

NGN based developments

Among our development themes the implementation of new platforms and the investigation of the possibilities of the introduction of the future's convergent network (NGN - Next Generation Network) are themes that we rank among the most significant ones. Within this scope, we have been working on several subjects, one of them is the ENUM (tELEphone NUmber Mapping) project. In the frame of the project we have elaborated such a pilot ENUM system, which allows assigning ENUM identifiers to users and accessing the ENUM users at several, different addresses.

A Web-based GUI (Graphical User Interface) is provided both for the administration and the managing of user profiles. We are investigating the signaling protocols of 3G mobile networks to amalgamate geographical mobility and dynamically distributable relatively high bandwidth with the wide range of next generation services.

In the field of IP telephony services and applications we have already implemented the integration of hardware-based telephones. We have elaborated such a QoS measuring method, with the help of which the quality of the VoIP (Voice over IP) service can be tested and measured on a relative scale, and the given test results can be compared. At the present we are working on the further development of the existing experimental system.

A special case of mobility is the so called nomadic mobility, when the user - who is on the move - is not connected to the network. An average laptop user can hardly concentrate on his work, while he is on the way. He needs network connection only when he stopped and can pull out his laptop from his bag. For instance, such typical places of temporary, nomadic presence are the public WLAN Hot spots located in airports or cafeterias, or connection points made available by companies for their business partners visiting them. In the course of our developments we have been analyzing the possibilities of providing VoIP connection for such "wandering" subscribers.

Multimedia developments

The services resting upon multimedia-based communications form a key element in the development strategy of Magyar Telekom. The research activities performed in this field have had the aim of making available for the future's households such value-added services that are based on home broadband access. With the implementation of the digital home concept, several supplementary elements can be added to the service portfolio provided currently to the customers, including IP-based communication provided on fixed or wireless networks, or forwarding on the same networks of audio and video, or other, for e.g. control, signals.

Under laboratory test conditions in Ethernet environment we have been testing DRM (Digital Rights Management) systems necessary for the implementation of triple-play (integrated voice, data and video) service via broadband access. Within the frames of this theme we have been studying the rights management of digital content distribution, and on a (prototype) lab test system the characteristics related to content protection and distribution and authorization.

To form out our vision on triple-play, we have made a study, giving an assessment on the status of the relevant technologies and services and on the international trends. In the study, besides summarizing the current technical possibilities, we have identified and evaluated the key aspects of becoming a triple-play provider. We have addressed issues, like: infrastructure development needs, CPE-s, content provisioning, system integration, CRM-specific tasks and regulatory aspects. With this work we wish to contribute to the planning activities aiming at the establishment of a new technical-service framework.

WiMax developments

Spreading of wireless technologies has not only continued in 2005, but beside the existing WLAN, studying of a new solution (WiMax) has commenced, too. Compared to WLAN, which is primarily designed for Internet access, WiMax with its integrated QoS (Quality of Service) features and being applied not in the ISM-band is a suitable technology for provisioning of leased-line like services for business customers. Though, the technology is yet in standard implementation phase, Magyar Telekom has already announced its new WiMax technology based service. In the interest of it, we have created a test environment on which the system integration and functional tests can be carried out prior to general rollout.

xDSL technologies

The traditional twisted copper pair continues to be a determinant element of access networks. Systems of the past have been improved in efficiency through numerous innovations and the appearing newer and newer technologies offer further possibilities for the providers. In the frame of this research we have been analyzing the possibilities of new generation xDSL technologies (ADSL2, ADSL2+, SHDSL, VDSL2). Achievable bandwidth, reachable distance and the triple-play related features of equipment are in the focus of the tests. Moreover, we carry out analyses and measurements to identify the conditions of system integration of DSLAM-s with Ethernet uplink. The purpose of the research works is to enable for Magyar Telekom to determine already in the early phase of technological developments those solutions that can provide broadband access for the future's advanced services.

Security in telecommunications

Security has become recently one of the most critical issues of the evolution and development of info-communication technologies. The issue is in the centre of attention, since it is tied up with the inescapable globalization process requiring the advancement of security solutions as well. Nowadays, a computer with online Internet connectivity that is installed at home is

exposed to up to several dozen, frequently even several hundred network attacks every hour. Effective protection against such attacks requires IT-skills that most users simply do not possess. Centralized firewall solutions entail one of the main directions for development. With the help of such solutions, it is possible to protect subscribers' computers against unauthorized access by means of control through a central router, without detailed local configuration. Utilizing the possibilities in SSL-based VPN-s constitutes the other direction for development efforts. Investigations extended to comparisons with existing VPN-solutions, as well as issues related to mobility.

Fixed – mobile convergent products

The demand related to the convergence of fixed line and mobile networks primarily arises on the side of the services that are provided to customers. Recognizing this, fixed-line terminal, and phone set manufacturers also produce devices that boast features seen in mobile terminal devices (high definition color display, integrated camera, polyphonic ring tones, etc.). Currently SMS, MMS, etc. are available over both networks as convergent services. The objective of the project was to investigate the development stages of fixed-mobile convergent networks and to compare possible technical solutions. The research task aimed at the technical investigation of opportunities that can maintain Magyar Telekom's competitiveness in the medium-term, as well as the deployment of professional competency that is essential from the strategic perspective. On the currently available specimen networks that is based on Bluetooth and intelligent call redirect functionality we are analyzing what requirements the network shall meet to provide the required voice quality and also the opportunities resting in the by today already available convergent products.

Optical systems

In high speed (10, 40 Gbit/s) DWDM systems, especially in pure optical networks, the optimum location of the optical amplifiers and the dispersion compensating elements to a great extent influences the performance (throughput) capabilities of the network. At the same time, an exact and accurate calculation method giving the optimum for the location based on the physical parameters of the network and the active elements, is not yet available. The R&D theme has the purpose to explore the mentioned interrelations and through practical measurements to verify and correct the theoretical results. In the frame of this research work we are searching for those practicable calculation and dimensioning methods that can be manufacturer, vendor or system independently applied for the 'physical' networks.

Network planning and designing methods

Introduction of new network platforms and services requires new methodology in planning. At the further development of our planning methods we endeavor to put such planning, engineering and testing methods at disposal of Magyar Telekom that both from technical as well as from financial point of view efficiently support the optimization of the networks of Magyar Telekom. In the interest of the above written goals we are further developing our network design and network planning methods in respect of every plane of the telecom network and with consideration of all its technologies. We deal with - among others - PON systems, the planning methodology of purely optical networks and further development the methodology elaborated for the dimensioning and modeling of IP core network. We are working on the optimization of free capacities available in the transport network and also investigating the possibilities of the implementation of NGN core network with special emphasis on the transition period leading us from PSTN/ISDN network to Next Generation Network.

R&D consortiums

Magyar Telekom Group consciously makes efforts to replenish or multiply its existing - whether professional or financial - R&D resources. Foundation of R&D consortiums offers splendid opportunities for the involvement of additional resources. A R&D consortium is a company form having no legal entity, which is based on voluntary assumption of obligation of its members and set up exclusively with a dedicated professional objective. The founders - in the interest of execution of the project and achieving the set target - act jointly in different tenders for obtaining additional resources to supplement their own ones. In the past the supporters have preferred R&D consortiums that have been established under the leadership of institutions of higher education and with the involvement of industrial partners for the achievement of a dedicated professional target. Further on we will consciously endeavor for being actively involved in such consortiums, where the results support Magyar Telekom's infrastructure and service developments and the Company's employees to enrich their professional skills. Keeping in eye the above criteria we are currently participating in the work of the following consortiums:

Adaptive media stream service architecture for the latest mobile telecommunications systems

The project has set the objective to develop - first of all for mobile environment - such a frame of service architecture, with the help of which scalable and quality media stream (streaming audio and video) services and applications can be provided in a flexible manner, tailoring them to the actual customer needs and the changes in the status of the network.

Establishment of Mobile Communications Research Developing and Innovation Centre - Mobil 2004

The objective of the project is to establish a university scientific and technology innovation centre ranked among the world-wide leading such institutions, in the interest of creation of such a professional and regional 'centre of gravity' in the field of mobile communications that pursues outstanding research and development, as well as technology innovation activity, intensively co-

operates with the players of the economic sphere, encourages the technological and economic development of the region and along with that improves the competitiveness of the region and the country.

MUPBED (Multi-Partner European Test Beds for Research Networking) Project

The purpose of the project is to test and introduce those ASON/GMPLS based intelligent network technologies and solutions that help to build up the future's ultra-wide research networks and fundamentally ensure the competitiveness of the European research networks.

GVOP 3.1.1 (Services over Advanced optical Networks)

The project analysis the advanced optical networks from the perspective of services with the primary objective to show the way from today's transport architectures towards the fully optical, service controlled intelligent optical networks. Among others, the project's objectives include the supporting of advanced high capacity services (Bandwidth on Demand, Virtual Private Networks, etc.), with assured end-to-end quality and reliability. Moreover, the scope of the project covers such aspects of optical networks, like: switching, control and management, reliability, network operations, QoS guarantees, end-user applications. Thus the activities include the testing of the existing network elements, controlling and management software, services and applications, and designing or developing of new ones according to need.

GVOP 4.4.2 (Construction of broadband network infrastructures by self-governments)

The project has the purpose of providing modern broadband Internet access services for small regions of self-governments or self-government associations. Magyar Telekom is involved in several such associations, as project partner, namely, as operator of the broadband network infrastructure to be built.