List of Projects

BRAIN (Broadband Radio Access for IP based Networks)

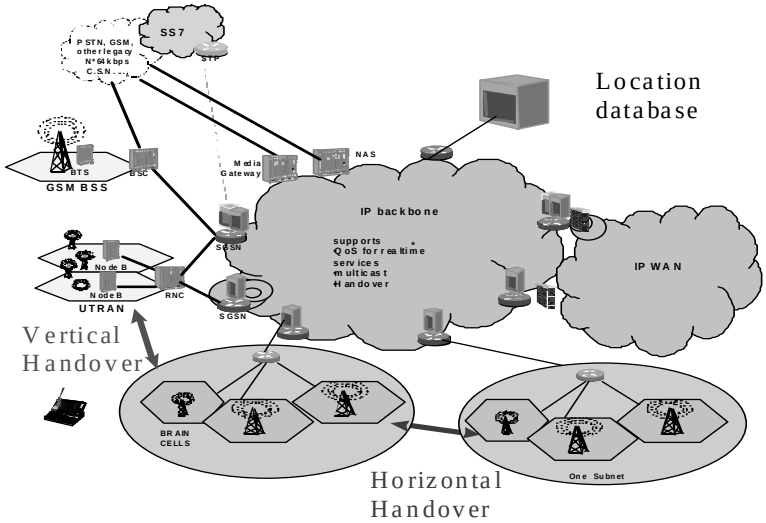
Project duration: 15 months
IST Action Lines: IV.5.2 "Terrestrial wireless systems and networks"
Clusters: Wireless IP, Radio Access, Mobile services and applications

Main Objectives

- To facilitate the development of seamless access to existing and emerging IP-based broadband applications and services for mobile users in global markets.
- To propose an open architecture for wireless broadband Internet access, which will allow an evolution from fixed Internet, emerging wireless/mobile Internet specifications and UMTS/GSM.
- To facilitate new business opportunities for operators, service providers and content providers to offer high-speed (up to 20 Mbps) services complementary to existing mobile services.
- To contribute actively to global standardisation bodies in the necessary timescales to impact significantly the international standardisation.

Technical Approach

BRAIN provides a broadband extension of cellular systems as GSM/GPRS/EDGE and UMTS up to 20 Mbps for hot spot applications. The BRAIN access network will be based on end-to-end IP for all real time and non real time services in public and private (corporate), licensed and unlicensed networks. The IP based core network connects all involved radio access schemes of the BRAIN architecture in a flexible manner. BRAIN will be applied in pico-cells as in-building and home cells and in urban and suburban cells. However, in the urban and suburban cells no full coverage is envisaged from the beginning. In these areas BRAIN will provide coverage, e.g., in hot spots as campus areas, conference centres, railway stations and airports. Full coverage with reduced data rates is being provided by GSM/GPRS/EDGE and UMTS. Therefore, these systems complement each other depending on the different radio environments and service needs.



BRAIN Network Architecture

For seamless service provision in the entire coverage area mobility functions will be proposed in the BRAIN approach (e.g. horizontal handover) as well as vertical handover between different access networks, e.g., UMTS including the negotiations of data rate and QoS. The figure shows the BRAIN vision of a fully IP-based communications network. It includes existing (GSM) and emerging networks, such as UMTS. BRAIN is a broadband extension to these; its radio interface, based on HIPERLAN Type 2 as the physical layer, provides the high speed, hot-spot, coverage with data rates up to 20 Mbps for the user. BRAIN also provides the required architecture to take IP all the way down to the base stations. The figure shows the integration of future and emerging technologies, including fixed-mobile convergence. BRAIN will therefore propose a wide range of integrated services across all

these platforms using IP. The BRAIN architecture will include signalling, mobility management, QoS etc. through the extension and analysis of IP protocols and the definition of the HIPERLAN Type 2 convergence layer for IP. The MAC layer of HIPERLAN Type 2 may be adapted to the needs of IP traffic if changes are necessary for an efficient use of the spectrum. The support of QoS in IP based mobile networks is an important issue of research in the BRAIN architecture. All traffic, including voice, is packet based.

Key Issues

- To define service scenarios based on user requirements and enabled by existing and future technologies.
- To identify the special requirements, including Quality of Service, of existing and evolving IP services and applications in different wireless mobile environments.
- To investigate, define and specify mechanisms for service scalability and application adaptation to support different radio access networks and environments.
- To define local and global mobility management in IP based networks.
- To design and specify mechanisms and protocols to support end-to-end QoS in a seamless manner.
- To define mechanisms for inter-working between BRAIN and the core network.
- To define requirements for a broadband air interface to support a data rate capacity of about 20 Mbps per cell which can be shared by the users dynamically.
- To evaluate the potential of HIPERLAN Type 2 in order to support the required QoS in an IP-based cellular network and identify the necessary enhancements on the physical layer, the data link control layer, and higher layers.
- To analyse the enhancements by means of link and system simulation.
- To assess the implementation complexity.
- To contribute actively to standardisation bodies and forums including ETSI, IETF and others relevant bodies.
- To disseminate results through major conferences, journals and through the Internet.
- To arrange a BRAIN workshop to promote BRAIN concepts as the core concept of mobile broadband multimedia.

Expected Impact

A new service creation platform is expected that brings the concept of Quality of Service up to the application and to the mobile user. For that purpose the access network requirements are specified. In addition current air-interfaces in conjunction with mobile IP technology are evaluated and their inter-working will be defined. The broadband air interface of the BRAIN radio access for IP-based networks as a complement to $2^{nd}/3^{rd}$ generation systems will be defined, improved and validated. The increasing demand for broadband data services requires the engagement of adaptive transmission techniques and the optimisation of the air interface for IP-based packet traffic. The results of BRAIN will be presented on international conferences, in journals and in a workshop organised by the project. A major part of the dissemination of results will be contributions of BRAIN concepts and results to the international standardisation process. It is expected to influence these standards significantly.

List of participants

Nokia Corporation	FI
France Telecom CNET	F
INRIA	F
NTT Mobile Communications Network, Inc.	Japan
Siemens AG	D
Sony International (Europe) GmbH	D
T-Nova Deutsche Telekom Innovationsgesellschaft GmbH	D
Agora Systems S.A.	E
Ericsson Radio Systems AB	S
British Telecommunications PLC	UK
King's College London	UK

Contact

Josef Urban
Siemens AG
ICN CA CTO 7
Hofmannstrasse 51
D-81359 Munich
Germany

Tel.: +49-89-722-24138
Fax: +49-89-722-44958
E-mail:
josef.urban@icn.siemens.de

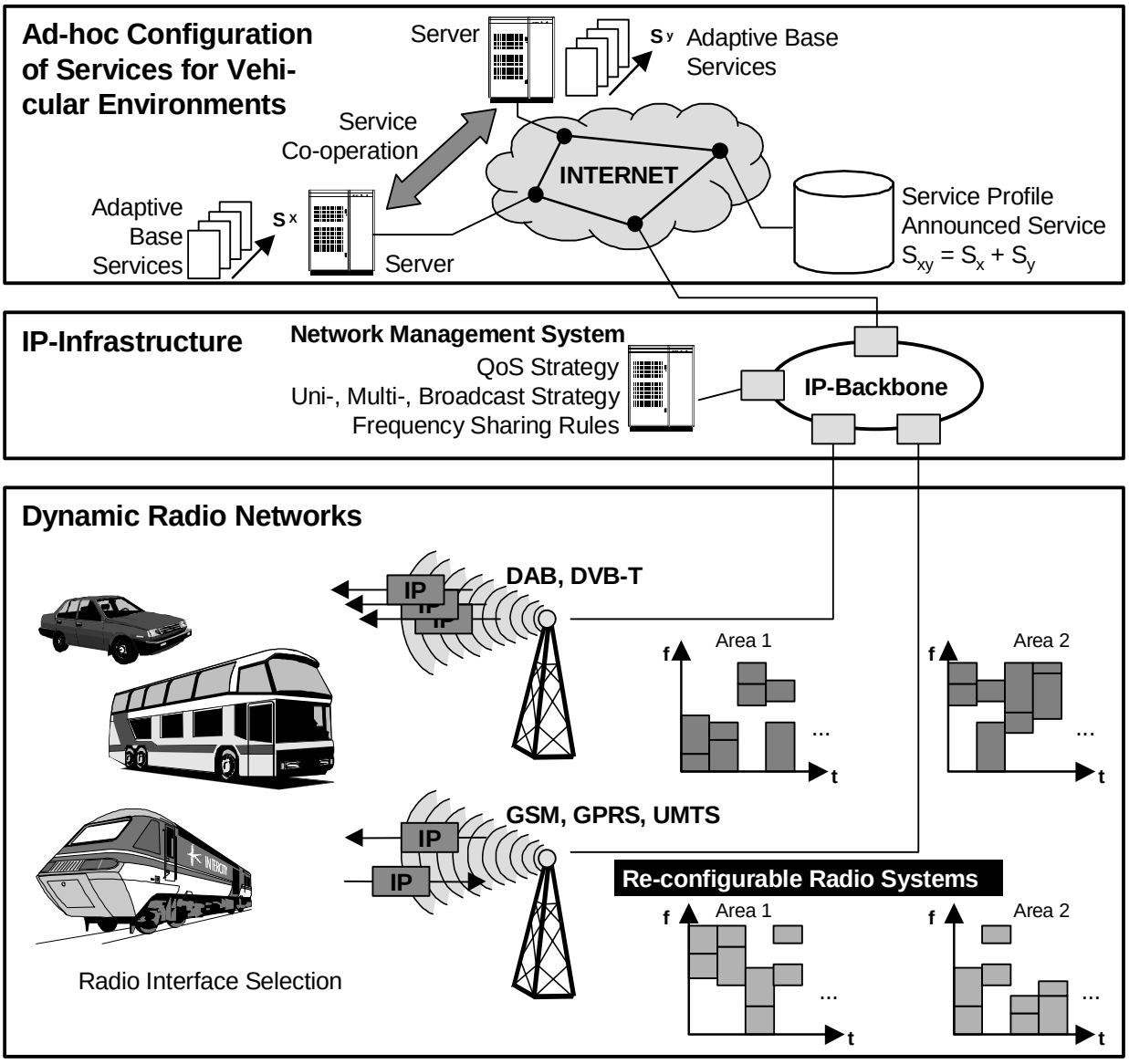
DRiVE (Dynamic Radio for IP-Services in Vehicular Environments)

Project Duration: 24 month
IST Action Lines: IV.5.2 –"Terrestrial Wireless Systems and Networks"
Clusters: Wireless IP, Location Technologies, Mobile Services and Applications

Main Objectives

The citizens' expectation for cost efficient provision of existing and emerging mobile multimedia services for information, education, and entertainment is faced with the reality of scarce radio resources. This discrepancy is especially true for the delivery of high-quality services to highly mobile environments such as cars, buses, and trains. The overall objective of the *DRiVE* project is to enable spectrum-efficient high-quality wireless IP in a heterogeneous multi-radio environment to deliver in-vehicle multimedia services, which ensure universally available access to information and support for education and entertainment.

To achieve this objective the *DRIVE* project addresses the convergence of cellular and broadcast networks to lay the foundation for innovative IP-based multimedia services.



Technical Approach

To reach these challenging objectives *DRiVE* is divided in four work packages:

- WP1 (dynamic radio aspects): develops methods for dynamic frequency allocation and for co-existence of different radio technologies (GSM, GPRS, UMTS, DAB, DVB-T) in one frequency band to increase the total spectrum efficiency and reach.
- WP2 (IP-infrastructure): realises an IPv6-based mobile infrastructure that ensures the optimised inter-working of cellular and broadcast networks. The IP-infrastructure will provide support for asymmetric communication, for uni-, multi-, and broadcast, for quality of service and for continuous service in case of hand-over.
- WP3 (services, implementation, and trials): develops adaptive services for a multi-radio vehicular environment, integrates the key concepts of *DRiVE* developed in WP1&2 to demonstrate them and validate the benefits by user trials and field test.
- WP4 (project management and dissemination): manages the project and co-ordinates the dissemination of the results , e.g. contribution to standardisation activities.

Key Issues

- Inter-working of different radio systems (GSM, GPRS, UMTS, DAB, DVB-T) in a common frequency range with dynamic spectrum allocation.
- Co-operation between network elements and applications in an adaptive manner.

Expected Impact

- Specifications for the co-operation of cellular and broadcast networks in a common frequency range with dynamic spectrum allocation.
- Estimate for the increase of overall spectrum-efficiency by using dynamic radio systems.
- IP-based mobile infrastructure that ensures optimised inter-working of radio networks for spectrum efficient provision of high quality multimedia services.
- Multimedia services for multi-radio vehicular environments.
- Demonstrations of key concepts of *DRiVE* and validation of the benefits of the technology by user trials and field tests.
- Influence on ongoing standardisation using the consortium member's presence in the corresponding bodies 3GPP, ETSI, IETF, ITU.

List of participants

Ericsson Eurolab Deutschland	D
Ericsson Mobile Data Design	S
BBC	UK
Bertelsmann	D
Bosch	D
RWTH-Aachen	D
DaimlerChrysler	D
Heinrich-Hertz Institut Berlin	D
Nokia	FI
University of Bonn	D
Tecsi	F
Teracom	S
VCON	IL
Vodafone	UK

Contact

Ralf Tönjes
Ericsson Eurolab Deutschland GmbH
Ericsson Allee 1
D-52134 Herzogenrath
Germany

Tel: +49 2407 575 7812
Fax: +49 2407 575 400

E-mail: Ralf.Toenjes@ericsson.com

URL: www.comnets.rwth-aachen.de/~drive

Moby Dick (Mobility and Differentiated Services in a Future IP Network)

Project duration: 36 months
IST Action Lines: IV.5.2: “Terrestrial Wireless Systems and Networks”
Clusters: Wireless IP, Mobile services and applications

Main Objectives

- To facilitate the development of seamless access to existing and emerging IP-based applications.
- To propose an architecture for wireless Internet access by developing new mechanisms for seamless hand-over, QoS support after and during hand-over, AAA, and charging.
- To facilitate new business opportunities for operators, manufacturers, services providers, and content providers for wireless, access, and backbone technology and services.
- To contribute actively to standardisation bodies, such as Internet Engineering Task Force and Internet Research Task Force.

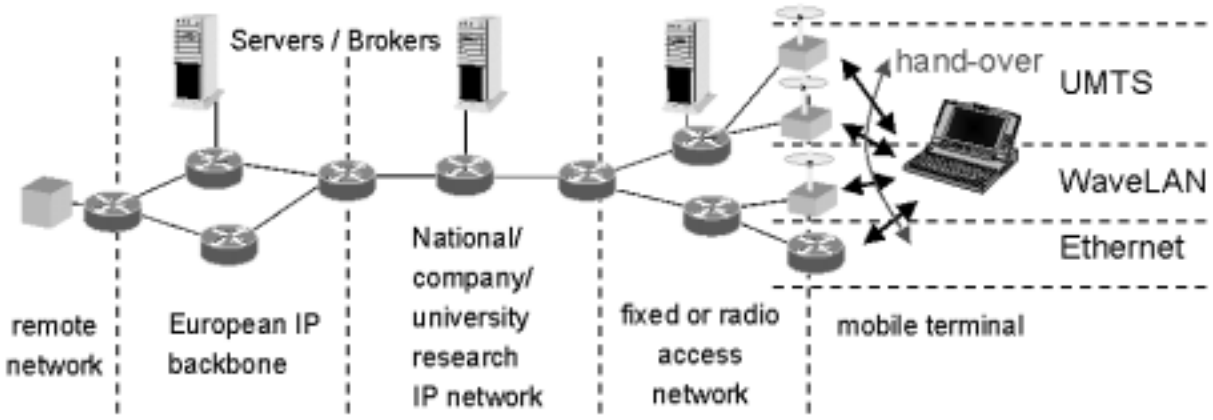
Technical Approach

In order to continue to evolve 3rd Generation mobile and wireless infrastructure towards the Internet - targeting IST 2000 IV 5.2 "Terrestrial Wireless System and Networks", the project Moby Dick will define, implement, and evaluate an IPv6-based mobility-enabled end-to-end QoS architecture starting from the current IETF's QoS models, Mobile-IPv6, and AAA framework. A representative set of interactive and distributed multimedia applications will serve to derive system requirements for the verification, validation, and demonstration of the Moby Dick architecture in a testbed comprising UMTS, 802.11 Wireless LANs and Ethernet. In case the existing applications or the underlying architectures do not provide what is required, the necessary modification will be undertaken.

Key issues

- Definition of a common architecture integrating QoS, IPv6 mobility, and AAA (out of the separate architectural approaches for each component currently provided by the IETF) with respect to wireless issues.
- Implementation and evaluation of an IPv6-based end-to-end technological approach to fulfil the requirements of present and future mobile communication services.
- Implementation and evaluation of QoS models (e.g. Differentiated Services) in highly dynamic and heterogeneous network topologies (understanding of QoS models is normally restricted to relatively static environments).
- Definition of a suitable charging concept which would enable permanent mobile IP based services on a large scale (a strong requirement related to AAA, but currently not a topic within the IETF).
- Trans-European trial to test the implementation by using SOKRATES-ERASMUS exchange students as test-users.
- Actively participate in IRTF (Internet Research Task Force) AAAArch (Authentication, Authorisation, and Accounting Architecture) working group, and monitor in particular ETSI, 3GPP (3rd Generation Partnership Project), MWIF (Mobile Wireless Internet Forum), IEEE (in particular 802.11).
- Follow and actively influence ongoing relevant IETF standardisation activities in particular in the working groups.

The evaluation of the implementation will be done in a distributed trial which will take place for six months.



Structure of the Trial Network

Expected Impact

The architecture is expected to support mobile IP end-to-end communication with QoS, seamless hand-over and all necessary AAA and charging mechanisms to satisfy the user and the network operator.

The implementation will be validated in a six months real environment field trial. The results will be presented in conferences, journals, and workshops. A major part of the dissemination will be the contribution to the standardisation bodies, IETF and IRTF, with a significant influence.

List of partners

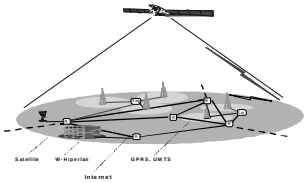
T-Nova Deutsche Telekom Innovationsgesellschaft mbH	D
Berkom	
NEC Network Development Laboratories	D
University of Madrid	E
Swiss Federal Institute of Technology in Zurich/Switzerland	CH
University of Stuttgart	D
GMD Fokus	D
Portugal Telecom Inovacao	P
Centre de Recherche de Motorola	F
Alcatel SEL AG	D
University of Cracow	PL

Contact person

Hans Joachim Einsiedler
T-Nova Deutsche Telekom
Innovationsgesellschaft mbH
Berkom,
Goslarer 35,
D-10589 Berlin,

Phone (+49-30) 34 97 35 18,
FAX (49 30) 34 97 35 19,
E-mail:
Hans.Einsiedler@telekom.de

SUITED (Multi-Segment System for Broadband Ubiquitous Access to Internet Services and Demonstrator)



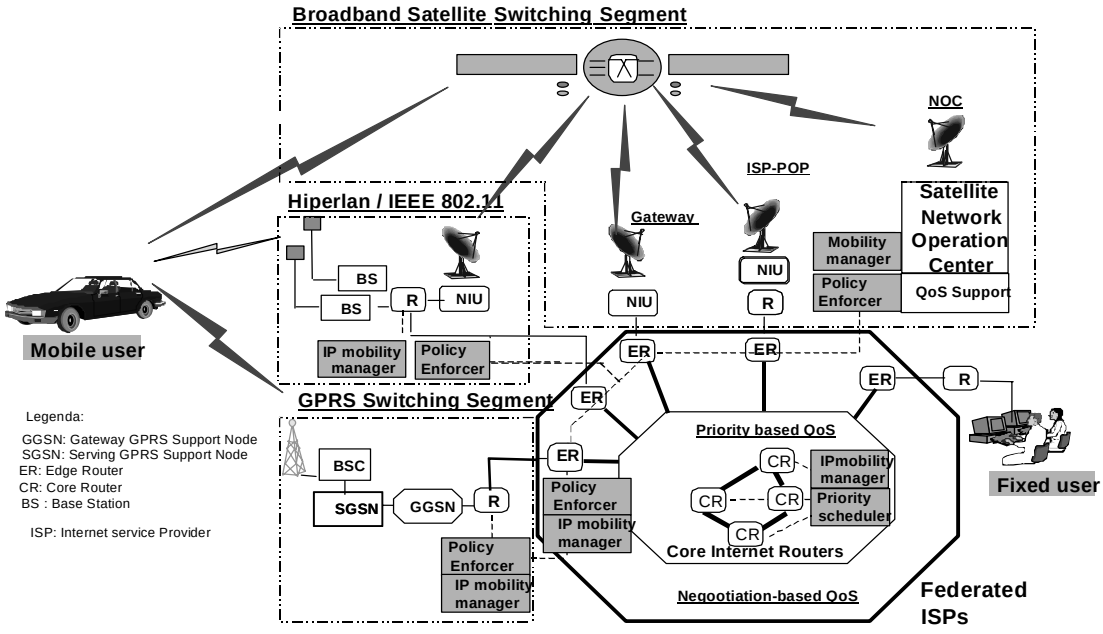
Project duration: 30 months
IST Action Lines: IV.5.3, IV.5.1, IV.2.3
Clusters: Wireless IP, Radio Access, User requirements for QoS specification of multimedia terminals

Main Objectives

The convergence of mobile and Internet Protocol (IP) based technologies is now the major driving force behind the research and development of future mobile technologies, services and applications. The SUITED project aims to make a significant contribution towards the understanding and development of IP based mobile networks consisting of both satellite and terrestrial (UMTS, GPRS, W-LAN) components. This integrated system is termed the Global Mobile Broadband System (GMBS). The goals of the project will be achieved through theoretical analysis, where issues including, network architecture, Quality of Service and Mobility Management will be addressed, and experimental work. The project will conclude with a comprehensive series of trials, using an integrated test-bed comprising of a prototype multi-segment infrastructure and a prototype multi-mode mobile terminal, capable of operating seamlessly with both satellite and terrestrial networks. Navigation capabilities will be integrated into the user terminal in order to enhance the performance of personal communication services and physical layer functions.

The project objectives can be summarised as follows:

- To define the network architecture with related performance evaluation for the provision of mobile Internet services over complementary satellite and terrestrial components
- To demonstrate the ability to provide QoS sensitive mobile services (e.g. QoS measured in terms of bandwidth availability, delay, packet loss, etc.) on advanced Internet scenarios
- To develop prototypal, multi-segment user terminals (car, large vehicles and portable versions)
- To develop a prototypal multi-segment network infrastructure capable of operating with the above mentioned terminals, based on the available Internet network upgraded to cope with the mobility, multi-segment and guaranteed QoS scenario
- To demonstrate and qualify the service with an extensive trial campaign involving complementary satellite and wireless terrestrial components, inter-working with an Internet segment, upgraded to provide support QoS and Mobility
- To integrate navigation capabilities, at terminal level, to improve relevant capabilities and offered services
- To expand / further exploit the results of the related ACTS projects: SECOMS/ABATE, ASSET and ACCORD



The Global Mobile Broadband System Target System Architecture

Technical Approach

System & Service Requirements activity will define the context in which the GMBS will operate and specifies the requirements the Internet services, the regulatory bodies, and the Internet market, impose onto the GMBS. This activity is devoted to a preliminary identification of service and system requirements, including service typology, user population estimates (strictly related to the service tariff), required aggregate capacity, as well as network and element requirements.

GMBS definition activity will define its capabilities and evaluate its performance. QoS sensitive services to be deployed on the Internet will be considered, and the network architecture will be consequently defined around the provision of such services to the mobile user. The requirement and design of the inter-segment mobility management system will be specified and formally validated. The most critical capabilities related to the inter-working between the Internet and the GMBS for the support of QoS sensitive, mobile services will be investigated. The GMBS terminal Specification and Design will be performed using, as far as possible, taking into account the existing standards and system parameters.

Equipment Development is devoted to the design, implementation and integration of the elements (IP based network infrastructure and terminals) for the system demonstrator, adopting the specifications worked out in the framework of WPG 3000. In particular the representative Internet sub-network will be developed upgrading the existing routers with the most promising protocols for the IP mobility and QoS support.

Trials will be performed in open, rural, suburban, urban and indoor environments. In particular transition between the above mentioned environments will be experimented. Comprehensive evaluation of the trials' results will be carried out, with the target to work out optimal signalling procedures and triggering for handover and access selection. The evaluation and definition of optimised procedures for both personal and terminal mobility will be based on the findings of the trials, amongst which, procedures such as automatic communication segment selection, segment handover and location updating will be included.

Key Issues

- Definition and validation of the main concepts of a wireless communication infrastructure, the Global Mobile Broadband System, which will be composed by a diversified set of segments to cover any possible user environment, rural/urban/in-door,
- Definition of the synergies between the Internet logical network and the GMBS physical network for an optimal provision of mobile, QoS guarantee, Internet services
- Design and prototyping of families of multi-mode terminals for the GMBS network infrastructure

Expected Impact

- System and service requirements for the GMBS as part of the new generation broadband mobile Internet
- Optimisation of the existing IETF standards for the mobile terrestrial and satellite business users
- Definition of the GMBS network architecture and performance evaluation from a service and network perspective
- Prototype of the multi-mode terminals including both a satellite section and wireless terrestrial components
- Processing of the results of the validation campaign qualifying the GMBS performance against the required Internet QoS

List of participants

Siemens AG Osterreich	A
SmartMove	B
Duetsches Zentrum fur Luft- und Raumfahrt	D
TTI Norte S.L.	E
Alenia Aerospazio	I
Consorzio di Ricerca sulle Telecomunicazioni	I
Etnoteam S.p.A.	I
Space Software Italia	I
Telital S.p.A.	I
Universitá di Perugia	I
Universitá di Roma I La Sapienza	I
Universitá di Roma II Tor Vergata	I
University of Bradford	UK

Contact

Giacinto Losquadro
Space Division - Network Engineering Unit
Alenia Aerospazio
Via Bona 85
00156 Rome
Italy

Tel: +39-06-4151-485, secr. ext: 498
Fax: +39-06-4151-297

E-mail: g.losquadro@roma.alespazio.it
URL: www.alespazio.it/eurosk/eurosk.htm

WINE GLASS (Wireless IP Network as a Generic Platform for Location Aware Service Support)

Project duration: 24 months
IST Action Lines: IV.5.2 "Terrestrial wireless systems and networks"
Clusters: Wireless IP, Mobile Services and Application

Main Objectives

This Project aims to contribute to the technical innovation and EU policies of the Community by exploiting the potential of IP-based wireless mobile multimedia networking with UMTS and WLANs. The objective of the Project is to exploit enhanced and/or new IP-based techniques to support mobility and soft-guaranteed QoS in a wireless Internet architecture incorporating UMTS and WLANs, and to explore their potential in enabling location- and QoS-aware application services for wireless mobile users. By its completion, the Project will have developed a wireless Internet testbed incorporating an IP backbone, UTRAN access to IP-based core network, and WLAN access to intranets, as a means to investigate, develop, test, integrate, validate and evaluate such innovative techniques and applications. Currently proposed techniques, such as Mobile-IP, IntServ, DiffServ, H.323, etc., are either non-scaleable or immature. As a result of this Project, more advanced techniques, together with ideas of their enabled location- and QoS-aware application services, should be submitted to 3GPP, SMG and IETF as contributions in UMTS and mobile multimedia Internet respectively.

Technical Approach

This Project will exploit the potential of IP-based wireless mobile multimedia networking in both public and business contexts, by means of UMTS and WLAN respectively. The wireless Internet testbed will be constructed around an IP backbone, which could as well be the Internet. The UMTS environment will be composed of IP-based UMTS core network with emulated W-CDMA-based UTRAN access. The WLAN environment will be made up of intranets with commercial WLAN access.

With this testbed, support of mobility and soft-guaranteed QoS will be investigated at the IP level in both the contexts of the IP backbone and IP-based UMTS core network. The Project will also address such support in the UMTS W-CDMA FDD mode. Besides, also investigated will be the associated issues that may arise in the inter-working of mobility and QoS between UMTS, WLAN and the IP backbone.

Location- and QoS-aware application services will be conceived to exploit the support of mobility and soft-guaranteed QoS offered by the underlying wireless Internet architecture. Specifically, session/call control, possibly based on SIP/RTSP or H.323, will be enhanced to incorporate capability negotiation and location information functionality.

This Project will be realised in two phases. Phase 1 technical activities will concentrate on technical requirements and expected results for the Project; hardware and software development and integration requirements for the wireless Internet testbed; assessment of intermediate research results with respect to mobility support in the wireless Internet architecture and location-aware application services. Technical activities in Project phase 2 will include final integration of the wireless Internet testbed; assessment of final research results with respect to support of mobility and soft-guaranteed QoS in the wireless Internet architecture, as well as location- and QoS-aware application services.

During the Project, feedback from continuous technical assessments to technical development will take place as frequently and as timely as necessary to ensure high quality of the Project results. In dissemination of its results, this Project will contribute to 3GPP, SMG and IETF and participate in relevant IST concertation and clustering.

Key Issues

- Integration of wireless access networks (UTRAN and WLAN) and the IP-based backbone in a convergent scenario involving a variety of service contexts.
- Definition of service schemes suited for location-aware applications in an integrated wireless-IP context.

Expected Impact

The 1999 IST Workprogramme identifies clearly the basic innovation paths for mobile and wireless communication. They can be summarised in the need of:

- developing service control tools able to guarantee that personal and mobility services can be used in a seamless way, within a variety of environments and under the established location-dependent service profiles;
- improving the technical basis for a convergent configuration of the wireless platforms, based on a complete integration of the advanced radio access systems with the IP-based networks;
- identifying and evaluating new service support architectures, offering the necessary quality of service levels (e.g. delay, integrity) within the performance levels guaranteed by the underlying network platforms.

The WINE GLASS Project aims at contributing to the construction of the above perspective through the implementation of real configurations and services and the emulation of real-time environments. Two levels of investigation will particularly be addressed, namely the Wireless IP Network integration and the relevant service support functions.

Besides, contribution to standard bodies (3GPP, SMG and IETF) and pertinent publications constitutes the foreseen exploitation of Project results to the Telecommunication and IT communities.

List of participants

CSELT S.p.A.	I
Alcatel SEL AG	D
CISCO UK Ltd.	UK
IHP	D
IMST GmbH	D
Motorola Ltd.	UK
Motorola S.A.	F
Philips B.V.	NL
UPC	E

Contact

Ermanno Berruto
Mobile Division – Systems and Services
CSELT S.p.A.
Via G. Reiss Romoli 274
10148 Torino
Italy

Tel: +39 011 228 5038
Fax: +39 011 228 7056
E-mail: ermanno.berruto@cselt.it

6INIT (IPv6 INternet IniTiative)

Duration: 16 months
Action line: “Network integration, interoperability and interworking”
Clusters:

Main Objectives

The objective of the 6INIT project is to validate the introduction of the NEW INTERNET in Europe based on the new Internet Protocol version 6 (IPv6), which offers a solution for current problems in space address limitation, quality of service, mobility and security. The 6INIT project will lead to the set-up of a first European operational platform providing customers with native IPv6 access points and native IPv6 services. 6INIT is a co-ordinated initiative of the major European Telecom companies, equipment manufacturers, solutions / software providers and research labs that will lead to provide production IPv6 transit service to facilitate high quality, high performance, and operationally robust and secure IPv6 networks in view of wider deployment of European E-commerce and convergence.

Technical Approach

The primary works of the 6INIT project will be to: - deploy an operational Trans-European IPv6 packet delivery service - provide a set of multimedia services including: IP telephony and videophony, multimedia web services - develop operational procedures for IPv6 networks and for IPv4 to IPv6 network and application migration - promote early IPv6-ready application testing and deployment - develop Access Devices which allow seamless IPv4-V6 transition, differentiated services and VPN services.

Key issues

The key issues addressed in this project are:

- Definition of fixed network architecture for next generation networks to provision seamless IP services with security and QoS
- Integration of IPv6 protocol suites to next generation networks
- Assess the technology that allows the rapid deployment of services and protocols for chosen architecture and application
- Implement a testbed with available and prototype products to demonstrate the technologies with selected applications and validate the exploitability of new technologies.
- Bring awareness of these new technologies and applications, and their possible impact on the user community

Expected impact

The expected result should be the validation of the New Internet based on IPv6, demonstrating the crucial benefits of the IPv6 features including quality of service (QoS) and Security.

List of Participants **Contact**

Ericsson Telebit A/S	DK	Latif LADID
British Telecommunications plc	UK	
Industrieanlangen-Betriebsgesellschaft mbH	D	Ericsson Telebit A/S
Intracom S.A., Hellenic Telecommunications and Electronics Industry	EL	Fabrikvej 11 8260 Aarhus (Viby.J)
Nordic Financial Products Ab	FIN	Denmark
Oy Netmedia Finland Ab	FIN	
T-Nova Deutsche Telekom Innovationsgesellschaft mbH - Leistungszentrum Berkom	D	Tel: + 45 86 28 81 76
TELSCOM A.G	CH	Fax: + 45 86 28 81 86
THOMSON-CSF DETEXIS SA	F	e-mail: latif.ladid@tbit.dk
Telia AB	S	
University of Southampton	UK	

6WINIT (IPv6 Wireless Internet Initiative)

Duration: 24 months
Action line: "End-to-End Application Experiments"
Clusters:

Main Objectives

The principal objectives of the 6WINIT project are the following:

1. To validate the introduction of the NEW MOBILE WIRELESS INTERNET in Europe - based on a combination of the new Internet Protocol version 6 (IPv6) and the new wireless protocols (GPRS and UMTS/3GPP).
2. To validate the integration of the protocol suites in (1) into real applications by running complete application testbeds.
3. To ensure that the implementations of (1) are generic, and not specific to a particular supplier or operator.
4. To ensure that the validation applications of (2) are not too tied to specific choice of applications.
5. To ensure that the international perspective is maintained.

We aim to choose as applications some generic, but important ones. In addition we wish to consider a specific domain in depth for some applications testbeds, and have settled on the Healthcare and Business applications.

We intend to avoid being tied to specific operators or suppliers, by ensuring that our applications work with different networks. Moreover, by including international partners from Asia Pacific and North America, we hope to avoid being too insular in our approach considering the international dimension of the technologies involved.

Technical Approach

In this project, our primary focus will be on application areas where wireless access is important. We will establish IPv6 Testbeds, which will allow us to:

- Define operational procedures for IPv6-2/3G networks, for IPv4 - IPv6 network and application integration;
- Establish mechanisms to aid in the transition from IPv4 to IPv6 technology;
- Investigate the problems in providing a Trans-European operational IPv6-2/3G mobile wireless packet delivery service;
- Provide a set of applications and services including: Healthcare, 3G IPv6 telephony and multimedia wireless services;
- Promote early IPv6-3G ready application testing and deployment;
- Implement Access Devices (3G handsets) and edge devices in the network components that allow such services;
- Provide a testbed environment, so that applications from other Framework or National programmes can be deployed experimentally and evaluated in a widely distributed environment;
- Provide feed back on our results to Standards bodies in the Internet, Wireless and Healthcare communities.

We will set up a true systems project, in which all the above can be investigated – though we will obtain as many components as possible from other projects, and to use basic communication networks established from other sources. We would also expect the testbed to be also available to others projects.

We will be using as generic applications the following: the Road Warrior, multimedia services, streaming media services, wireless connectivity to a weather station, and mobile e-commerce.

We will be using as clinical testbeds four hospital sites in Germany, Poland, Switzerland and the UK. The clinical applications include: mobile access to patient information, tele-consultation of vital data from ambulances, mobile care for patients in the community after surgery, and clinical education.

Key issues

The key issues addressed in this project are:

- Definition of fixed-mobile network architecture for next generation networks to provision seamless IP services with security and QoS
- Integration of IPv6 protocol suites to next generation mobile network
- Assess the technology that allows the rapid deployment of services and protocols for chosen architecture and application
- Implement a testbed with available and prototype products to demonstrate the technologies with selected applications and validate the exploitability of new technologies.
- Bring awareness of these new technologies and applications, and their possible impact on the user community

Expected impact

The major impact of 6WINIT is in strengthening the leading role of Europe in both IPv6 and Mobile technologies deployment by providing the pre-commercial pilot network implementation and operating with involvement of real users, operators and service providers.

Addressing the health care sector application, the project brings together technologists and application domain experts, that should lead to better quality of life.

Contribution to standards both in wide area networked systems and in the emerging communication architecture

List of Participants

University College London	UK
6WIND S.A.	F
Akademia Gorniczo-Hutnicza Im. Stanislawa W Krakowie	PL
British Telecommunications plc	UK
Eberhard-Karls-Universität Tübingen	D
Ericsson Radio Systems AB	S
Ericsson Telebit A/S	DK
T-Nova Deutsche Telekom Innovationsgesellschaft GmbH	D
Technical Research Centre of Finland	SF
Telscom A.G.	CH
Universität Stuttgart	D
Ericsson Sp. z o.o.	PL
Industrieanlagen-Betriebsgesellschaft GmbH	D
Universität Bremen	D
University of Southampton	UK

Contact

Peter Kirstein

University College London
Gower Street
WC1E 6BT London
United Kingdom

Tel: + 44 20/76-79-72-86
Fax: + 44 20/73-87-13-97
e-mail: Kirstein@cs.ucl.ac.uk

LONG (Laboratories over Next Generation Networks)

Duration: 24 months
Action line: "Testbeds for advanced networking and application experiments"
Clusters:

Main objectives

LONG aims to foresee and solve problems related to the design, configuration and deployment of Next Generation Telecommunication networks specially when new services and applications are carried out across them.

The new version of the IP protocol, IPv6, will become an integral part of these Next Generation networks. In addition to this, the proliferation of new high bandwidth and asymmetric access technologies, like ADSL and CATV, will also shape the network design of these Next Generation Networks. On the other side, applications must be aware of the advanced services provided by the networks and protocols, and must take into account the impact of the underlying network. LONG aims at gaining an in-depth knowledge in the design and deployment of IPv4/IPv6 transition scenarios, as well as in the operational inter-working when heterogeneous access (ADSL, CATV, ISDN) and transport (IP/ATM, IP/SDH, IP/WDM) technologies are in place. The integration of IPv6 with advanced network services will be validated in LONG.

On the other hand, LONG focuses on extending the framework of applications, so that they benefit from the services provided by these Next Generation networks. In order to achieve these goals, LONG faces the following objectives:

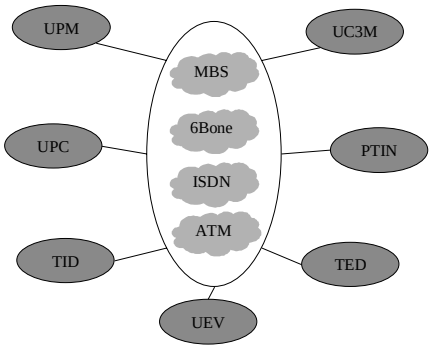
- To deploy a Next Generation testbed.
- To adapt and validate a representative set of applications to the Next Generation Network scenarios.
- To perform trials and experiments.
- To develop guidelines for migration of networks and applications and disseminate results.

Technical Approach

The LONG objectives will be fulfilled by a set of distinct Workpackages.

Network Design and Deployment will ensure that a high performance testbed is in place. The testbed will connect the partners using the pan European research network infrastructure and will incorporate IPv4/IPv6 migration scenarios and advanced services like QoS, multicast, mobility or security. LONG will identify and select the mechanisms to provide these scenarios and services. The incorporation of a mixture of different access (ADSL, CATV, ISDN) and transport technologies (IP/ATM, IP/SDH, IP/WDM) will be one of the design goals. Collaborative Work Environment will adapt and validate representative applications to the next generation network scenarios, e.g. ISABEL, standard services, MBONE applications, etc. The interoperability with the IPv4 versions will be preserved. Prior to the adaptation, the network and service requirements for the Next Generation applications will be established. System Exploitation, Trials and Evaluation will perform trials and experiments over the platform deployed making use of the adapted applications. These trials will help to fine tune the design and to elaborate recommendations. These recommendations will be produced in the corresponding Work Packages taking as input the trials and experiments performed. LONG will produce recommendations related to: IPv4/IPv6 transition, IPv6 and advanced services integration, the inter-working of heterogeneous access scenarios and the adaptation of applications to the Next Generation networks. The dissemination of results will be made in the relevant fora by the Dissemination and Implementation workpackage. The Project Management will guarantee the correct progress of the work.

The project plans to co-ordinate and exchange experience and results with other relevant projects in the area. Candidates are 6INIT, ARMSTRONG and GCAP.



International connectivity of LONG platform

Key issues

IPv6 is being seriously considered as a real fact for Next Generation Networks, which are going to be developed. It includes some new advanced mechanisms such as autoconfiguration, security, QoS, better multicast support and mobility. The main point is that every IPv6 node has these mechanisms ready to activate by default, so that developing such services will be easier and more cost effective since no additional software needs to be installed in any node.

The transition from IPv4 to IPv6 involves a period in which some mechanisms are needed to guarantee the connectivity among IPv4/IPv6 clients and IPv4/IPv6 servers throughout IPv4/IPv6 networks. The IPv4-IPv6 Transition mechanisms are being defined and developed to guarantee the interaction of IPv4 and IPv6 nodes and networks.

LONG aims at studying and testing all these key issues. Since all participants have some know-how and experience with IPv6 and some of them have experience with Transition Mechanisms the first step is setting up an IPv6 platform where the main mechanisms will be studied. Also the new advanced IPv6 network services will be studied and tested, especially QoS and multicast. The IPv4-IPv6 migration of applications is planned at two levels:

- To adapt a set of applications from IPv4 to IPv6.
- To really migrate/deploy applications to use the advanced services provided by the IPv6 stack.

One of the applications, which are going to be migrated to IPv6, is ISABEL (http://isabel.dit.upm.es) which is a tele-conference and tele-meeting application which has been successfully used with IPv4. The idea is not only to adapt the application but study how these real time applications can be improved with the advanced IPv6 properties.

Once ISABEL is migrated to IPv6, LONG participants expect not only to do internal project tests and tele-meetings but also to distribute public events to some sites not participating in the LONG project (from other IST project members for instance).

Expected impact

Today many people are aware of present IPv4 Internet and IPv4 networks problems and limitations but are not aware of the stability and maturity level that IPv6 has reached.

In this way, LONG will provide an IPv6 platform among participants and documents related to IPv4-IPv6 migration and IPv6 new advanced network services usage. Also some experiences related to IPv6 in new advanced network technologies (ADSL, CATV, ISDN) will be documented.

But the most visible impact of LONG project will be the distribution of public workshops and conferences using an IPv6 network platform and an advanced real time IPv6 application. This will be the most effective way to show the real status of the IPv6 environment and will produce a lot of experience in the new real time services which could be the "killer-applications" of Next generation Networks.

List of Participants

Telefonica Investigacion y Desarrollo S.A. Unipersonal	E
Ericsson Telebit A/S	DK
Portugal Telecom Inovação, S.A.	P
Universidad Carlos III de Madrid	E
Universidad Politecnica de Madrid	E
Universitat Politecnica De Catalunya	E
Universidade de Evora	P

Contact

Carlos Ralli Ucendo

Telefonica Investigacion y Desarrollo
C/ Emilio Vargas, 6
28043 Madrid
Spain

Tel: + 34 91/337-45-63
Fax: + 34 91/337-43-52
e-mail: ralli@tid.es

SEQUIN (SErvice QUality across Independently managed Networks)

Duration: 15 months
Action line: “Testbeds for advanced networking and application experiments”
Cluster:

Main Objectives

The objective of SEQUIN is to define and implement an end-to-end approach to Quality of Service that will operate across multiple management domains and will exploit a combination of IP and ATM technology.

SEQUIN will ensure that researchers across Europe have access to networking facilities that can be tailored to the requirements of individual groups and which will offer predictable and stable quality across multiple underlying management domains and networking technologies.

Technical Approach

Project SEQUIN consist of five work packages (WP):

- WP1 will ensure a smooth and effective project management and includes all activities related to the project management, such as financial management, project administration functions as well as the co-ordination with the EC. This work package also includes external relations for the effective dissemination of the results of the project.
- WP2 will, as a first step in the project work, provide for a definition of Quality of Service which is independent of the underlying networking technology. The work package will include a definition of an end-to-end service that can be implemented in a multi-management domain environment and across Europe.
- In parallel to WP2, WP3 will define a test bed environment that can be used to implement and test end-to-end Quality of Service across multiple underlying technologies and management domains.
- The main activity of the project is WP5. This work package will create an operational test network interconnecting the participating national research networks according to the plans set out in WP3, and making use of the current (June 2000) pan-European research infrastructure, TEN-155. A Virtual Private Network will be established and an appropriate set of tests will be carried out to determine the feasibility of the Quality of Service definition as defined in WP2.
- WP4 will set out proposals for dissemination of the results including plans for the broader implementation of the Quality of Service approaches pioneered in SEQUIN. It will recommend the parameterisation for the different underlying technologies and will address the operational as well as the technology lessons learned during the test phase.

Key issues

- Ability to provide predictable and guaranteed Quality of Service services over IP.
- The range and type of QoS that should be implemented.
- Capability of hardware to support these services.
- Manageability from a user perspective.

Expected impact

Implementation of one, or possibly two, types of IP based QoS within GÉANT and the connected networks.

List of Participants		Contact
Delivery of Advanced Network Technology to Europe Limited	UK	Dai Davies
Groupe D'intérêt Public Réseau National de Télécommunications pour la Technologie, l'enseignement et la Recherche	F	Delivery of Advanced Network Technology To Europe Francis House, 112 Hills Road CB2 1PQ Cambridge United Kingdom
INFN - Istituto Nazionale di Fisica Nucleare	I	
SWITCH-Teleinformatikdienste Fuer Lehre Und Forschung	CH	Tel: + 44 1223/30-29-92
The JNT Association	UK	Fax: + 44 1223/30-30-05
Verein Zur Förderung eines Deutschen Forschungsnetzes - DFN-Verein	D	e-mail: Dai.Davies@dante.org.uk

WINE (Wireless Internet Networks)

Duration: 24 months
IST Action Lines: IV1.1, IV2.3, IV2.4, IV5.2, IV5.4
Clusters: Radio Access, Wireless IP

Main Objectives

WINE´s main aim is to build fully IPv6-based globally optimised wireless Internet environment with QoS awareness. To reach this, WINE will have sub-tasks heading to the main aim. First, we aim to implement three testbeds with simulation models dedicated for specific environments and current IPv4/v6 implementations. Second, we aim for solid theoretical understanding of wireless Internet environments. This knowledge will be verified and based on practical tests on testbeds and simulation models and large scale research networks. Based on previous results we aim to implement true wireless Internet solution that is as far as possible radio link independent. We are building wireless IP adaptation layer, that is configurable so that it can be optimised for different platforms and links. Above the layer objective is to implement wireless Internet protocol fully compatible to current Internet world.

Technical Approach

Our study shall be done with three complementary approaches. First, we study theoretical issues in wireless IP with protocols, queuing models etc. Second, large simulations and case studies over research networks are done to verify theoretical results and to gain extra information on large-scale network environment. Third, we are implementing our results into different underlying communication hardware platforms. The test radio links shall include Bluetooth, HiperLAN-2 and IEEE802.11. These three very different platforms shall be our official testbed environment. Moreover during the project some partners might use their existing complementary networks to test developed protocols, for these extra tests we are not applying EU funding.

WINE is divided into four work packages that comply with our approach providing clear continuity of work and natural overlapping of certain tasks. Project main line in administration and technical management is done in WP1. The specification workpackage (2) will provide basis of the work starting from current knowledge of the consortium and other research world and continuing to specification of wireless Internet architecture and testbed environments. Testbed implementation workpackage (3) will be implementing three testbeds and implementations of TCP/IPv4 and TCP/IPv6. In parallel of testbed environment implementation, network simulation models we will be produced. Extensive performance tests and analysis for implemented testbeds will be conducted. Based on performance analysis we will update our simulation models. Finally, in the workpackage four we will implement our results into globally optimised end-to-end wireless Internet network solution including most of the required system components. We will validate our solution in three different testbeds implemented in workpackage three. Finally we intend to finalise our specification and produce contributions for relevant standardisation organisations such as ETSI and IETF

Key Issues

- Development and research on true, transparent Wireless Internet Connectivity. This is to be verified with actual prototype systems
- Global end-to-end transmission optimisation
- The transmission is based from the start existing Internet philosophy and namely IPv6 protocols, not to WATM (i.e. IP-over-ATM solutions)
- Build wireless and cellular IP-networks
- Development of an adaptation layer to allow the transparent IP services provision over different air-interfaces.
- Three very different platforms will be used to demonstrate the results; Bluetooth, HiperLAN-2 and IEEE802.11

Expected Impact

End-to-end optimisation with the wireless TCP/IP traffic taking into account *all* aspects of broadband wireless communication, networking research, radio channel information, and wireless protocol knowledge to collaborative R&D. New protocols at network and link layers to improve throughput and reduce latency of the wireless link, keeping transparency with upper layer protocols will be proposed. Other encapsulation schemes will be investigated in order to make the transmission of IP traffic more efficient by not transmitting unnecessary IP header fields in each packet (such an approach may also find use in the design of fast packet switching and routing). Several Internet drafts will be submitted to IETF for identified wireless IP improvements based on measurements and simulation results, and Request for Comments if Internet drafts are accepted.

List of partners

Technical Research Centre of Finland	FIN
Philips S.p.A. – Italy	I
UNIVERSITA' DI ROMA "LA SAPIENZA"	I
ALLIANCE QUALITE LOGICIEL	F
COGEFO CEFRIEL	I
Intracom S.A.,	GR
Advanced Communications R&D	E
The Queen's University of Belfast	UK

Contact person

Petri Mähönen
Technical Research Centre of Finland
Kaitovaeylae 1
90571 Oulu
Finland

Tel : +358 8 5512493
Fax : +358 8 5512320
e-mail : petri.mahonen@oulu.fi

AQUILA (Adaptive resource control for QoS Using an IP-based Layered Architecture)

Duration: 36 months
IST Action Lines: IV.2.3, IV.2.4
Clusters: Internet Infrastructure, Premium IP

Main Objectives

- To enable dynamic end-to-end QoS provisioning in IP networks for QoS sensitive applications.
- To continuously analyse customer requirements and market situations and to create applicable business plans.
- To design a cost-effective, scalable and backward compatible QoS architecture enhancing the Differentiated Services architecture with dynamic resource and admission control.
- To enable migration to and deployment of QoS-enabled networks.
- To develop a novel resource control layer extending Bandwidth Broker functionality
- To implement prototypes of the QoS architecture as well as QoS based end user services
- To provide a toolkit for migration of end user applications to QoS
- To create tools for QoS monitoring and management.
- To develop and integrate a distributed QoS measurement infrastructure
- To validate the architecture in testbeds and user trials.
- To contribute to standardisation bodies like IETF (Internet Engineering Task Force), ITU (International Telecoms Union), OMG (Open Management Group).
- To keep the project open for new concepts and recent developments

Technical Approach

The AQUILA project aims to define, implement and evaluate a new enhanced architecture for Quality of Service provision over IP networks using as basis existing approaches to QoS specified for the Internet. The achieved technical solutions will be verified within testbeds and trials involving end users. The trials will include QoS-supported multimedia services. The proposal mainly contributes to the objectives of Key Action IV.2.3 (Network integration, interoperability and interworking). Additionally, it covers some of the objectives of Key Action IV.2.4 (Technologies for network management and service-level interworking). The use of the world-wide accepted Internet Protocol (IP) enables the seamless interconnection of multiple heterogeneous networks and components. On the other hand, IP was not designed to support QoS. In this sense, the requirements of advanced multimedia telecommunication services are not completely fulfilled. In this context, the proposal will design and develop a service-independent QoS architecture providing an extra layer for resource control. It aims to ensure migration from existing networks and interoperability between heterogeneous networks. In principle this architecture can be used by any IP application as it provides several options for QoS support. The proposed architecture will be cost-effective, efficient, scalable and backward compatible for the provisioning of QoS in IP networks. The project is structured into 3 workpackage groups (WPG) and 9 technical workpackages. WPG "system architecture and traffic issues" deals with requirement analysis, specification, traffic studies and engineering. WPG 2 "prototype implementation" develops prototype systems for service and resource control, applications and user services, test utilities. WPG 3 "integration and trial" deals with system and network integration, trials/measurements and exploitation/business models.

Key Issues

The current Internet architecture is not designed to support QoS per se and there exist different approaches for providing QoS over IP-based networks. Due to the different underlying mechanisms of these approaches and the complexity of end-to-end QoS, there is currently no solution suitable for global operation. In particular, management of these QoS mechanisms and the provisioning of inter-domain QoS are open issues. The most important approaches are the following:

- Optimised IP traffic over ATM (e.g. MPOA, IP Switching).
- Integrated Services (IntServ).
- Differentiated Services (DiffServ).

- Multi Protocol Label Switching (MPLS).
- QoS Routing.
- Bandwidth over-provisioning.

Most of the above mentioned technical solutions on how to bring QoS into IP networks are still under discussion. Some of them are divergent, while some are complementary. No integrated scaleable solutions are available right now. Furthermore, management and interoperability aspects of the mentioned approaches are currently treated poorly.

There is a strong need to make new technical features accessible to users in a customer friendly manner. Technical details should be hidden to the user. This is of growing importance since more and more new applications will include QoS sensitive components. For the wide range of traditional applications, we need customer-friendly ways to use them properly with the new network QoS interfaces.

Expected Impact

The well-known challenge for this project is to provide reliable Quality of Service (QoS) by using current IP technologies. The new architecture to be developed by this project shall provide a similar degree of interoperability for heterogeneous networks as current IP, but on the higher layer of resource control for IP networks. The project will take up and further develop some promising new concepts that came up recently (and very rapidly) and were applied in the US prototype networks for “Internet2”. Europe currently needs more activities towards future IP networks. The proposed project aims at providing a significant European research contribution to this area. The proposed project will contribute in three different aspects. *Technically*, the project will focus on a highly scalable architecture that can be introduced by relatively small migration steps on top of existing infrastructure, using results from other European research projects. *Economically*, the project focuses on commercial usage of the network by high numbers of end-users (mainly private persons and small or medium enterprises) in contrast to the US-approach of an academic research network. *Methodically*, the project faces the problem of aiming at a rapidly moving target, and therefore provides mechanisms for dynamic fine-adjustment of some project objectives during its execution.

List of partners

Siemens Aktiengesellschaft	D
Bertelsmann Media Systems Gmbh	D
Coritel - Consorzio Di Ricerca Sulle Telecomunicazioni	I
Helsinki Telephone Corporation	SF
National Technical University Of Athens	GR
Politechnika Warszawska	PL
Q Systems	GR
Salzburg Research Forschungsgesellschaft Mbh	A
T-Nova Deutsche Telekom Innovationsgesellschaft Mbh	D
Technische Universitaet Dresden	D
Telekom Austria Ag	A
Telekomunikacja Polska S.A.	PL

Contact person

Bert F. Koch
Siemens Aktiengesellschaft
Hofmannstr. 51
81359 Munich
Germany

Tel : +49 89 722 22465
Fax : +49 89 722 41920
e-mail :
Berthold.Koch@icn.siemens.de

GCAP (Global Communication Architecture and Protocols for new QoS services over IPv6 networks)

Duration: 24 months
IST Action Lines:
Clusters:

Main Objectives

The objectives of the project are:

- To define and evaluate a new end-to-end multicast transport protocol and a new end-to-end multimedia multicast transport protocol for supporting dedicated or specialised applications having guaranteed QoS requirements.
- To define and evaluate a new integrated global multinetwork end-to-end architecture for supporting innovative multimedia and co-operative applications needing guaranteed Quality of Service.
- To propose a design approach to rapidly deploy and use such new protocols, that will be developed on top of the new QoS architecture based on IPv6 and DiffServ, by means of an active network based technology.
- To illustrate the feasibility and evaluate the potential of the advocated approach by conducting two experiments using the national research networks and their European interconnection.

Technical Approach

A new Transport layer for the Internet next generation will be designed and implemented, being the work conducted across different items. Two protocols, designed as two building blocks, a multimedia protocol and a multicast protocol, will be specified and implemented. These protocols will have different capabilities in terms of QoS, i.e. of reliability and synchronisation. They will be consistent with the IETF and the IRTF to which we will participate. The multicast protocol will allow the management of groups of users, and will provide the mechanisms needed to guarantee the selected QoS parameters to the groups of users; the multimedia multicast protocol will be made flexible by defining a set of parameters allowing the application user to select the monomedia reliability and the multimedia synchronisation that will be enforced by the layer.

An active network approach to be able to run the two previous protocols written in Java in IPv6 environments will be selected. The aim is to produce a software environment that will be able to support the automatic remote loading and the automatic remote execution of these two protocols for deployment. These results will be integrated into a new advanced end-to-end multinetwork transport layer. For this, GCAP will: first carefully analyse the QoS parameters defining the different interconnected networks; second define the mapping of the designed protocols to the DiffServ services of the IP layer; third define a transport API, extending and compatible with TCP and UDP.

Two demonstrations will be provided: one on the multimedia mechanisms and one on the multicast service. They will be conducted on an European testbed using the corresponding national research networks and their European interconnection. The obtained results will be evaluated and analysed: the protocols themselves and their mechanisms, the active support environment including code design and execution, and the large scale deployment and behaviour.

Key Issues

Expected Impact

List of partners		Contact person
Centre National De La Recherche Scientifique	F	Michel Diaz
Alcatel Space Industries	F	Centre National De La Recherche
Ericsson Telebit A/S	DK	Scientifique (Delegation Midi-Pyrenees)
Gmd - Forschungszentrum Informationstechnik Gmbh	D	7, avenue du Colonel Roche 31077 Toulouse
Telekom Austria Ag	A	France
Thomson Csf Detexis Sa	F	
Universidad Carlos III de Madrid	E	Tel : +33 5 6133625
Universite Pierre Et Marie Curie	F	Fax : +33 5 61336411
University Of Lancaster	UK	e-mail : diaz@laas.fr

NETGATE (Advanced Network Adapter for the new Generation of mobile and IP based Networks)

Duration: 24 months
IST Action Lines:
Clusters:

Main Objectives

To design and develop a novel, low cost, flexible, highly efficient and scaleable system able to operate as a high performance protocol gateway, which will bridge the 'compatibility' gap between different telecommunication networks such as SS7, IN, ATM, GSM, GPRS and also provide interfaces to IP based networks. To provide a high performance protocol execution engine which will be based on a robust run-time executive optimised for protocol execution. To provide generic protocol translation modules for inter-working between the different interfaces and resource management techniques based on standard technologies. To integrate different networking protocol stacks and interface with them in live networks. To provide instantiations of the NETGATE system as: a GPRS support node combining the SGSN&GGSN functionality and an enhanced VoIP gatekeeper. To assess the migration of telecom operators to the new types of services and networks.

Technical Approach

The project is organised in six workpackages bringing the necessary partners and ingredients for assuring successful execution and accurate market orientation. The technological background is offered from Partner 1 (with impressive credentials in the telecoms business) and Partners 2&3 (major telecoms manufacturers). In order to establish the market momentum necessary and the user input as well, the consortium brings together an established University (Partner 5) with a long list of network project participation and established telecom operators (Partner 4, Partner 6). All of them are market leaders in their respective activity sectors, although their size is quite different. The course by which the project will come to completion is by first defining the requirements of the system (WP2), which in turn will be used to define the specifications of the system. This will be achieved having scalability in mind for future modifications and extensions. The next stage (WP3, WP4) involves the detailed design and implementation of both the H/W and S/W subsystems, which includes the physical interface access boards, central protocol adaptation and advance inter-working/switching unit, embedded software subsystem, system services and GPRS & VoIP applications. All the preceding steps converge with the integration of the subsystems to the NETGATE system (WP5). Functional tests and performance measurements will verify compliance to the original specifications. User tests along with optimisations will end with a complete system evaluation, after which the prototype form of NETGATE will be complete. The marketing assessment (WP6) will be performed at predefined points during the course of the project, but will also be an ongoing and continuously updated process, to compensate for changes in market needs as well as adopting new requirements as they develop.

Key Issues

Expected Impact

List of partners		Contact person
Alcatel Sel AG	D	Vassilis Velentzas
Cellurar Operating System of Mobile Communications S.A.	EL	Solinet GmbH Telecommunications Mittlerer PFAD 26
Intracom S.A., Hellenic Telecommunications and Electronics Industry	EL	70499 Stuttgart Germany
National Technical University of Athens	EL	
Portugal Telecom Inovação, SA	P	Tel : + 49 711 1398 13 0
Solinet GmbH Telecommunications	D	Fax : + 49 711 1398 13 99 e-mail : V.Velentzas@Solinet.com

GEOCAST (Multicast Over Geostationary EHF Satellites)

Duration: 36 months
IST Action Lines:
Clusters:

Main Objectives

Due to the satellite evolution, a separate definition of ground and space segments is not any more possible. On-board processing on the one hand, higher frequencies on the other hand, have impacts on the definitions of all segments and all layers of the communications links. The purpose of GEOCAST is then to come up to a better definition of such systems, encompassing building blocks (terminals, gateways, satellite) as well as protocols (network, medium and physical layers) which can match the needs of such multicast systems. The Objectives are then to define next generation systems, demonstrate their feasibility and optimise their performance thanks to an emulator realisation, and validate their performance thanks to live experiments, which can only bring the best practice experience necessary for a wide adoption by operators. Successful deployment of such systems can be measured by contributions to normalisation bodies (Internet Engineering Task Force - IETF- and European Telecommunications Standardisation Industry - ETSI), as well by a wide participation from early participants.

Technical Approach

GEOCAST project consists of five work packages (WP):

Work package 1000 is to make an overview on existing systems, protocols, applications, economics and their shortcomings in order to give several reference scenarios. The main objective is to identify the shortcomings of today's multicast protocols over existing or up coming GEO systems in order to highlight their interest from an economic standpoint and to identify key elements of improvement. At the end of the task the following topics should be made it clear:

- Multicast are the "killer" applications for the GEO satellite. New systems (comprising space and ground segments, protocols and applications) are needed to leverage the possibilities of such protocols
- Trends and reference scenarios are identified for a deeper analysis in the following tasks.

The System Design work package (WP2000) is to design the overall system. It comprises:

- System segment description and specification (user, space, mission and gateway) leading to a system and sub system description
- Layer by layer protocols optimisation and specification through simulated performance: physical layer (fade counter measure algorithms), access layer (resources management protocols), network layer (multicast and security management protocols), and services layer (applications, customer care and billing…)

The Demonstrators Specifications work package (WP3000) is to specify the demonstrators, namely: emulator definition and satellite experiment definition. The different components of the emulator will be realised, integrated and tested in WP4000. Finally the WP5000 will validate the Emulator and it will carry out the respective exploitation and promotion.

Key Issues

Develop the market opportunities in Europe for multicasting over future broadband satellite by preparing technical solutions to the existing impediments.

Address the issues regarding the limitations of multicast: what are the limitations of existing solutions? What are the impediments that are raised by the use of a wireless satellite link? What are the possible investigations/improvements?

Propose building blocks and systems that can contribute to a better optimisation of multicasting over geostationary satellite (seamless interworking and best utilisation of the satellite position). This encompasses protocols, applications, on-board payload, modems and EDI management. The building

blocks should be simulated in order to estimate their performance.

Validate the solutions by specifying, realising and demonstrating an end-to-end emulator of the different layers which are impacted in several chosen typical system scenarios.

Expected Impact

GEOCAST shall enable innovative technologies be explored in order to address current short-falls in multicast protocols. In particular, these protocols shall be reviewed and developed taking into account other constraints which are not usually considered at an early development phase:

- Radio layer: impact of acute attenuation, proposition of adapted fade mitigation techniques (FMT).
- Access layer: impact of an intelligent and efficient resources management set of solutions.
- Network layer: security, scalability, operational management impacts constraints on the protocols.
- Service layer: study of the impact of applications and related services that shall be provided through the system to the end-users and service providers.

Contribute to standardisation bodies in order to better take into account the satellite in the GII by proposing the optimised solutions (protocols, systems, building blocks…), which in turn should develop the demand from the operators. The contributions shall be made at ETSI standardisation, at ATM and DVB Forum for multicasting in the layer 2 and at the IETF and IPMI (IP Multicast Initiative) for the IP multicasting at layer 3.

List of partners

Università Di Roma "La Sapienza"	I
Softway International	F
The University of Surrey	UK
The University Court of The University of Aberdeen	UK
Archimedia Ltd.	EL
Electronic Automatic Systems S.R.L.	I
Alcatel Espacio SA	E
Alcatel Space Industries	F
Office National D'etudes et de Recherches Aerospatiales	F
Newtec CY N. V.	B

Contact person

Laurent Roullet
Alcatel Space Industries
26 avenue J.F. Champollion
31037 Toulouse
France

Tel : + 33 534356659
Fax : + 33 534356169
e-mail : laurent.roullet@space.alcatel.fr