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Exploration Programmes:  
Corporate Technology Explores Future Telecommunications

# Bluetooth Access Hotspots, a Winning Business Case?

The convergence of Internet and Mobile Networks will soon open the door for new mobile service opportunities and multimedia. The imminent availability of Bluetooth short-range radio devices offers the operator additional channels for reaching customers of mobile services. New business opportunities will arise such as bundling and content customisation, service packaging, and portal wholesale, in collaboration with retailers and marketers.

The Exploration Programme "Service Design and Media" focuses on the business models and on enabling technologies of media syndication, for example transforming multimedia content into services, and explores the creation, provision and distribution of rich-media services over various access networks and terminals.

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

It is anticipated that by 2006, 76% of mobile phones and 24% of PDAs will be Bluetooth enabled [1]. By 2004, approximately 50% of the mobile ser-

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vices revenue will be generated from data traffic with the highest growth expected in Internet access and real-time multimedia applications.

The continuous enhancement of the GSM network with GPRS, and eventually UMTS, offers users the much needed higher data rates to access services any-time, anywhere. Bluetooth will enable the interconnection of all types of multimedia-capable personal devices with each other and with fixed and mobile networks and services.

This article explores the operator's business opportunity for providing the mobile users, via their Bluetooth equipped devices, with access to a new range of services.

The forecast of a wide Bluetooth adoption for connecting user devices to networks presents a new opportunity for service provision. By building a set of compelling services that can be easily accessed via Bluetooth devices, a market of significant size and intensity of use can be tapped. Success will depend on the satisfactory provision of bundled services that are personal, location-based, and adaptable to a wide range of user devices and media-rich content.

As Swisscom is in the process of planning for UMTS, it has become necessary to explore other technologies offering alternative access to services that can either complement or substitute expensive UMTS solutions. This approach will prepare Swisscom to quickly exploit suitable commercial opportunities and also to understand the user expectations from UMTS services. A comprehensive solutions portfolio will enhance Swisscom's responsiveness to the changing and demanding market needs.

In this article, typical services and their business cases are closely investigated.

#### **Bluetooth Activities at Corporate Technology**

Swisscom Corporate Technology collaborates with several European operators as part of a EURESCOM project [2], [3]. Our contribution includes studies of customer needs, Bluetooth usage cases, definition of business cases for operators and the conceptual design for a Bluetooth platform architecture. The platform design will integrate new technologies such as Bluetooth access points and a number of multimedia applications.

#### **What do Users Expect from Bluetooth?**

During Spring 2001 the "Fachhochschule Reutlingen" (Germany) [4], supported by Corporate Technology, conducted a survey based on a public questionnaire that was completed by more than 100 participants. The target group was that of alumni members of the Fachhochschule Reutlingen. This group consists of graduates and students of an MBA study course and thus represents current and future decision-makers in business. The 81 male and 21 female participants range between age 24 and 60 years with the largest segment (ages between 25–32) representing 53% of the sample.

A summary of the results is given below:

- *Bluetooth devices usage (fig. 1)*: Participants think that a Bluetooth mobile phone will be the most frequently used product, immediately followed by notebook, PC and PDA. Multimedia products seem not to be favoured by the participants. However, with PDA becoming multimedia capable (e.g. Compaq iPAC), business users may become interested in multimedia services.
- *Bluetooth solutions*: 39% recognise Bluetooth as a unique technical solution, 27% see it as a variant of wireless LAN. 21% think it can be used at their office workplace and 31% think it can be used also when they are mobile.
- *Bluetooth use cases*: Different Bluetooth applications [5] were also presented to the participants. The results reflected a good in-depth understanding of the role and capabilities of Bluetooth technology. 90% of the participants believe that the fundamental role of Bluetooth is in connecting personal devices together (Personal Area Network, PAN). In addition, 50–60% acknowledge the usefulness of public Bluetooth access hotspots.
- *Bluetooth roadmap*: 10% of the participants believe Bluetooth technology will be ready to market in 2001 whereas 71% believe Bluetooth will be available by 2003.

Additionally the general public appreciates the safety advantage of Bluetooth low power level technology.

#### **What are the Feasible Business Roles for an Operator?**

Figure 2 illustrates the 5 main constituent domains of a proposed business model for a public Bluetooth access hotspot. The operator involvement options range from a minimum of providing the connectivity only, to the addition of one or more of the other domains, for example the access network or the support and the functional services (see fig. 3 for details). Provided that the necessary expertise for these services exists, increased revenue is achieved by extending the involvement to other domains and services. It must be pointed out here that the operator has also the possibility to adopt another, more conservative option that capitalises on the currently existing unique assets, for example subscriber databases for fixed and mobile networks or billing systems. Through partnerships, an operator's competence portfolio can be extended

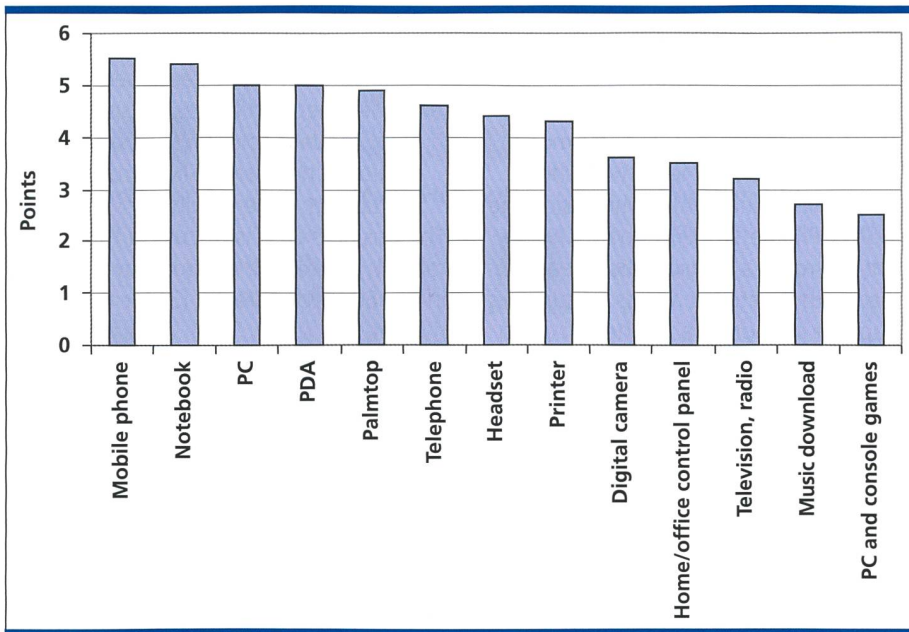


Fig. 1. Questionnaire results: participants preferred Bluetooth devices.

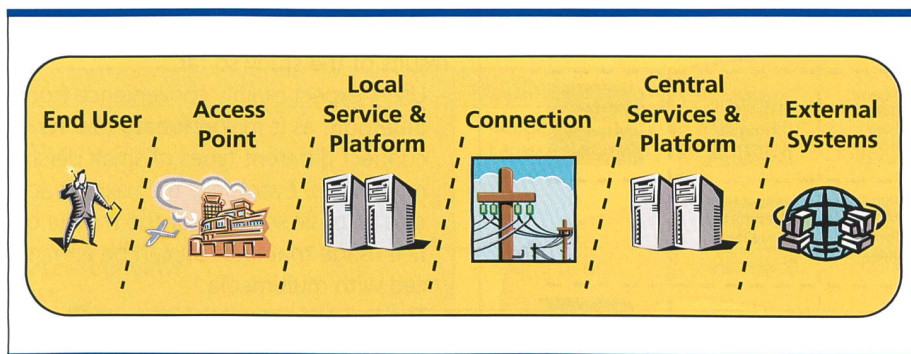


Fig. 2. Domains of the Bluetooth business model.

to other domains. A close examination of possible new roles such as content mediation, billing and licensing and/or application service provisioning is necessary. Successful partnerships can help secure new sources of revenues to compensate for the reduction in the traditional ARPU.

**Examples of Use Cases:**

**Multimedia Services and Telephony**

Out of the several use cases studied in the Eurescom project [3], the multimedia services and telephony, as shown in fig. 4, are selected here for discussion. The multimedia services use case concentrates on two main scenarios: (1) image transfer and (2) music download and gaming. Whereas image transfer via Bluetooth could be interesting for business as well as for private users, the user segment for downloading music and

playing games clearly concentrates on private users, mainly young people. The telephony use case considers the scenario where the user needs just one phone to access both mobile and fixed (cordless) telephony. Since voice calls remain the “killer application” for telecommunications networks such a simplification could be an important driver for a user to require public Bluetooth access for making voice calls. The following sections describe the business cases in some detail, while table 1 compares a number of the business case attributes for both use cases.

**Business Case for Multimedia Services**

This business case considers two examples illustrating different types of multimedia services for Switzerland. The examples as seen from the user perspective are:

- Easy e-mailing of images. This application will make it easy for a user to construct and send pictures.
- Download of music and multimedia content. Young people willing to spend money on entertainment can download music, games, etc directly to their small end-devices.

From the service provider perspective, to realise these applications, it is necessary to provide and support

- Bluetooth devices for images (cameras), mobile phones with mail clients, pocket PCs with mail clients, access points
- Picture messaging service for mobile net and Internet
- Bluetooth enabled audio players, game boys
- Music and multimedia download shops: local or remote via Internet
- Billing/payment for content.

The operator may take the following roles in order to acquire revenue:

- Sale and support channels for Bluetooth devices
- Connectivity and transport of multimedia applications
- Application service provisioning, content mediation and licensing services for music shops
- Provision of systems for authentication and billing/payment over the networks.

For multimedia, the revenue estimate is € 10/month/user for service access. See table 1 for estimates of market sizes, costs and profit [6].

For music and multimedia download, the additional average revenue estimate is € 25/month per active user for content mediation and licensing.

**Business Case for Telephony Services**

To identify why a user would acquire/require Bluetooth access to make voice calls, two typical situations from a user perspective are described below.

- In the home/office, a user with a Bluetooth mobile phone may wish to use the home network for voice calls. On arriving in the home, the phone uses the Bluetooth access terminal to make phone calls across the fixed (POTS, IP, DSL) network. This is an obvious choice as fixed line access will always be cheaper than accessing the mobile network. The user will also have access to his own address book on the mobile phone and will not be limited to the room where the fixed phone is located.

- On the road, there are reasons why a user with a Bluetooth mobile phone may not use GSM/GPRS/UMTS. Such reasons may be: price advantage, out of coverage range or problems with international roaming, e.g. lack of agreement or use of different operating frequencies. A Bluetooth public access terminal in a hotspot can basically route the call along the fixed network.

To be able to offer such services from a service provider perspective, the following infrastructure is required:

- In the home, Bluetooth access terminals connected to the fixed network can connect the mobile user either to make

voice calls or to access the Internet. The residential gateway (home network concept) is a good candidate to accommodate the additional functionality of these terminals. Consequently, mobile phones can use home networks for voice calls in the home, while using the GSM/GPRS network outdoor.

- On the road, a public hotspot equipped with Bluetooth access terminals is capable of routing a phone call on to the fixed network. There will always be extra costs associated with offering users access to the public telephony network. Whether these costs can be recouped in a free service scenario through advertising, promotion or

goodwill building is questionable.

- Billing and authentication are critical issues with any service accessed via the public Bluetooth access hotspot. A new standard solution for user authentication is necessary. SIM card based solutions may be sought.

The business case is discussed further in table 1, figures are provided by a partner in the Eurescom project [3] for the Irish market.

Expected benefits for an operator generally are:

- Revenue made from the involvement in the deployment of Bluetooth home networks and hotspots.
- Revenue from extra calls on the network that would not have been possible via GSM/GPRS. An estimated revenue of € 15/month/user is feasible [3,7]. This sum is the flat rate the user will pay for all the voice calls made.

**Conclusions**

The following summary covers the main results of the study so far:

- Users expect mainly convenience from Bluetooth as it makes it easy to interconnect different types of small personal devices. Eventually they expect access to basic services for the mobile office usage that later on can be enhanced with multimedia.
- The business case analysis of multimedia and telephony reveals that the provisioning of access points and services in homes/offices and other premises may offer a new source of revenue streams. For each of the use cases the operator has to carefully select the roles and the partners.
- Offering remote services such as content mediation, billing and licensing for third parties and applications hosting are attractive services for the operator to pursue.
- The provisioning and running of just one major service (e.g. telephony) are no longer profitable. A range of bundled multimedia services including features such as personalisation, localisation and device awareness will soon be the regular/common user requirements.
- Partnerships and co-operation are playing an increasing role in this race.
- The experience gained from this project concerning features the users expect from a mobile services platform will be invaluable for the deployment of UMTS services.

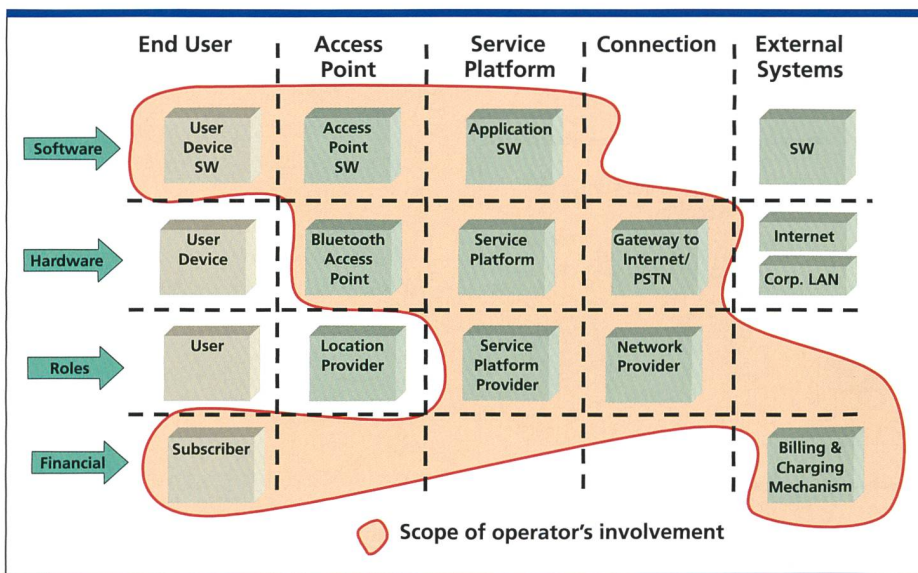


Fig. 3. Business model roles and the maximum involvement option for an operator.

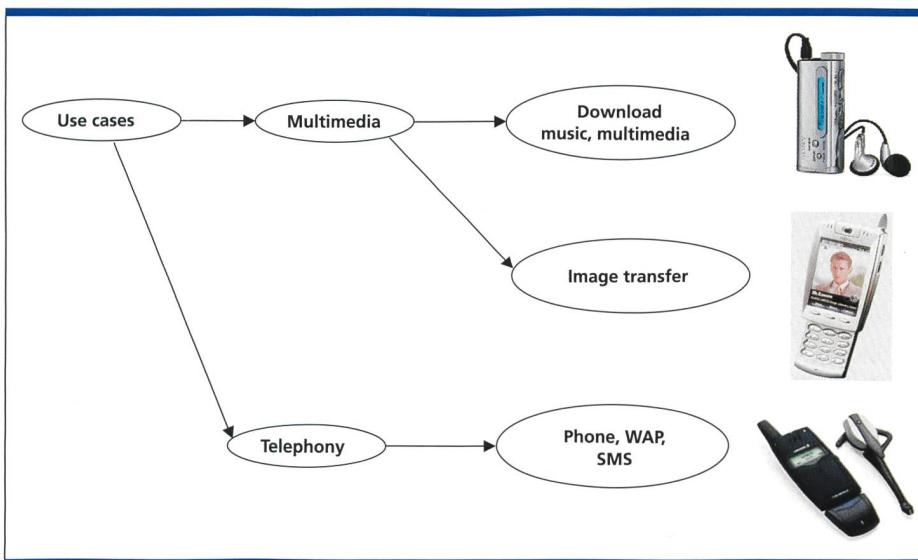
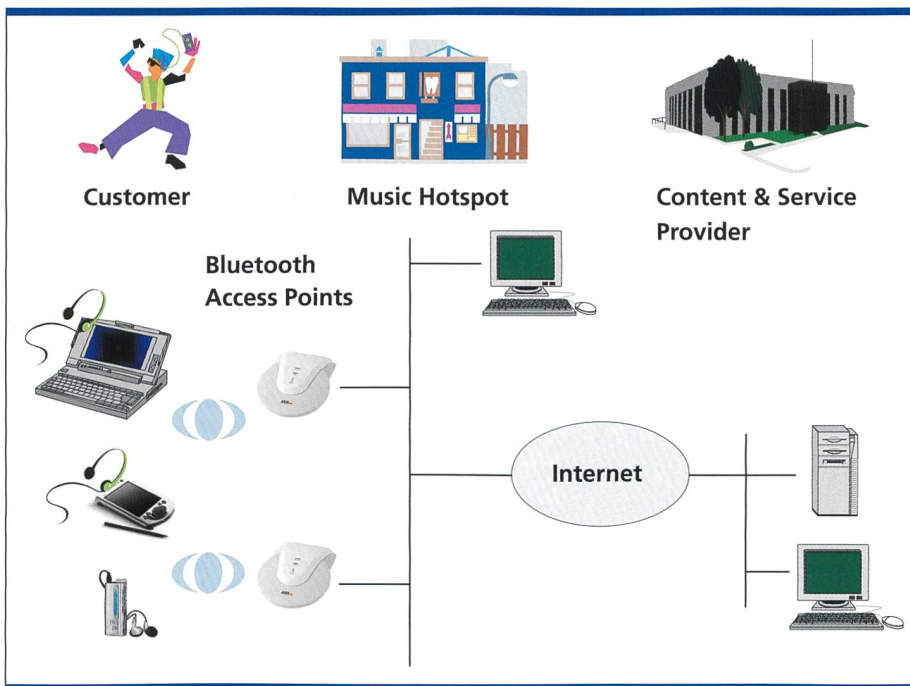


Fig. 4. Examples of use cases: multimedia and telephony services.



**Outlook**

As a follow-up, Swisscom Corporate Technology plans to build a demonstration platform integrating new services with Bluetooth technologies. As a service example, music download as described above will be the first service provided. Figure 5 shows the concept for the demonstrator architecture. The demonstrator architecture and services will be closely examined, particularly service usability when accessed by a limited number of users with Bluetooth devices. In the meantime, a continuous monitoring of the Bluetooth market is important in order to steer the development of new services for the expected mass market of personal devices. 3, 7

Fig. 5. Demonstrator architecture concept for music download.

	<b>Multimedia Services</b>	<b>Telephony Services</b>
<b>Service description</b> what? where?	<ul style="list-style-type: none"> <li>– Image mail in homes and businesses</li> <li>– Music/multimedia download in hotspots</li> </ul>	<ul style="list-style-type: none"> <li>– Voice calls in homes, offices and hotspots</li> <li>– Internet services access, e.g. WAP, in homes, offices and hotspots</li> <li>– Mobile phone to access both mobile and fixed networks</li> </ul>
<b>User segments</b> who?	– Young people, professionals, consumers	Home/office users, mobile business users
<b>Operator roles</b>	<ul style="list-style-type: none"> <li>– WAN (transport) and ISP (e.g. mail server)</li> <li>– Add-on roles: content syndication, billing, licensing, ASP</li> </ul>	Fixed network access and mobile services
<b>Partner roles</b>	Installation and/or running of BAPs everywhere and running hotspots where young people go shopping, eating, dancing, etc.	Installation and/or running of BAPs everywhere and particularly in homes, offices, public places, street corners
<b>Market volume</b>	<b>Switzerland:</b> <ul style="list-style-type: none"> <li>– residential homes 3.5 Mio</li> <li>– business premises 0.4 Mio</li> <li>– young people: 1 Mio</li> <li>media content spending: € 50 /month/user</li> </ul>	<b>Ireland:</b> <ul style="list-style-type: none"> <li>– mobile phone subscribers 2.7 Mio</li> <li>– Hotspots airport, hotels, etc.</li> </ul>
<b>Financial analysis</b> Assumptions of the model: <i>Switzerland:</i> The model considers business and home users with progressive adoption rate of 10% and 5%, respectively, over 5 years. <i>Ireland:</i> The model considers 300 hot-spots for 110 000 users.	<b>Switzerland:</b> At end of 5 years*: Business premises 200 000 Homes 875 000 BAP 1 300 000 Total cost € 864 Mio Charge/business user/month € 12 Charge/home user/month € 10 Total Revenue € 1,035 Mio Profit in the 5th year € 170 Mio * Breakeven point during the third year.	<b>Ireland:</b> Active users 110 000 BAP in public places 1500 Total cost € 3.96 Mio Charge/user/month € 15 Total revenue pa € 15.5 Mio Mobile revenue loss € 11 Mio Profit € 4.5 Mio
<b>Risks</b>	<ul style="list-style-type: none"> <li>– BLT has not taken off yet</li> <li>– Bandwidth of BLT insufficient for multimedia</li> <li>– Incompatible billing solutions</li> </ul>	<ul style="list-style-type: none"> <li>– No standard BLT profile for mobile phone</li> <li>– Need for national and international acceptance of subscriptions, billing, etc.</li> <li>– Reduced revenue from GSM/GPRS</li> </ul>
<b>Rollout proposal</b>	Pilot: 2002 Commercial: 2003–2004	Deployment end 2003

Table 1. Comparison of business cases for multimedia and telephony services. (€ Euro currency)

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**Edwin Wiedmer** received a PhD in computer science from ETH Zurich, worked in telecom industry and is now senior engineer at Swisscom Corporate Technology. He is leading and contributing to a number of projects exploring technologies and business opportunity for networked multimedia services and mobile devices for short distance coverage range (Bluetooth, W-LAN).

#### Abbreviations

ARPU	Average Revenue Per User
ASP	Application Service Provider
BLT	Bluetooth
BAP	Bluetooth Access Point
GPRS	General Packet Radio System
ISP	Internet Service Provider
PAN	Personal Area Network
PDA	Personal Data Assistance
RADIUS	Remote Access Dial Up Server
UMTS	Universal Mobile Telecommunications System
VPN	Virtual Private Network

#### Pointers

Bluetooth: [www.Bluetooth.com](http://www.Bluetooth.com)

GPRS: [www.mobilegprs.com](http://www.mobilegprs.com)

UMTS Forum: [www.umts-forum.org](http://www.umts-forum.org)

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#### Chipkartensicherheit durch DNA?

Die Nippon Telegraph and Telephone (NTT) trägt sich mit dem Gedanken, den genetischen Code des Menschen in komprimierter Form als Sicherheitsmerkmal auf Chipkarten zu bringen. Wegen des Umfangs der Dateien denkt man an einen zweidimensionalen Barcode, den man speichern will. Ob man das braucht, muss sich erst zeigen. Chips wären vermutlich wegen der viel kleineren Abmessungen der elektronischen Speicher besser geeignet, zumal man auf einem Chip von etwa 30 m<sup>2</sup> eine nicht knackbare RSA-Verschlüsselung mit 1024 Bit unterbringen kann.

NTT Communications Corp.  
1-1-6 Uchisaiwaicho  
Chiyoda-ku  
Tokyo 106-8019  
Japan

#### Pentagon verstösst gegen Persönlichkeitsrechte

Eine interne Revision im Pentagon hat ergeben, dass – entgegen den Vorschriften – etwa jeder vierte Besucher der Homepage des Verteidigungsministeriums gespeichert wird. Etwa ein Drittel aller Webseiten des Pentagons benutzen dafür so genannte Persistent-Cookies. Der frühere Präsident Bill Clinton hatte diese Praxis per Order unterbunden.

#### «Wearable» PC

Hitachi beabsichtigt, einen 310 g leichten und am Körper tragbaren PC auf den Markt zu bringen. Herz der Maschine ist ein 32-bit-RISC-Prozessor, der mit 128 MHz Taktfrequenz betrieben wird. Als Betriebssystem soll Windows CE in der Version 3.0 eingesetzt werden. Der PC ist ausgerüstet mit einem Compact-Flash-Slot, einer USB-Schnittstelle und verfügt über einen RAM-Arbeitsspeicher von 32 MByte. Das am Kopf zu tragende Farbdisplay arbeitet nach SVGA und löst 800 × 600 Pixel auf. Ein Preis wurde bisher nicht genannt.

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## Zusammenfassung

Was sind die Erwartungen der Benutzer an die Bluetooth-Technologie? Die Resultate einer Umfrage ergaben, dass primär eine Vereinfachung der Benutzung dank weniger Verkabelungen und automatischen Updates der diversen Geräte erwartet wird, und das vor allem im Office-Bereich. Für später könnten sich die Benutzer auch Multimedia-Anwendungen vorstellen.

Welche neuen Rollen ergeben sich daraus für einen Netzbetreiber? Er wird an verschiedenen Orten und für verschiedene Benutzerprofile sowie mit unterschiedlichen Techniken Anschluss anbieten. Er wird nicht mehr alleine einen Hauptdienst (Killer-Applikation) über das Netz offerieren, sondern eine Vielzahl von Diensten in Zusammenarbeit mit Informations- und Systemanbietern sowie Verteilern.

Dies wird im Artikel anhand von möglichen Diensten für Audio und Multimedia aufgezeigt. Dabei wird empfohlen, dass der Netzbetreiber neben der konservativen Rolle des Datentransporteurs auch neue Rollen, wie Mediation von Inhalten oder das Verrechnen und Lizenzieren für Drittpartner angeht.

## IP-VERKEHRSANALYSE – KLAR, EINFACH UND SCHNELL



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Wer hat heute noch Lust über Protokolldekodierung und kryptische Fehlermeldungen zu brüten? Oder herauszufinden, ob Netzprobleme vom Datenverkehr bei Endanwendern oder durch Beeinträchtigungen der physikalischen Schicht verursacht sind? Genau deshalb haben wir den CycloneFrame IP Optimizer™ für die automatische IP-Verkehrsanalyse entwickelt. Seine intuitive, grafische Bedienoberfläche automatisiert das Setup sowie die Be-/Verarbeitungs- und Dekodierungsphasen beim Troubleshooting. Das Echtzeit-Expertensystem lokalisiert Probleme schnell und erstellt sinnvolle Lösungsvorschläge.

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