FITCE Forum

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Note from the 45th Congress in Athens by the Hellenic Group

Another successful FITCE Congress took place in Athens from August 30th to September 2nd. The 45th Congress brought more than 320 professionals from different arenas to discuss interesting issues who touched areas in new telecom technologies, referred to issues in fair competition and ways in achieving good customer relationships among to other interesting topics.

The Congress was opened by a welcome speech from the President of FITCE Hellas Mr Costas Sidiropoulos who among other things also thanked for the good work done by the International Scientific Committee. His talk was followed by a welcome speech from the President of FITCE Europe Mr Georgios Argyropoulos.

During the opening there were presentations from exceptional people of the industrial, governmental and academia sectors. The title of the Congress was "Telecom Wars: the Return of the Profit" aiming to bring to the floor topics on fair competition among telecom operators and profit sharing, issues on whether regulations are needed to achieve it and what it takes in the telecoms business to be at the forefront of the arena.

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Congress delegates at the opening ceremony.

Guest speakers at a coffee break.

Mr Panagis Vourloumis, the CEO of OTE, mentioned for the title of the Congress that the Greek Philosopher, Heracletus, had a saying that War is the father of creation. In telecommunications war means competition and competition means that no excessive profits can be maintained, except for short periods. He also mentioned that taking a risk in business is compulsory. It's not a field for the fainthearted.

Professor John Baras from University of Maryland, presented the technological developments on Broadband Mobile Wireless Infrastructures (BMWI) and explained their expected impact on all aspects of quality of life and work which is equal to that of the PC and Internet.

Mr George Papapavlou from the European Commission presented the necessities of enforcing regulations in achieving fair competition among telecom operators.

The following picture shows a conversation that took place among the guest speakers during a coffee break.

Overall, the quality of the speakers was good which was much appreciated by the delegates. The presentations were given by highly professionals whose paper was either selected by the Scientific Committee or were sponsors of the event. Some very few presentations were invited from the International Community.

Many interesting issues were addressed during the Congress. Focus was on finding new revenue streams, ways of achieving further market developments and ways of cultivating long-term customers and service relationships. Ideas, views, knowledge and practices were exchanged on a great variety of technical, business, commercial, financial, legal, social and other issues. Some presentations were focused on the ways that the fixed operators have now reorganized, potential and returned to a mature battlefield by offering competitive alternatives, in a way to regain their lost ground. Other exciting presentations were concentrated on new broadband services which are a reality

and a necessity for the operators to gain a market advantage. Interesting ones were given on ways of how an operator can make profit through fair competition and by securing his customer base. Interesting topics were presented about the market and the strong confrontations between network operators, service providers and other players.

Mrs Viviane Reding talking on regulations.

The Congress was concluded by a very interesting talk from European Commissioner Mrs Viviane Reding who focused on the necessity of the regulatory framework, on the needs for more competition by bringing more players in the market through the introduction of new services and investments on advanced technologies and infrastructures.

Congress **Awards 2006**

The award for **Best Paper** was given to Doctor Leontios Hadjileontiadis from Greece for his paper "SmartEyes: An Efficient Mobile Phone/Navigator for Blind or Visually Impaired People".

The award for **Best Presenter** was given to Professor Andy Valdar from UK "What's so Important About Convergence".

The Award for the **Best Young Presenter** went to Mrs Eleni Kosta from Belgium "Data Retention Directive: What the Council Cherishes, the Privacy Advocates Reject and the Industry Fears".

Athens from its cultural view

The social events to the Vores Museum and the gala dinner at Hilton Hotel proved also to be a great success. Guests and delegates were taken to the cultural Vores Museum for a lovely view of ancient sculptures and art collections followed by traditional Greek food with nice regional folk dances.

Greek night at Vores Museum

The Gala dinner, the last day, took place next to the swimming pool and was accompanied by soft music and traditional Greek dancing was taken up by many delegates.

Will the Telecom Operators of Today Become the Digital Supermarkets of Tomorrow?

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At present, it is the twin moons of analogue and digital that orbit the world of telecommunications. But time is limited for analogue. Analogue TV stations are soon to be switched off. Once this is done, the underlying technology behind the most popular technology products and services will consist of a common digital building block. There will no longer be a digital analogue divide; only digital will survive. Will customers then expect a single operator to meet all their digital requirements? This paper looks at the digital market, from the migration of TV to digital broadcast to video cameras that now record directly to hard drives. It looks at the digital possibilities of the home of the future; one home storage device to store your pictures, your videos, your programs – and looks at how this will be made possible in the coming years by networks that will be able to carry all traffic types. The benefits to the customer of having multiple services from one supplier will be outlined – already triple play is popular and quadruple play is being offered by some companies. This paper looks at the benefits to the operator of having many services it can offer on a single network. This paper concludes by looking at what an operator will be able to do in this all digital age and whether or not its customers will expect it to provide all their digital requirements.

Keywords – Next Generation Network (NGN), 21CN, analogue, digital, migration, evolution, digital home, convergence.

I. INTRODUCTION

Until recently, one telecommunications product has meant one company or at least one network. There was a time when telecommunications companies provided telephony and this was pretty much all they did; television companies provided television programmes; video hire shops provided films on video. This model has changed in recent times as companies have had to embrace new technologies that have forced them to diversify their products and services. Most notably, telecom companies are no longer providers of voice calls only. The past two decades has seen telecoms companies provide a plethora of data products to add to their traditional voice products. These new data products have in general all involved the building of costly data networks, which have run along side existing

voice networks. This "one network per product" approach has been costly, missing out on the economies of scale that come from utilizing a single resource for multiple purposes. Ubiquitous digital technology is removing the necessity for a single network to support one kind of product. As such, telecommunications operators stand on the verge of morphing into lean, efficient, single network entities that will provide multiple technology business products and services. Voice calls, video, data and mobile will no longer require their own isolated networks but will be able to share network resources. As telecommunications operators begin the process of updating their networks to the next generation of network they need to make the choice of what it is they will become in this digital age. They can continue to provide their voice calls but what else will they need to do to for their customers to stay in business? Dial access and broadband internet access have revolutionized customer's communications horizons. Is the way forward to provide a network that will accommodate tomorrow's products and services, providing the supermarket shelves on which other companies will bring their products and services for sale? Digital technology is providing the catalyst for change; will telecommunications companies become the digital supermarkets of tomorrow?

II. CHANGE

Change will include old products and services using new technology. Over time, Voice over IP (VoIP) will increasingly replace circuit switched communications. This will result in a change to the business models and strategies of telecommunications operators. In the last 10 years international traffic into and out of the United States has quadrupled, whilst the revenues associated have fallen from $11 billion to $8 billion – a proportional drop in revenue of 80 per cent in 10 years.

Change will also occur in the products and services that an operator may offer. Exactly what the products and services are that customers will want in the future cannot be known entirely in advance. However, there are certain characteristics that tomorrow's products and services will have. For example, there is a clear distinction between real time and non real time services. Telephony or voice calls will clearly require a real time capability whereas a file transfer will generally be a non real time service. Using the web is not exactly real time but does have a greater time requirement than file transfer. Time constraints will manifest themselves as Quality of Service (QoS) parameters that the network will have to support [1], [2]. Clearly products and services that will arrive in the near term will require differing QoS levels.

Another characteristic that will help differentiate future products and services is bandwidth. Some products and services will be bandwidth intensive, video calls for example whereas voice calls will require relatively little bandwidth but will make massive demands on (QoS) due to the extreme sensitivity of the human ear. Thus as products and services cannot be known in advance of their creation, the characteristics required such as real time requirements and bandwidth to name but two, provide a basis on which to define the change in the way networks operate so that they will be capable of supporting future products and services. The characteristics that will define the products and services of the future are more varied and more difficult to control in the networks operators will need to build.

Customer expectations will also change. It is likely that customers will expect to use Home hubs, which will enable households to manage PCs, laptops, entertainment centers, domestic appliances and home security systems on a home network – fixed or wireless [3]. Customers are likely to expect to be able to access shared directories from different access devices. One example might be sharing a personal phone list with a computer, fixed phone, mobile phone, personal organizer or other device. As well as operators providing large bandwidth capabilities, Customers may expect flexibility of bandwidth so that bandwidth can be boosted when required. Typically this would be done to accommodate the requirements of a particular application. For example, surfing the web may require a fairly low bandwidth but if a web page provides some form of multimedia then the customer may want to boost their bandwidth while they stream a video clip.

Security is a major issue with computing systems and customers will want to feel secure in their networking. Identity fraud is a real issue in current times so innovations ensuring customers can securely sign up for on line services, for example using biometrics, would be welcome by customers. Wireless video streaming, enabling customers to watch live and recorded TV through their mobile phone and public Wi-Fi access points, is already becoming a reality and will no doubt become commonplace. The "Martini" concept of communications will become a reality in the Next Generation Network world. Customers will be able to access their digital products and services at any time, in whichever place they happen to find themselves and on any device they happen to have with them.

The expectations of customers have increased considerably in recent years. Internet on the move is taken for granted now for example. Customers know they can send an SMS from a PC to a mobile phone or even to a fixed line. They already bundle communications devices into one piece of equipment and expect all communications devices to be able to talk to each other. Customers have come to expect communications to be easy regardless of what communications devices are being used. Ubiquity of devices that can all communicate with each other is a given.

One product or service that looks likely to enter the world of telecommunications and accelerate the move to anytime, anywhere any medium telecommunications, and possibly the most dramatic change that is taking place in the coming years will be that of switching off the analogue television broadcasts in favor of digital broadcasts. Already, digital television has started rolling out in many countries so that the changeover from analogue to digital can be made a smooth transition rather than happen overnight.

Figure 1 provides approximate switch off dates for analogue television in a number of countries worldwide. Some countries are already switching off their analogue broadcasts in some of their regions whereas others have yet to begin. For example, various regions in Germany, Munich, Nuremberg and South Bavaria switched off their analogue broadcasts on 31st August 2005. The rest of Germany is set to complete by 2010. Finland is planning a unilateral switch off on the 31st August 2007. Regardless of where countries currently are, by 2012 pretty much all analogue television broadcasting will have disappeared.

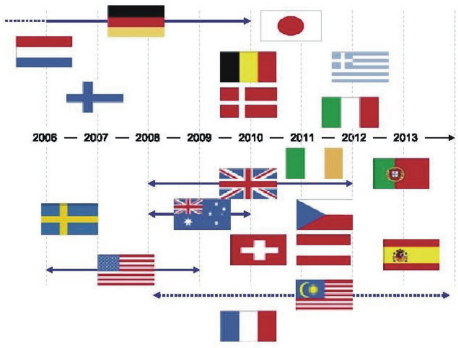

Fig. 1. Approximate analogue TV switch off.

The conversion to digital standards means television is now something telecommunications companies can offer. At the time of writing, one third of men questioned said they would watch the world cup on their PC and mobile phone as well as on conventional television [4].

So there is a trend towards convergence: single networks on which multiple products and services with differing characteristics can be supported. This requirement is not

abstract, as the example of digital television and VoIP shows, there is a real opportunity for telecommunications operators to start to diversify their products and services portfolios into areas that have hitherto been technologically off limits.

III. CONVERGENCE

Convergence is commonly understood to refer to aspects of combining mobile and fixed networks. However, it has come to be a more general term that refers to aspects of combining not only fixed and mobile networks but also electronic equipment, electronic media services and IT.

Not so long ago, records made of vinyl and cassette tapes were the way that songs were distributed to the customer. Tape was adopted when video cameras arrived so both audio and video utilized a common storage medium. Tape standards evolved and became digital – DAC for example; CDs came to replace tapes and then evolved into DVDs that stored audio and video. As a digital product, cameras soon connected to PCs, DVDs releasing their contents to hard drives. Now video cameras have the capability to record directly to a hard drive. These cameras have a hard drive and a CPU making the question "when is a PC not a PC?" difficult to answer.

Companies too are converging to offer services based on the convergence of voice, mobility, video, data and content. Companies that offered fixed line telephony now have their own or have partnered with mobile companies to provide various levels of fixed and mobile convergence. BT's Fusion is a good example of a service based on the convergence of fixed and mobile voice that has already been developed and launched. In this service a handset device will make calls either, using a fixed line when in its home area, or using a mobile network when roaming. The user doesn't choose whether the device should make a fixed or mobile call. The device itself chooses the most appropriate telecommunications medium.

Companies are also coming together to offer data and video services in addition to fixed and mobile telephony. However, these converged products, still use multiple technologies and one or more technology companies, thus convergence in this case refers more to the single bill customers receive. Such products are available to customers in the guise of triple play products or sometimes quadruple play where the mobile element of a product is considered an extra "play".

True convergence is gaining momentum. The boundaries between mobile and fixed-line services; between voice, data and video; between computing and telecoms; and between devices are becoming increasingly blurred. But convergence needs an underlying infrastructure to deliver and support it.

IV. MOVING FORWARD

Figure 2 shows a myriad of digital products that have traditionally required a myriad of different hardware devices for use

Fig. 2. Digital clutter.

and storage. Figure 3 shows a potential future home environment which is digitally clutter free: convergence in technology and devices enabling multiple media types to be stored, played and viewed on a single or small subset of devices. Already there are

Fig. 3. Digitally minimalist.

products on the market into which you can plug broadband, satellite, cable, DVD player and these services are networked around the home. Homes have been built with CAT5e/CAT6 networking capabilities and now the popularity of wireless networks enable networking in homes already built [5].

Already there are packages that let you watch digital TV or send emails on your TV set. Flat screen technology has evolved and screens in excess of 100" are set to become commonplace. DSL max speeds of 8M are being increased with ADSL2+ to 18–24 Mbs^{-1}. VDSL (with a theoretical maximum of 250 Mbs^{-1}) and FTTC/H offer even higher speeds. People will find uses for these bandwidths and no doubt will require ever higher bandwidths. There are visions of Artificial Intelligent Agents that will select information we will be interested in and bringing it into our environment be that in the home or on the move.

The reason all of this will be possible will be a digital approach to information that will be accessible on a myriad of devices that all talk to a single network. Such a network will complement developments in customer electronics, home entertainment and broadband content creation. The network will be able to rapidly deploy the newest communications products and services that will exploit an unprecedented level of technical sophistication. Customers will have full control over their services, which they will be able to customize, personalize and change in real time.

But how do you put together a network that will do all these things and a plethora of others that have not yet been thought of. Operators need a future-proof, flexible, intelligent network to enable them to deliver communications services that will meet their customers' requirements in the coming decades. In addition, while deploying their Next Generation Network, operators will also need to continue to deliver existing services at the same or better quality as that which customers receive today meaning operators will need to continue to maintain their legacy networks and services as they transition to their NGN.

The incumbent network operators have a number of decisions to make. How will they take part in this next generation of products and services? What will their Next Generation Network look like? What products and services will is support? There is of course always the option to do nothing and see what happens. But this would be a dangerous strategy. Competition will no longer only come from a handful of other similar telecoms companies but from telecoms companies that have traditionally operated in different markets. Mobile and fixed will be pitted against each other; cable companies, internet service providers, and even IT companies are all well positioned muscle in on traditional telecommunications territory. Doing nothing has the unenviable possibility of reducing incumbents to bit carriers. Doing nothing is not an option for niche carriers either. For example, a carrier that provides VoIP as a niche service will find its product being sold by NGN operators. VoIP just becomes another application the NGN supports.

But the up side for incumbents and niche players alike is that they are well positioned to play the lead role in the NGN future that is already happening in the communications world; to diversify and increase revenues.

Indeed, the signs are that there is a great demand for new communications services. In characteristics that the network will need to the UK, broadband has become the fastest growing communications service of all time. Potential revenues for new services and products are high. In order for companies to grow, the will need to embrace these new products and services. Only in this way will they remain competitive and stay in business.

To meet customer expectations, NGNs must provide a simple, seamless, integrated communications platform, powerful enough to meet future needs. Customers should be empowered by NGNs, giving them choice, flexibility, control allowing them to operate without restriction in the anytime, anyplace, any device NGN world.

V. DIGITAL OPERATORS

Operators are on the verge of updating their networks to be flexible enough to cope with the demands customers will make on their networks. To help do this, aspects of Next Generation Networks are currently being standardized. The ITU provides the following definition of an NGN [6]:

"A Next Generation Network (NGN) is a packet-based network able to provide services including Telecommunication Services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. It offers unrestricted access by users to different service providers. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users".

There is currently no single standard that defines an NGN network explicitly in the same way as there are standards that define, say, a 3G mobile network [7]. Standards are in the process of being put together [8]. Thus an operator wishing to move to an NGN encounters a major issue in defining exactly what it is that constitutes an NGN. BT, like numerous operators is involved in creating national and international telecoms standards. BT is active in more than 50 standards bodies and fora. Network interoperability will be a key output of the Standards work. The adoption of common standards should ensure calls and information passes smoothly and seamlessly between cable, mobile and fixed networks, and between the NGN networks around the globe. Economies of scale also come from Global standards. Standards allow equipment manufacturers to address the global market place thereby allowing the industry and end user customers to benefit from the cost advantages of economies of scale. "Off-the-shelf" equipment offers the added benefit of the reduced cost and risk of technology introduction and on-going maintenance.

For those operators whose NGN plans pre-date the standards, a necessary prerequisite for them is to identify a number of support and then work these through the standards with other interested parties: other service providers, manufacturers and regulators. At the highest level, these characteristics include things such as flexibility, efficiency, reliability, future proofing, QoS and security.

In terms of flexibility, an NGN will need to flex its capacity and connectivity to support the requirements of different applications and users on its network. Use of IP in an NGN greatly enhances the network's flexibility – no longer will circuit switching dictate an overlay network for a new product. IP can flex to accommodate those new products. It is through IP that a single network will be able to support real and non real time services simultaneously for different service types: voice, data, internet, video. In the IP world, the applications running on the network are the services – so voice becomes just another application, possibly a very minor application when compared with other services on the network and it shares management processes with all the other applications. In effect, the transport layer is separated from the control or signaling layer.

Efficiencies will be inherent in NGN networks by dint of the fundamental concept of sharing hardware and software resources between all applications. This common sense approach to network design will provide efficiencies in all areas not least of all economies of scale which will reduce the cost of providing a product or service to the end customer.

As operators move to new platforms, providing the same quality of service using a new network for an existing service becomes a major issue. In general, a customer, once they are used to a certain quality level for a service, will not be happy to pay the same amount for what is meant to be an equivalent service, but is of lower quality. This will be a particular issue with telephony. The current circuit switched approach to providing voice calls is of a very high quality. Moving this high quality real time service to an IP platform needs to be done with care. The perception of customers using voice services on the IP platform needs to be comparable with that of the same service on the circuit switched platform. Access control mechanisms or Multi Protocol Label Switching (MPLS) technology can be used to prioritize network access requests or services, i.e., a real time service like voice would have a higher access priority and/or service priority than non real time services [9], [10]. This coupled with a well dimensioned network design should lead to the situation where the customer isn't aware that their voice calls are made on an NGN platform rather than the existing circuit switched.

Reliability and resilience issues will need to be resolved to guarantee the new network will meet any existing Service Level Agreements (SLAs) an operator currently has and that SLAs for new services are acceptable to customers. An NGN will provide the opportunity to improve resilience by virtue of the fact that one IP-based network itself will be physically less complex than the sum of its circuit switched predecessors. This in turn will reduce the need for complex service management and this simplicity should manifest itself as a more reliable network.

Trying, as best as is possible, to future proof the network is important given the costs and complexity of moving to an NGN. Once an operator has deployed their NGN, the last thing they want to do is to have to change large elements within it shortly after rollout. Some changes will be inevitable, such is the unpredictable world we live in, however, with a little forethought, clever design and consultation within industry, the delta of change can be forced to a minimum.

Of course for any network to appeal to a customer society, it will need to be secure. An NGN network will need to be able to withstand attack from viruses or hackers as well as being able to resist physical attack. IP helps on both fronts: allowing parts of networks to be completely separate from external sources and re-routing traffic in the event of a site being taken down for any reason. From a network management perspective, keeping an eye on the network to ensure correct operation will be done via the model or framework of standards know as Next Generation Operational Support Systems (NGOSS) [11], [12]. This off the shelf approach to systems will reduce the complexity and costs traditionally associated with OSS, again in part through adopting the simplicity of design philosophy of NGN.

Many operators are already moving forward with their NGN plans. BT's own inter-

pretation of an NGN is referred to as the Twenty First Century Network or 21CN [13], [14], [15]. BT's 21CN programme is transforming its many legacy networks into a simpler, but more powerful, multi-service network, which will be the platform for a full portfolio of new services, as well as continuing to support traditional services.

A next generation network infrastructure is all about supporting the next generation of services and revenues for an operator so that it can maintain profitability in an ever competitive digital market place. One of the aims of an NGN network will be to provide an end-to-end IP-based network. In so doing an NGN will be able to consolidate an operator's complex network and systems infrastructure to ensure that the delivery of the next generation of converged services is faster, more efficient and more cost-effective than the traditional one network per service approach.

Rolling out an NGN will be difficult for an operator on a technical, investment and operational level. In terms of technology, new architectures and the skills to build and maintain those architectures need to be resourced. Financially the initial investment in an NGN will be huge though in the longer term the costs saving will make the move to a new platform make financial sense. However, an initial investment for an operator of many hundreds of millions if not billions of euros will be required. On an operational level working with so many stakeholders on a project, employees, customers, strategic partners, governments and vendors, will make the going tough. Operators will need to keep their eye on the final goal of increased revenues and growth to get them through.

21CN is BT's next generation network which it is building in the UK and throughout the markets it serves. It is an advanced broadband network based on intelligent systems, Internet Protocol (IP), Session Initiation Protocol (SIP), Ethernet and MPLS. IP is key to 21CN because it has the potential to act as a common transport protocol for all types of communication and applications; SIP allows the service provider to control the communications activity to meet a customer's requirements and MPLS enables the efficient designation and routing of IP traffic flows.

The shape or topology of 21CN has been optimized using complex algorithms to select nodes in the network that will lead to a least cost network. This economic analysis takes in information about cost of equipment at nodes in the network and costs of connecting nodes together with correctly sized links (bandwidth) to identify aggregation points. This approach results in network designs that have fewer main switching/routing nodes and, as a rule of thumb, longer transmission links between nodes. The physical simplicity and the reduction in the number of operating facilities will have the added benefit of enhancing reliability.

Figure 4 represents BT's existing UK network comprising of numerous discrete but related network platforms, each designed to support a particular service. This existing network comprising of multiple

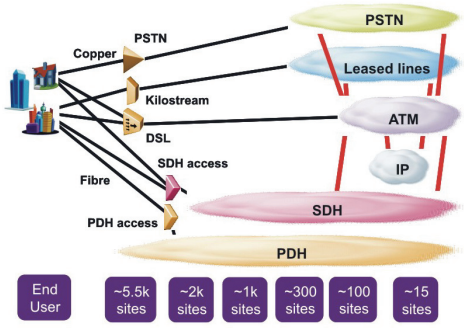

Fig. 4. Multiple stovepipe networks.

networks reflects the many waves of telecommunications technology that have arrived over the years. Rather than incorporate a new technology into an existing network, it was usually easier to build a new network and loosely connect it into existing networks.

For many operators, their existing network comprises tens of thousands of network elements, including switches, routers, concentrators, and transmission terminals. Maintaining this type of network, with the associated services, support and training it requires, is expensive and a significant part of an operator's operating costs.

Figure 5 represents the simplified network architecture that will result from BT moving to an NGN. As an end-to-end Internet Protocol (IP)-based network, NGN will

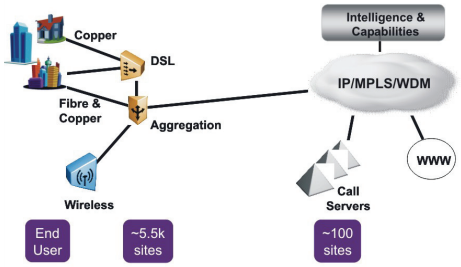

Fig. 5. Simplified single NGN.

consolidate an BT's separate network platforms into one. It will replace the complex network and systems infrastructure with a physically simpler and more reliable network, to ensure the delivery of the next generation of converged services faster, more efficiently and more cost-effectively than ever before.

In the UK, 21CN transformation involves gargantuan investment, logistical and regulatory challenges. Delivering 21CNrequires BT to replace the equipment infrastructure in their telephone exchanges across the country over a five year period. BT needs to migrate all their end-user customers, and those customers of other services providers who use the BT national infrastructure, over the same period. That means migrating some 30 million lines, about 20 million customer site connections, onto the new infrastructure and new systems, and to deliver products and services to work efficiently and effectively over the new network. All this while at the same time making sure those customers with non NGN networks are still supported.

VI. DIGITAL PROS AND CONS

One of the benefits of being able to connect into a network regardless of where you are is that you can use time more effectively. Already, trains are full of busy executives responding to emails, organizing their business day or downloading distractions from the internet. Of course, being always connected to the network is no longer a benefit when you want to leave the office behind. For those who are able to organize their days effectively, an extra means by which they can plan their day will no doubt be useful. For those who are a little less organized and unable to hit the off button, their days may prove to be even more unpredictable and demanding.

Networks are key to businesses and as businesses evolve their communications requirements will evolve. With a flexible IP based NGN network all the future communications needs of companies will potentially be easier to provide and be provided in a timely manner.

For operators diversifying their product and services portfolios an NGN offers the opportunity to grow moving away from the kinds of services whose revenues are now decreasing.

Other companies will be able to partner with NGN operators to bring their own products to the operator's NGN. The ability to offer products almost literally at everyone's doorstep – the end points of networks are, after all, to be found in the home or office – will be of great value to operators wishing to enter new markets. Clearly many companies may offer the same or similar

services, so the network connection in the home or office, itself becomes an outlet for products and services: almost like a shelf in a supermarket.

Some operators may not have the finances to invest in their own NGN. These operators will be able to partner with NGN operators and use their infrastructure proving an extra revenue stream for the NGN operator and providing the smaller operator with a means of providing NGN services.

An NGN operator can offer capabilities that make it easier for third party service providers to offer their own services. For example they could re-use billing and location capabilities of an NGN network so that they need only concentrate on what is new about a service, i.e., re-use standard service elements.

VII. CONCLUSION

Operators are looking to move away from a one network – one service business model. NGN networks are providing the necessary conditions for change. An NGN offers a means by which multiple services or applications can utilize a common network thus reducing the cost of producing applications through economies of scale and the reduction in overhead costs that result from maintaining multiple networks. A more efficient networking approach for operators has been defined in principle and is currently being defined in standards bodies as an NGN. This NGN will offer communications anytime, anyplace via any device meaning customers can benefit from the always available nature of an NGN.

Technologies, networks and devices are converging to produce products and services that span hitherto autonomous telecommunications services: voice, data, video will be available on a single IP network and accessed on PCs, Phones, Personal Communicators and other devices. The move to digital technology has made this possible as the fundamental building block of all services and products will be digital technology which slots nicely into the IP protocol that will run on NGNs.

NGNs mean that telecom operators can diversify their product portfolios: even to the point that they may become deliverers of film and TV programmes. Operators will need to make serious strategic decisions for their future NGN given the myriad of different services customer will want – and in many cases yet to be thought of. In order to move forward with NGN plans, operators need to define a general set of characteristics that they wish to support with their NGN or wait for standards to mature.

The diversity of applications that operators will be able to support will mean that they may not be the ones to develop the applications. Third parties could be the developers and NGN operators would be the means of distributing those products and services. This could lead to multiple services that do the same thing on a single network; services would be differentiable by cost, feature sets or some other attribute. In this way, the network socket in the home becomes the sales outlet for the products and services on the network. In the same way that multiple products that do the same thing appear on supermarket shelves, so to products and services on the network could compete on the network "shelves". This approach to service provision could lead to operators of the future becoming the digital supermarkets of tomorrow.

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Service Delivery Framework: A Vehicle to Reduce Risk for Carriers and Suppliers

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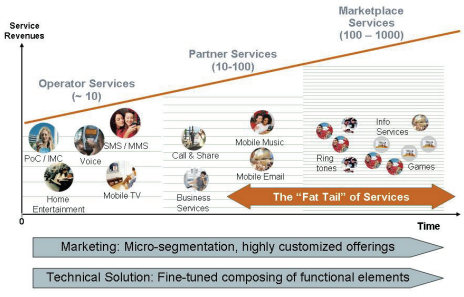
Applications are a high risky business. A service delivery framework is able to reduce this risk dramatically.

Keywords – Applications, SDP, Service Delivery Framework (SDF).

I. INTRODUCTION

Telecommunication and broadcast networks have been designed for a single application, i.e., Telex, Gentex, Telephony and Television. When telephony got mobile, networks different to fixed networks have been provided to optimize the application. As technology was analog, there were good reasons to do so.

As services moved to digital a basic IT-law was also applicable for the TELCO world: "Moore's law". The result was an exponential increase in performance/price ratio for "IT"-components. So IT-technology took over step by step all – up to now – segment specific technology. Switches were controlled by computers, IP and Ethernet replaced ATM, VoIP displaced TDM-voice and – much more essential – was only one application on top of a data network.



The old "killer application" "telephony" which means communicating between and leaving message to human beings is as old as the man kind. Only the technology changed.

As long as I worked in telecommunications the industry segment looked for a new "killer application". Video telephony was often thought as a candidate but finally none was found. New applications tend to be much more volatile, fashion and life style dependent. They may appear and disappear in short times – and they depend on each other: may be "killer bundles" are the answer rather than killer applications.

All that makes the application business a highly risky business. Like the weather, it is unpredictable over a longer timeframe and needs much more flexibility and adaptability than single service networks can offer.

II. SDF DEFINITION

A. Technical Structure

Application development moves from stove pipe applications towards SDF-based applications [1] . Main drivers are state-of-the-art software design and SOA principles. The common expectation is that SOA is already the dominant form for building business applications (e.g., Gartner) and that it will reduce integration cost and achieve higher interoperability by providing:

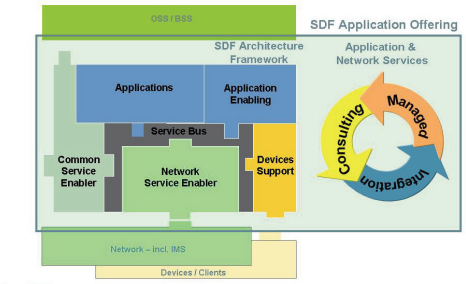
- Quick and easy system integration.
- Integration into OSS/BSS landscape often called NGOSS.
- Platform independence.
- Plug and play of new components and services.
- Service orchestration instead of programming new services.

The main benefit of SOA is to provide an easier and more efficient integration of applications on the business layer.

An SDF consists of Technical Domains and Service Domains.

The technical domains are as follows:

- Application Domain: generating revenues for carriers including consumer services and enterprise services.
- Application enabling domain: tooling and infrastructure to create, deploy and execute applications.
- Common service enablers: keep services and applications independent from network functionalities and provide interfaces to common functions such as subscriber self service and OSS/BSS.
- Service Bus: logical communication within SDF.
- Device Support: functions to execute services on any device and allow carrier managed devices.
- Network Service Enabler: provides networks services like presence and location towards the SDF.



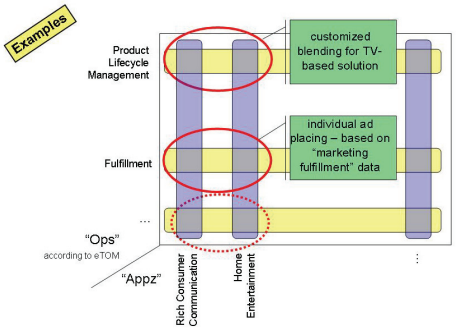
The Service Domains are as follows:

- Analyze and Design.
- Integrate and deploy.
- Life Cycle Management.

B. Business Structure

Unlike classical telephone networks an SDF is no standardized product but differs mainly driven by the business applications of the carriers. On the top level you could differentiate between:

- NetCo SDF: providing physical and logical access towards the SDF, allow to host ISP and ASP and provide the wholesale business model.
- ServeCo SDF: providing single or bundled services mainly as retail business model.

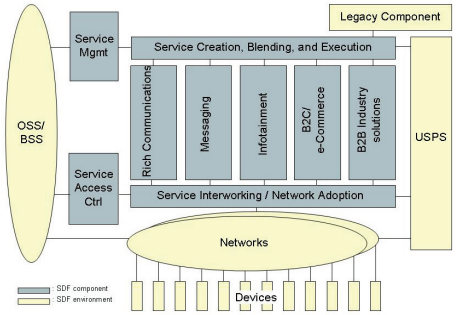


In detail, all applications have to be mapped against all business processes of the carrier. The diagram shows an example: Two applications are mapped versus three process parts.

C. Technical Components

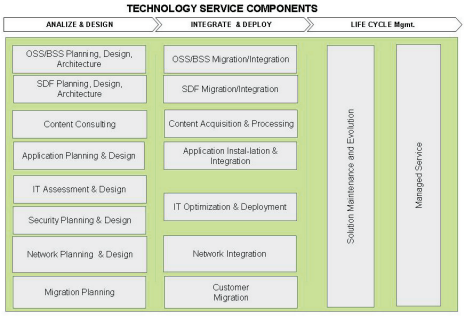
Main target of the technical components is to focus development effort on revenue generating applications. Therefore the SDF has to provide an environment to hide the complexity as much as possible:

- Towards OSS/BSS two interfaces have to be provided: Service Management, e.g., allows for mediation and billing whereas service access control realizes functions like single sign on and access to subscriber self service portals.
- Service interworking and network adaptation allow the easy adaptation of services for different networks and therefore are essential for "seamless services".
- Service creation and execution provide an environment to facilitate new services for suppliers, carriers and third parties.
- The Universal Subscriber Profile Store (USPS) is not part of the SDF. It is an example for the separation of function and data in an SDF environment which is essential to improve flexibility and multi vendor capability.
- During the migration phase or even longer legacy components will play a major role. Key is to freeze legacy as much as possible and provide small and stable interfaces to SDF.



D. Service Components

An overview of service components is shown in the following diagram:



Solution Management and evolution is well known from stove pipe application business. The other service components especially in the domains of "analyze and design" and "integrate and deploy" are better known from the IT business than from the TELCO business. In the IT industry these services have been paid for separately from the products for a long term and now will also be in the TELCO industry.

Managed services are the enabler for the new business models. Managed services where the supplier owns the asset are known as ASP business models. White label ASP are, e.g., handling the ring tone business in Germany, own label ASP, e.g., Google are part of carrier portals. The ASP business model will most likely arise. It is ideal for operators and suppliers to share the risk. The operator can start a new application without major investment; the supplier gets immediate feedback about the usage of the solution. Especially when the applications are driven by fashion and lifestyle weekly or even daily adaptation of the application and content may be required.

III. SDF MOTIVATION FOR THE CARRIER

The following diagram shows the motivation for the carrier to introduce SDF:

- Primary focus in all discussions is the introduction of new services and application. All market participants agree that this is really the final goal. Nevertheless, the introduction of new services costs money, e.g., for the necessary deployment of the service equipment. If the carrier wants to save this money he is able to use managed services or the white label ASP business model. But he can't avoid the complete investment, e.g., marketing cost. So, EBIT generation follows revenue generation with some delay (typical hockey stick).
- Classical application infrastructure like IN may either need capacity improvement or reach end of life. In both cases carriers are forced to introduce new service platforms. Most of them use the platform change also for a platform functionality change. They require SDF compatible platforms and the migration of existing services. What they immediately get are OPEX savings and the flexibility to create new services faster and with less effort. OPEX savings immediately produce EBIT.
- The introduction of SDF compliant platforms may also have the potential to produce an innovative image for the carrier. Stock markets often honor this image providing a better sales multiple.

As a summary, service delivery frameworks will generate value for the customer providing short term EBIT by OPEX saving, long term EBIT by revenue generation and market capitalization by innovative image.

IV. SDF MOTIVATION FOR THE SUPPLIER

An SDF offers the suppliers different business models:

- Supplier of HW/SW components of applications: Business driver is the economy of scale of the component, e.g., Open scape, Myrio, ...
- Provider of a single application: Business driver is the economy of speed, marketing is the key enabler.
- Integrator for a dedicated service delivery platform, e.g., voice and messaging, entertainment, … : Business drivers are the application class specific enablers, e.g., caching, streaming, … for video, ...
- Integrator for the complete SDF.
- ASP.

When we zoom into the integration of a complete service delivery framework we can find three areas of business drivers:

- Integration of the applications into the existing network infrastructure: key driver in this area is real time. Companies which are used to deal with real time are best suited for this part of the integration.
- Integration of the application into OSS/BSS: key driver is business process re-engineering. Finally those companies will win who are able to completely automate the business processes of a carrier.
- Separation of application and data: To create flexibility and multi vendor capability, the target is to make applications completely stateless and databases completely application free. This decouples the logic of different applications from each other and allows the simple integration of applications of different vendors without high reliability platforms which are currently very costly.

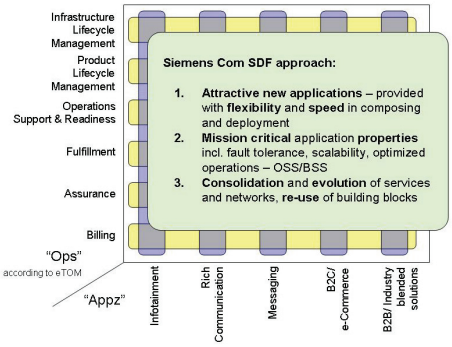
When we zoom into the ASP model, we find that this is the ideal model for risk sharing. Classical applications like telephony are driven by economy of scale and can be best handled in old style business models (carrier – supplier). New applications like entertainment are often driven by economy of speed.

As an example from a different industry we can find fashion labels which own the complete value chain from development, production to end user selling. They are able to deliver within 12 workdays after start of development and can therefore adapt trends in the markets. Astonishingly, these labels are able to manufacture there cloths in Europe.

If we transfer this learning into our industry we see that the feedback loop between the provider of an application and the consumer of an application may not be more than two weeks. This does not work in the classical business model of carrier and supplier. The ASP business model has the following advantage:

- For carriers it minimizes risk by reducing the investment necessary for a new application.
- For the ASP it reduces the risk by introducing the shortest feedback loop ever possible.

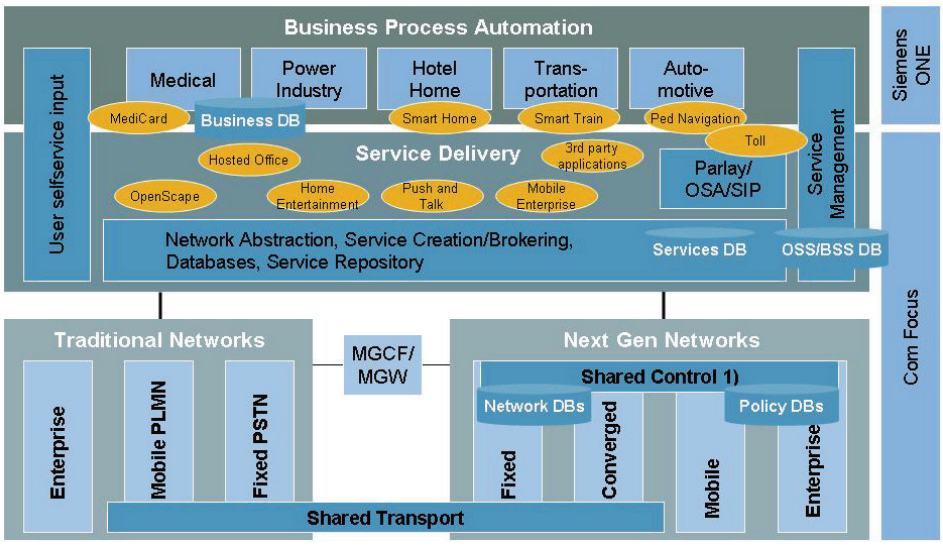
Siemens Com addresses three target areas as shown in the diagram below:



Finally a Service Delivery Framework has the ability to influence a major part of the electrical and electronical industry. Industry segment solutions will use more and more components from SDFs to speed up their industry specific development.

Siemens is best suited to combine the industry world with its target of business process automation with the communication world of making everything "networked".

The diagram below shows the combined approach of Siemens ONE and Siemens Com:



V. SUMMARY

A service delivery framework is a vehicle to reduce risk for carriers and suppliers using "IT-like" components – also called COTS (components off the shelf) – to provide a framework which can be easily adapted to changing market needs using business models of the IT-industry, e.g., value added services like "consult, design, integrate, …"

- A service delivery frameworks allow fast and cost effective provisioning of applications. Innovation cycles of the network and of different applications will be decoupled. Different applications of the same kind may be bundled and be able to share resources.
- An SDF facilitates the linking between the application itself and the carrier business processes. Charging, mediation and billing are the prerequisites for application business. Network abstraction facilitates seamless services.
- Components may be delivered by several suppliers or open source based on an industry architecture. Key is system integration.
- The separation of data and applications facilitates the integration of applications of different vendors into one service delivery framework.
- Centralized service access, e.g., subscriber self service portals allow the users to adapt their applications to their specific needs.
- Finally all processes have to be automated to reduce OPEX and increase quality and finally user confidence.

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Assessing the WiMAX Global Market

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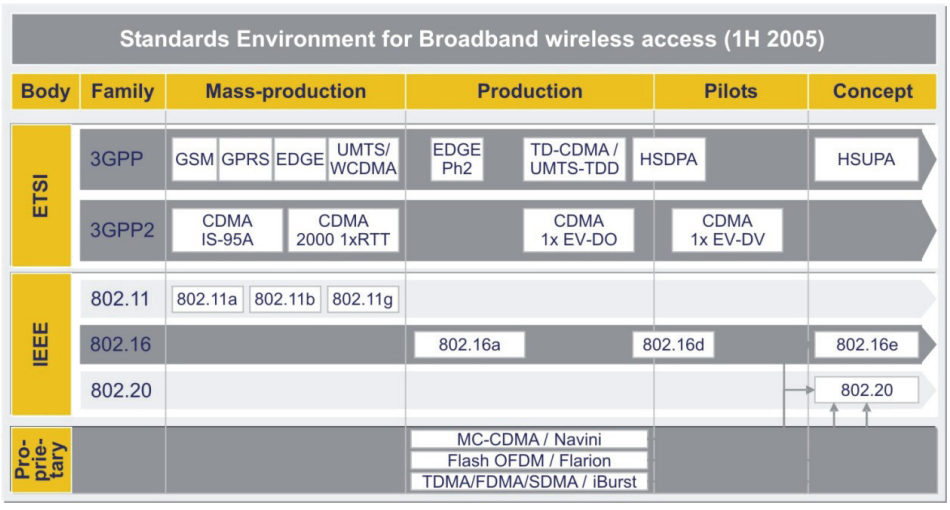
The impressive growth in Broadband over the last several years, driven by evolving applications and continuous technology evolution in fixed and mobile data with decline in Broadband access prices, forces competition between infrastructure providers to leverage the growing Broadband customer base. New technologies like Broadband Wireless Access (BWA) deliver low-cost products that provide high-speed data rates and allows end-users to have freedom of movement and mobility. Therefore established BWA technologies provide attractive opportunities with innovative business models within the huge broadband market.

I. THE WIRELESS BROADBAND ACCESS MARKET

Although the broadband data market segment has been rather anemic for the past couple decades, declining verage revenue per user has caused carriers to look at wireless broadband data as a means to drive revenue growth. While growth of low-bandwidth applications such as downloading ring tones and SMS are experiencing sharp growth, the growth of broadband data applications such as email and downloading/uploading files with a laptop computer or PDA has been slow. Primary inhibitors of portable broadband services have included service price, slow data speed and spotty coverage. Early Wide Area Network (WAN) Technologies such as General Packet Radio Service (GPRS) offered average throughput speeds of 10 Kbps, which was far too slow for user satisfaction. In 2003, carriers began deploying services such as Enhanced Data rates for Global Evolution (EDGE), which delivers average speeds of 100–130 Kbps and bursty traffic up to 200 Kbps. Code Division Multiple Access (CDMA) technologies such as 1xEVDO provide average speeds of ~300–400 Kbps with bursts up to 700 Kbps. Recent research activities indicate that laptop computers are becoming the access devices of choice for broadband wireless data. Personal productivity applications such as email, address books, calendars, and internet browsers, are among the top applications used. While many service providers and operators may be somewhat familiar with the previously mentioned 2.5G services, they are now hearing about newer 3G technologies such as UMTS and HSDPA, and other technologies such as WiMAX (IEEE 802.16e), which offer substantial improvements in data rate and spectral efficiency. This paper focuses on the technical differences between these technologies by comparing the differences between the modulation techniques used in CDMA and OFDMA.

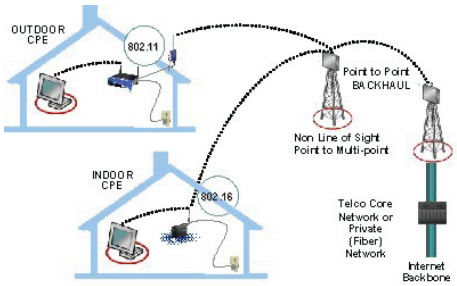
Broadband wireless will revolutionize people's lives by enabling a high-speed connection directly to the information they need, whenever and wherever they need it. Broadband data services, such as delivery of rich Internet Protocol and media content, are an increasingly important component of the services and revenue of network operators, who want to expand the reach of their broadband data networks without expensive construction and infrastructure costs. High-speed broadband wireless data overlays to voice network are just emerging, as service providers respond to these consumer and enterprise demands for rich media, mobile applications and services.



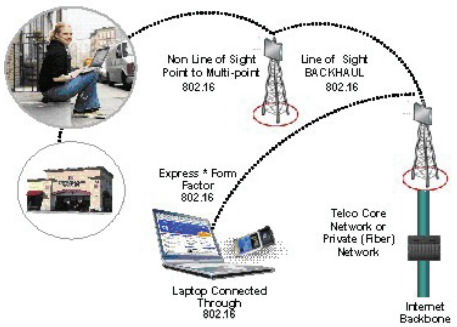
II. WiMAX COULD REVOLUTION THE BWA MARKET

Worldwide Interoperability for Microwave Access (WiMAX) is poised to become a key technical underpinning of fixed, portable and mobile data networks. WiMAX is an implementation of the emerging IEEE 802.16 standard that uses Orthogonal Frequency Division Multiplexing (OFDM) for optimization of wireless data services. OFDM technology uses “sub-carrier optimization”, assigning small sub-carriers (kHz) to users based on radio frequency conditions. This enhanced spectral efficiency is a great benefit to OFDM networks and makes them very well suited to high-speed data connections for both fixed and mobile users. Systems based on the emerging IEEE 802.16 standards are the only standardized OFDM-based Wireless Wide Area Networks (WWAN) infrastructure platforms today. Service providers will operate WiMAX on licensed and unlicensed frequencies. The technology enables long-distance wireless connections with speeds up to 75 megabits per second. (However, network planning

assumes a WiMAX base station installation will cover the same area as cellular base stations do today.) Wireless WANs based on WiMAX technology cover a much greater distance than Wireless Local Area Networks (WLAN), connecting buildings to one another over a broad geographic area. WiMAX can be used for a number of applications, including "last-mile" broadband connections, hotspot and cellular backhaul, and high-speed enterprise connectivity for businesses. WiMAX can be deployed in three phases: the first phase of WiMAX technology (based on IEEE 802.16-2004) will provide fixed wireless connections via outdoor antennas since first half of 2005. Outdoor fixed wireless can be used for high-throughput enterprise connections (T1/E1 class services), hotspot and cellular network backhaul, and premium residential services.



In the second half of 2005, WiMAX will be available for indoor installation, with smaller antennas similar to 802.11-based WLAN access points today. In this fixed indoor model, WiMAX will be available for use in wide consumer residential broadband deployments, as these devices become "user installable", lowering installation costs for carriers. By 2006, technology based on the IEEE 802.16e standards will be integrated into portable computers to support movement between WiMAX service areas. This allows for portable and mobile applications



and services. In the future, WiMAX capabilities will even be integrated into mobile handsets. There is significant interest in the advancement of WiMAX into the mobile space with the IEEE 802.16e specifications and profiles. A combination of the superior broadband wireless capabilities of WiMAX along with mobility and other improvements holds the promise of significant change in the way broadband is used by consumers. Prior to the availability of WiMAX solutions, consumers have had to choose between mobility and broadband, with mobility significantly degrading the quality of their data service. Carriers have been sharply divided into two groups: true broadband providers offering fixed-location services, and mobile providers offering sub-par data performance.

In contrast with other standards that are attempting to provide a true convergence of mobility and broadband, mobile WiMAX will leverage superior technology, industry, and political advantages.

- OFDMA is continuing to remain in the forefront of modulation schemes for future advancements in wireless access technology and the 802.16e Medium Access Controller (MAC) provides vastly superior efficiency.
- From the very beginning, mobile WiMAX specification will take advantage of advancements in IP networking to create an open architecture for mobile data networks, significantly reducing complexity and cost.
- Superior transparency to applications in WiMAX will encourage faster adoption of the service by enabling performance equivalent to and, in some cases, better than wireline access technologies. Mobility data with this level of performance promises to open up new applications as well.
- Fewer royalties, less expensive system architecture, and higher performance yields higher average revenues at lower costs for significantly better economics.

III. MOBILE WiMAX DELIVERS PERSONAL BROADBAND

Therefore Mobile WiMAX has the potential to disrupt the current mobile data industry much in the same way that GSM significantly changed the cellular industry. Starting from ground zero and taking advantage of knowledge acquired from first cellular deployments, the GSM community was able to architect a system that was free of many of the defects and inefficiencies of systems available at the time and enabled the technology to be the dominant force it is today. For over a decade, incremental advancements made to add data to existing wireless technology standards have not managed even to keep up with increasing consumer throughput requirements. Enacting change in these increasingly immense standards bodies is slow and cumbersome, and an absolute requirement to maintain backwards compatibility for hundreds of millions of subscribers further retards progress. In contrast, the broadband wireless industry and its many proprietary solutions have served to incubate the technologies needed to significantly advance the performance and efficiency of wireless data systems. While these technologies are only now available in an interoperable standard, they have been field-tested in a multitude of field deployments. These systems are, today, providing data performance what consumers expect from DSL broadband access.

The wireless industry is ready for another disruptive technology. Being free of cumbersome history and process, the mobile WiMAX industry will finally provide wireline-equivalent data services to consumers with the competitive advantage of portability and, eventually, full mobility.

The WiMAX Forum and IEEE 802.16e are, today, mainly focused on a new and advanced airlink technology. The benefits of OFDM modulation are now understood well enough that all major wireless research and development organizations consider it to be the only contender for the future advancement of wireless technology. The OFDMA variant of OFDM provides additional benefits in efficiency and control. For battery life and obvious personal safety, regulatory bodies have proscribed lower maximum power output levels for subscriber equipment than for infrastructure equipment. Historically, this has generally meant that the throughput and range of point-to-multipoint solutions has been limited to the lower uplink link budget. For wireless data systems, this has meant that the uplink or inbound traffic channel provides much lower throughput than the downlink or outbound traffic channel. WiMAX uses a unique property of OFDM to solve this issue and provide symmetric link budgets and throughput even in the presence of these regulatory restrictions while remaining perfectly safe to consumers. Through the use of subchanneling in the uplink channel, the mobile WiMAX airlink allows multiple subscriber units to combine

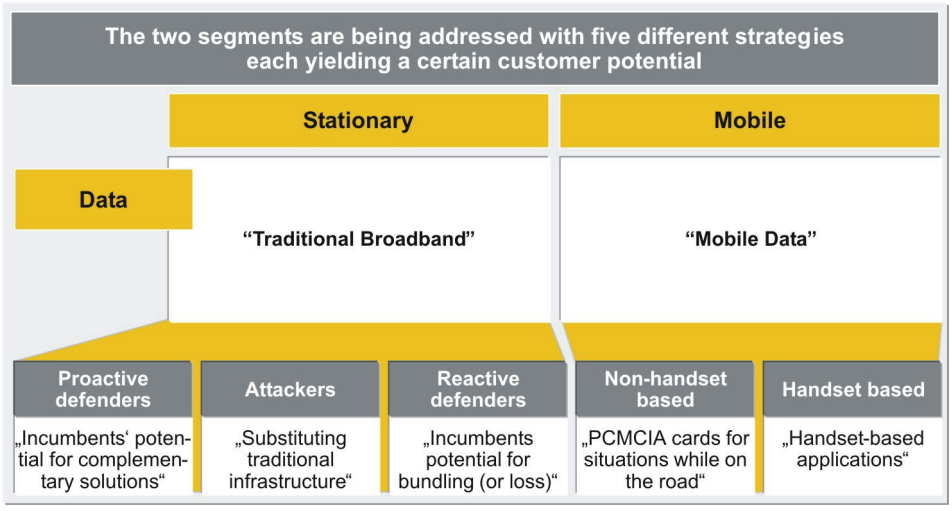
their power by simultaneously transmitting on a different subset of the available frequencies. By transmitting the maximum allowable power on fewer frequencies, the subscriber transmits more power per Hz while remaining within regulatory limits. The sum of the power output of multiple CPEs provides a total instantaneous power equivalent to that allowable from the base station output. Uplink OFDMA subchanneling provides another key benefit. By enabling subscriber stations to transmit on a fraction of the uplink channel bandwidth, the subscriber station can transmit with the same power per Hz, while reducing power to as little as 1/16th of that needed when transmitting in the full channel. Similar power-saving methodologies are possible in other airlink technologies but only OFDMA subchanneling maintains the power per Hz in lower power mode. As detailed in the previous section, OFDMA subchanneling preserves channel bandwidth. Other technologies' low-power transmit modes reduce the power per Hz and therefore require the subscriber station to transmit with a lower-order modulation – using the same bandwidth in the channel but with a lower throughput. In the broadband wireless industry, there has always been a focus on downlink performance. Downlink improvements are simpler to implement and the benefits of improved downlink performance are easily understood. Historically, consumer applications have been downlink focused as well. Newer applications continue to emerge, however, that require uplink performance that is significantly better than what many wireless systems offer today. The bulk of these systems either dedicates bandwidth to a user on the uplink or utilizes collision-based access methodologies. Dedicating bandwidth is a significant waste of channel resources and collision-based systems cause increased jitter and delay. For the first time in standards-based solution, WiMAX provides a nearly collision-free uplink with scheduling of uplink resources. This provided both the efficiency of a packet-based system with the system performance equal to wireline. A key aspect of OFDM and OFDMA is that the bulk of signal processing is performed in the frequency domain. Processing-intensive features like equalization, multiple-input multiple-output (MIMO) antenna schemes, or advanced antenna systems (AAS) techniques such as beamforming are possible in lower-cost platforms than in TDMA or CDMA solutions. On top of the physical layer the MAC layer function enables data to be conveyed over the physical layer. It controls the flow of traffic. For 802.16e mobile WiMAX, the MAC is as innovative as the physical layer described previously. For the most part, existing wireless data technologies lose significant efficiency in the presence of too many subscribers per channel. The WiMAX MAC is designed to provide statistical multiplexing of data bandwidth on par with wireline performance. The MAC provides multiple QoS levels appropriate for various applications and subscriber requirements. For the first time in a wireless data standard, appropriate quality of service will be provided at the MAC layer to support services that consumer and business customers demand. This includes adequate support for real-time and streaming applications, as well as for consumer and business Service-Level Agreements (SLAs).

IV. BROADBAND WIRELESS ACCESS MARKET AND FORCES

Broadband Wireless Access (BWA) systems, which are currently being tested and rolled out worldwide, offer customers broadband connectivity, also on the move. The development of BWA presents market opportunities as well as real strategic challenges to companies that own and operate fixed and mobile telecommunications networks, with the possibility of a disruptive change in the competitive landscape.

With broadband wireless access technologies becoming available at prices affordable for both operators and customers, it presents current market players and new entrants with radically new market opportunities and threats. These further stimulate competition and contribute to global broadband growth.

For incumbent fixed operators, BWA can enable the delivery of basic broadband services to areas that can not be economically served with DSL or fibre. Likewise, mobile operators can leverage BWA to meet their customer needs for reliable and cost-effective, fixed and mobile broadband data. However, with the substantial investments into UMTS, most of which still weigh heavy on many balance sheets, investors want to see solid justification for investing into yet another technology. Importantly, alternative operators and new entrants can use BWA to bypass the incumbent's local loop and thereby compete more effectively. BWA may also permit these operators to wrest control of key segments of the addressable broadband market, such as business users and road warriors. In light of this important new threat, incumbents will therefore need to consider their position, as well as that of any mobile subsidiaries, in the light of them both being able to offer broadband services based on this new technology. The regulators in any market play a critical role in the development of BWA services as they ultimately determine the allocation of spectrum. In doing so, they decide whether to license spectrum to particular operators or particular technologies, thus determining the level of competition on the market. The development of BWA presents real strategic challenges to companies that own and operate fixed and mobile telecommunications networks, with the possibility of a disruptive change in the competitive landscape. However, many operators have yet to address the impact of this new technology. Vendors and mobile operators are hoping to build on the growth in wireless LAN (WLAN) systems and repeat the spectacular success of mobile telephony by moving into mobile data. Al-



ternative operators are interested in using BWA to bypass the local loop barrier when delivering broadband services and to gain additional attractive revenue through the delivery of voice services. The rapid growth in the WLAN market over the last several years has helped change customers' perception of data access. WLAN systems enable several computers in an office or household to be connected to the Internet via a wireless access point and a fixed broadband service. WLAN hot spots have become increasingly available in public areas such as hotels, cafes and airports. This freedom provided by WLAN has stimulated the demand for wider coverage and extended service provision of wireless broadband services, features unable to be adequately satisfied by these low-cost shortrange WLAN systems. In contrast to the limited 100-metre range of WLAN, BWA systems provide roaming coverage over tens, and more often hundreds, of square kilometres, from a series of cellular-like base stations. Some of these systems support roaming between cities, others full mobility. As was the case initially for mobile telephony, there is evidence from BWA trials and the first commercial deployments that early adopters are willing to pay a premium of up to 25 percent for the freedom BWA offers compared to DSL or HFC alternatives. In markets where existing fixed and mobile systems are constrained, for example by pair-gain or spectrum limits, the premium for BWA has been up to 50 percent. Demand from alternate carriers and operators, such as ISPs, is a critically important driver of the growing interest in BWA systems. These operators recognise the strategic and cost advantages of these systems compared to conventional DSL. BWA frees them from the local loop barrier, which is usually controlled by the incumbent operator. So far, the only alternative was to unbundle the local loop, a costly and risky venture. Without unbundling, alternative operators had to accept the incumbents' product specification and nominal pricing margins. With BWA, alternative operators can avoid many of these issues and still successfully compete in the broadband market. BWA reduces capital expenditure needs; operators have more freedom to differentiate the product while retaining full customer ownership, all with lower production costs, which improves financial performance. The primary focus of mobile operators, ISPs and start-ups is in entering the broadband data business, while incumbents and other fixed net operators are rather interested in nomadic data services. Mobile VoIP is especially important to incumbents and operators without a mobile subsidiary, while stationary VoIP is of high importance for start-ups. The primary end customer segments for these services are small and medium size businesses (SMEs), SOHOs and residential customers primarily located in rural areas with no current access to broadband services. Road warriors, customers who spend much of their time travelling and need broadband connectivity on the road, are also an important customer segment for these services.

Broadband wireless access technologies have the potential to have a disruptive impact on telecommunication markets in the medium term. The technology can open up new markets for current players, and enable alternative operators to free themselves from existing fixed and mobile access providers. Once the service and devices are widely commercially available at a reasonable price to the end customer, BWA could dramatically change the customer's perception of the convenience and flexibility of Internet access. Several proprietary solutions are currently commercially available, and are in the process of being tested and rolled out world-wide. Meanwhile several groups, with participation of the companies currently offering proprietary solutions, are working to develop a standard technology for BWA. The most vocal, WiMAX, has yet to finalise their mobile standard and are not expected to be ready to launch commercially until 2006 or 2007. Operators, whether fixed or mobile, incumbent or alternative, are facing difficult choices, given the wide range of BWA technologies currently available or under development.

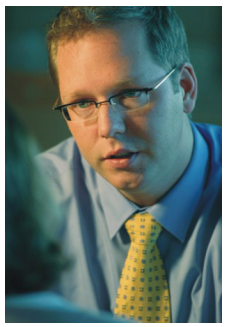
V. BWA MARKET ENTRANCE OPPORTUNITIES

There is a risk to investing too early, before these solutions are commercially-proven and a BWA standard has been finalised. However, a wait-and-see approach may present a greater risk, and in many markets may not be a feasible option. With a new, potentially disruptive technology, being a late entrant will leave an operator out of the market completely. Operators have three alternatives in terms of BWA:

- deploy one of the readily available proprietary systems that are now being aggressively deployed, but risk selecting a technology that may be ultimately superseded by other standardised technologies, or
- Opt for a standards-based system such as WiMAX (802.16e supports mobility) or 3G with HSDPA or MIMO (next UMTS evolutionary steps) to avoid the risks associated with deploying a technology orphan, while accepting the delays before a commercial launch is possible, or
- use CDMA2000 1xEV-DO or FDD W-CDMA (the current UMTS platform) to quickly deliver modest broadband performance, but with the risk of a limited market uptake in the face of proprietary competitors with systems that deliver significantly better performance and lower cost structures, particularly under conditions of heavy network loading.

If operators have not already developed a strategy with regard to BWA, there are three immediate actions to take in order to determine which alternative is the most appropriate for their particular situation.

First, they should perform a market assessment of the potential for BWA services, as well as their competitors' likely strategies concerning BWA. Second, they should determine a strategy for negotiation with the regulator regarding the availability and cost of spectrum, and the conditions attached to any allocation (i.e., functionality enabled, technologies supported). Third, it is critical that operators begin to test these systems, whether proprietary or standards-based, in order to gauge their strengths and weaknesses, the potential threats which they may pose in the hands of competitors, and the value they could bring to their particular market. After completing these three steps, an operator will be able to actively move forward to address the challenges that BWA presents.



Edwin Ronacher has nearly 10 years experience within the TELCO market and is Head of Broadband Solutions within Kapsch CarrierCom AG. Before joining Kapsch CarrierCom AG, he did a technology scouting on VoIP within aphona Entwicklungs und VertriebsgmbH and worked within Austria Telecommunication, a subsidiary of Kapsch AG, within the wireless and next generation network department. He completed a technical college of telecommunications and a General Management MBA program in Vienna.

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Submitted papers should contain the following:

- Abstract of 200 words (in English)
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- Table of contents and outline of the paper in bullets limited to 2 pages
- Author contact details (e-mail, telephone, fax and address)
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The FITCE Technical Programme Committee (TPC)

According to the decision of Comité de Direction during its Plenary Meeting 3rd of November 2006 in Warsaw the FITCE Technical Programme Committee is established. The role of the TPC is to work with Congress National Organisation Committee to develop the theme for the technical programme and to ensure that the agreed procedure for paper selection is followed.

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A preliminary outline of ideas to be included in the Congress sessions is the following:

- New Emerging Technology and Innovations
- BB Services and Products
- European Regulations Review and Its Market Consequences
- Nomadic User and Converged Services
- Quality and Security – Key for Profitable Services
- New Content Distributors Entering BB Market
- BB Access – New Utility
- Global Services and Local Networks – Opportunity for Investments

The Sessions of the Congress will be finally decided by FITCE Technical Programme Committee (TPC).

Timeline

- Deadline for the abstracts is Monday, 26 February 2007.
- Authors will be advised of the outcome of the paper selection before the end of March 2007.
- The full text of the selected papers (maximum 10 × A4 in English) is required by May 15, 2007.
- The presentation material is required by July 17, 2007.

The presentations will be strictly limited to 20 minutes and there may be time for questions. All contributors selected will be requested to follow the "Instructions for Authors and Speakers" on http://www.fitce2007.pl

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New communication technologies will dominate our technological environment and our way of living. Broadband access, technological innovations in the networks, as well as new sector regulations will drive us to the easier and open choice of communication possibilities. All Members of FITCE, professionals and simple users of telecommunication will find in 46th FITCE Congress in Warsaw an interesting forum for friendly meetings and bright discussion.

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See you in Warsaw!

Wojciech Hałka
President of SIT Polska
Member of FITCE

Zbigniew Krawczyk
Vice President of SIT Polska
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