technology: SIP-enabled video between a PC and 3G device, importance of location data as a way to enrich end-user services

More demos are available at www.lucent.com/convergence

IMS: The Engine of the Next-Generation Network

» A technology overview

IMS is based on IP core networking standards that have been developed by the 3G Partnership Project (3GPP) and 3GPP2, industry bodies that are responsible for the establishment of standards for 3G – third generation – networks. Through Bell Labs, Lucent has been integral in developing the IMS architecture and has led the charge to get it adopted in both the wireless and wireline environments.

IMS offers a structured multimedia service architecture, which adds service intelligence to new and existing wireline and wireless networks. It is a unified architecture that supports a wide range of services enabled by the flexibility of Session Initiated Protocol (SIP) while continuing to support H.323 and circuit endpoints. The IMS architecture separates and extracts service and control types from access and client types, making services available in both wireless and wireline environments.

Application development partners can access the open IMS architecture, which allows service providers to rapidly roll out new features and functionality.

The Lucent implementation of IMS architecture is founded on four principles:

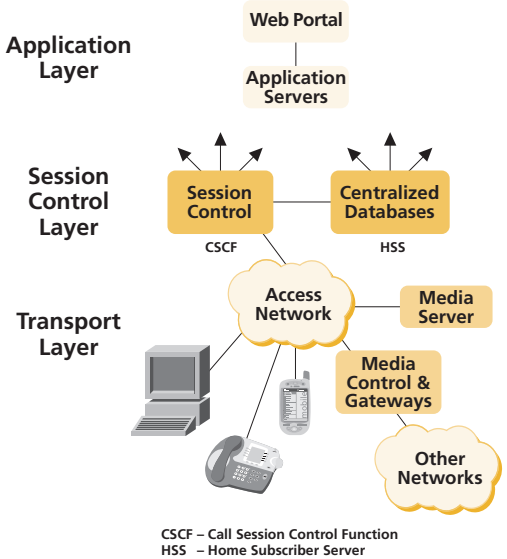
- An open-standards interface allowing plug-and-play integration of any number of applications.
- A common session control element through which all application servers can signal. This allows full convergence of services over a number of access modes – blending instant messaging with unified communications and VoIP, for example.
- A centralized subscriber database that locates all customer profile data in one spot. This concept, similar to the home location registers (HLRs) of the wireless world, makes both service rollout and ongoing administration manageable and scalable.
- A set of completely access-agnostic interfaces down into the access network, so that these converged services can be adapted to any device that the end user chooses and delivered with consistency.

A three-layer architecture

IMS architecture is organized in three main component layers. At the top is the application level, supporting a wide variety of telephony and non-telephony network application servers. Consumers can access these directly through a Web portal to enable and disable whatever services they choose.

Below the application layer is the call session control function (CSCF), which registers the network's endpoints and routes SIP signaling messages to the appropriate application servers. The home subscriber server (HSS) is a global resource used by both this layer and by application layer components to determine which of its services are applicable. It maintains the unique service profile for each end user, including IP address, roaming information, buddy lists, calling service subscriptions, and voice mail options.

Finally, the transport and endpoint layer sets up sessions through SIP signaling and provides bearer services such as packetizing analog voice. This layer provides media gateways for converting VoIP bearer streams to TDM. A pool of media servers supports functions such as conferencing, announcements, speech recognition, and collecting digits across a range of applications including voice mail, advanced 800 numbers, and interactive VXML.



CSCF – Call Session Control Function
HSS – Home Subscriber Server

IMS is:

- **An industry standard services architecture for VoIP, Telephony and Multimedia services.**
- **Defined with Open Standard Interfaces and based on IETF Protocols (SIP, RTP, ...)**
- **Designed for both Wireless and Wireline Networks**
- **A Solution for Service Transparency - between network types**



Bell Labs: NGN Thought Leadership

Although IMS is an open standards architecture, Lucent delivers great value through its unique intelligent NGN solution. Being at the heart of the creation of the open-standards IMS architecture, Lucent is able to take that architecture to the next level by enhancing the defined elements of the IMS and developing those unique and necessary attributes that are not defined by the IMS. The philosophy that ties together this unique intelligence is the "Simple, Seamless, Secure, Personal and Portable communications experience". The origin of this intelligence is S-DHLR (or Lucent Unified Subscriber Data Server), a non-purpose built database that tracks subscribers across wireless and wireline networks, that was invented at Bell Labs. The bloodlines that support this intelligence is Session Initiation Protocol (SIP). This protocol was invented at Bell Labs and is the protocol that is used by all the elements of IMS to communicate with each other.

While IMS appears to be a plug-and-play architecture, the implementation of IMS, in reality, is rife with challenges. When a provider migrates from the traditional, point-to-point, device-to-network-to-application model to a model that connects multiple devices to multiple networks to multiple applications that can be run simultaneously, a special set of tools is needed. The ability to develop these tools and the algorithms that make IMS function – this is what Bell Labs has traditionally done best.

- Border Gateway Control Function (BGCF) – Lucent's Bell Labs created this algorithm to route calls between the IP network and the PSTN one, resulting in intelligent and efficient call routing.
- Call Session Control Function (CSCF) – Lucent's Bell Labs created this algorithm to ensure carrier-grade performance of the IP network under peak loads.

These examples are just some of the unique Bell Labs inventions that have reasserted Lucent's thought leadership in the communications market.

In addition to helping design SIP and other next-gen building blocks, Bell Labs is developing many of the enhanced applications those protocols enable. Running voice, data and video on a common infrastructure opens the opportunity to take services now available in the voice world and enrich them with multimedia. These include "push to show", allowing instant connection over any video-enabled device; automatic call reconnection; and a personal info digest that can push alerts relevant to the user's context (virus warnings when online, community meetings when at home). Carriers will have to accommodate these services from deep within their networks. For example, subscribers will occasionally want to block their locations. This should be done not as an add-on but from a centralized customer profile database, as Bell Labs' new Privacy–Conscious Personalization framework does. Customer profiles will also enable highly personalized Find Me/ Follow Me services, enabling customers to designate who can get through to them and over what devices and to set those policies on the fly via a Web interface.

As Lucent has started building a convergent world of services, it is already looking to further refine it. For example, Lucent's Bell Labs researchers continue to make progress in developing technologies in key areas such as security systems to ensure that these networks don't collapse from intrusive hackers or unwanted spamming. Looking a bit further out, nanotechnology will bring an entirely new class of convergence capabilities as tiny devices and sensors are added to networks and devices, improving machine-to-machine communications… and promising to go far beyond merely linking computers. All of these trends redefine convergence as more than a confluence of technologies. In the end, it's all about creating seamless communications experiences for the individual at home, at work or on the go. The new convergence is about each of us as individual users.

Evolving Next-Generation Services

» KPN on the way from being a network operator to being an IP Multimedia Service Provider



"Lucent and KPN share the same vision on market trends and IP Multimedia Services based network architecture."

Jan Wildeboer
KPN Board Member Strategy and Business Development.

In an age and an industry where everything has to be better, faster and more efficient, service providers find themselves in the middle of a high-stakes race to satisfy customer demand for capacity while maintaining quality and network speed. To reach this end, KPN Netherlands recently chose Lucent to deploy one of Europe's first nationwide IP Multiprotocol Label Switching (MPLS) networks.

The IP/MPLS solution will enable KPN to offer ATM (asynchronous transfer mode), frame relay and IP services cost effectively and at the same level of quality and reliability as provided by ATM networks.

An MPLS network is a multiservice data transport network that allows operators to deliver a variety of services while satisfying individual Quality of Service (QoS) requirements over a common, converged network. Lucent's solution, jointly developed with Juniper® Networks, resolves one of the major conflicts that service providers face -- an unwillingness to abandon their already established networks and their competitive need to evolve to next-generation services.

LUX spoke with Jan Wildeboer, KPN Board Member Strategy and Business Development.

LUX: How would you define KPN's role in the European telecommunications market?
Wildeboer: KPN is the incumbent operator in the Netherlands, that means that we are both a fixed and a mobile operator in the Netherlands. Next to that we are a mobile operator in Germany via E-Plus and we are a mobile operator in Belgium via BASE.

LUX: What is KPN's current financial situation?
Wildeboer: KPN has come through a very difficult transition period; we were very much focusing on cost reduction and reducing our debts because we had a hard time some years ago with our financial budget. We have come through that period in a good way, which means that we are in a more stable financial position now.

LUX: Could you explain KPN's focus of today and Lucent's role in it?
Wildeboer: Our two targets now are achieving operational excellence and customer satisfaction. Lucent assisted us in many areas in that field by delivering a range of services and solutions to improve our customer satisfaction and to achieve operational excellence, which was a very good cooperation. Lucent has by far been our most important strategic partner for years already, so we are very much relying on Lucent in that field.

LUX: KPN has set itself the target to become the market leader in broadband access. What can be expected from KPN in the future?
Wildeboer: Our next step is to make the transition from the network operator to an IP Multimedia Service Provider. That we are doing again in cooperation with Lucent. They helped us in making this step to becoming a broadband multimedia service provider and they helped us to define the target architecture to enable us to deliver the IP multimedia services. We are on the right track in that program, which means that we are growing in the broadband area. We have gained more than one million broadband DSL customers in the last two years. Next to that we are very aggressive and successful at introducing IP-VPN and Ethernet services and we will make the next step to IP Multimedia services in general.

LUX: As for end users, what does all this mean for them?
Wildeboer: They will be able to rely on KPN's network for high end-to-end performance and assurance for supporting business-critical applications--a network that offers the universal connectivity of the Internet along with the solid performance and security of a private network. And eventually, KPN will be able to supply its customers with IP voice and data services such as high-speed mobile data access, video-on-demand and IP Centrex services.

LUX: How would you characterize the relationship with Lucent?
Wildeboer: Our relation with Lucent is a very old one and we will continue to work with Lucent as a strategic partner for KPN to deal with our business and network challenges.
Lucent and KPN share the same vision on market trends and IP Multimedia Services-based network architecture that will enable KPN to continuously introduce attractive new appealing services to our customers.



3G Momentum Continues Worldwide

Sprint is widely recognized for developing, engineering and deploying state-of-the-art network technologies, including the United States' first nationwide all-digital, fiber-optic network. Now, Lucent and Sprint have announced a contract renewal agreement to enhance Sprint's nationwide PCS wireless network and support the deployment of 3G CDMA2000® 1xEV-DO (Evolution - Data Optimized) technology. EV-DO will enable Sprint to offer its customers average data speeds that are more than 10 times faster than what it currently available on its existing network.

Lucent will provide key elements of its IMS solution, which will enable Sprint to simply and cost-effectively introduce new voice over IP (VoIP) and multimedia services, delivered across mobile, wireline and converged networks. These elements include the Lucent Network Controller (softswitch technology), Lucent Network Gateway, and Lucent Super-Distributed Home Location Register (S-DHLR).

With Lucent's IMS solution, Sprint will be able to deliver converged 'lifestyle' service bundles that can help attract new subscribers and retain existing ones. Lucent Worldwide Services (LWS) will provide installation, integration, and optimization services for Sprint's network upgrade.

High Speed on the Isle of Man

The IMS option also was one of the driving forces of the contract made between Lucent and the UK-based mmO2 group. Besides IMS, the agreement contains the delivery of UMTS- and HSDPA-Technology (High-Speed Downlink Packet Access) to the mmO2 subsidiary Manx Telecom. Supported by the experts of LWS, one of the first high-speed converged networks in the world will be built on the Isle of Man. It will be a commercial UMTS network which integrates mobile and wireline technologies.

The network, based on HSDPA and IMS, will combine high-speed data, mobile, and VoIP services. With IMS, Manx Telecom will be able to offer a lot of attractive multimedia services, both via mobile and wireline networks. After a transitional phase, HSDPA will allow for theoretical throughput rates reaching 14.4 Mbit/s.

Lucent is providing mmO2 with a comprehensive solution including network management and application software. Flexent® OneBTS (Node Bs) base stations, which support HSDPA, the Flexent® Radio Network Controller (RNC), and the UMTS packet core with the Flexent® Serving GPRS Support Node (SGSN) and the Gateway GPRS Support Node (GGSN). Lucent moreover will ensure the availability of HSDPA-enabled terminals for Manx Telecom. The key IMS elements that Manx Telecom will deploy are analogous to the Sprint ones mentioned above.

For more information about HSDPA, please visit www.lucent.com/hsdpa

Cingular: UMTS with Lucent

Another 3G success Lucent has to report on is a 4-year contract with the U.S.-based network provider Cingular Wireless concerning the delivery of UMTS/HSDPA technology and software. These deliveries plus LWS services will support Cingular's nationwide 3G service rollout. Beginning in 2005, the new UMTS/HSDPA network will allow Cingular to offer a wide variety of multimedia services for consumers, such as high-speed downloads of video clips of films, sporting and entertainment events, and advanced multi-player video gaming, and provide its business customers with services such as mobile broadband Internet access. Lucent is not only supplying Cingular with a world-class network, but partnering with them to successfully bring new services to market. Following the deployment, Cingular is expected to have one of the world's largest, most sophisticated UMTS networks.

IMPRINT

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