BATS: Broadband Access via integrated Terrestrial and Satellite systems

BATS will develop and demonstrate the concept of a fully integrated terrestrial and satellite communication system to enhance the quality of experience in those areas of Europe which are unserved or underserved in terms of superfast broadband availability.

Main Objectives

The BATS concept is driven by a gap in the capability to deliver the EC Digital Agenda targets using conventional terrestrial BB technology. The BATS integrated approach will bridge the potentially widening Broadband divide between urban and rural areas by combining the flexibility, large coverage and high capacity of future multi-spot beam satellites, the low latency of fixed DSL lines, and the pervasiveness of mobile-wireless access while achieving attractive consumer price and improved user experience.

BATS proposes a novel architecture that combines satellite and terrestrial service delivery via an Intelligent User Gateway (IUG), dynamically routing each application’s traffic to the most appropriate access network, according to its service needs and access link capabilities to optimise the Quality of Experience (QoE). To cope with this integrated scenario, BATS will provide a unified network management framework.

In order to address the areas of Europe that are “unserved” or “underserved” in terms of Broadband (BB) availability, an Ultra High Throughput Satellite System is being researched. Such a system will provide order of magnitude cost/bit reductions and a solution to the market barrier of bandwidth limitations. Environmental sustainability will be one of the design factors across the project with protocols and algorithms aiming to minimize the carbon footprint of the system. The evaluation of these concepts will take place via laboratory emulation with controlled objective and subjective testing, and via field trials using prototype IUGs and capacity on in-orbit satellites to assess real user experiences.
Technical Approach

BATS is organised in eight WPs. WP1 undertakes all project coordination, financial management and quality control activities. WP2 investigates broadband service requirements, technologies and Future Internet trends by 2020 developing functional level architectures for the integration of satellite and terrestrial networks. WP3 develops an overall networking architecture for the system; analysing the integration scenarios at user segment, satellite networking and network management levels via conceptual evaluation and simulations. WP4 investigates new concepts for the delivery and operation of the high capacity satellite component of the BATS network. WP5 investigates possible service provision concepts and analyses the environmental sustainability and commercial feasibility of the concept. WP6 plans, implements, tests and deploys the trial infrastructure to be used for show cases and validation. WP7 evaluates the BATS concepts via field trials with prototype IUGs and in-orbit broadband satellites, and WP8 disseminates project outcomes and links the BATS concept with relevant standardisation organisations, regulatory bodies and other projects.

Key Issues

Limited BB Bandwidth and degraded availability: innovative satellite access network architecture will enable high speed BB service at high availability. This will take advantage of high throughput satellites by implementing an innovative feeder link diversity scheme. Moreover, robust and adaptive waveforms will be investigated as well as interference management and radio resource management techniques.

Latency: integration of SatCom (high capacity and resiliency) with terrestrial access (low latency, but low capacity in rural areas and in some parts in sub-urban areas) networks featuring dynamic routing protocols to deliver optimal QoE and ensure resilient connectivity to the Internet.

Development of a prototype Intelligent User Gateway: able to determine (in real time) the QoS requirements for data transfer for applications, so that data traffic can be routed over the most appropriate medium available at the IUG, based on knowledge of the transmission medium characteristics of the communications systems available at the IUG.

Integration with Future Internet ecosystems: Integration of the Intelligent User Gateway with home network environment emerging standards, and close coupling between applications and the networks to obtain maximum QoE.

Specific managed services: SatCom network management system needs to be harmonised with systems managing terrestrial access networks for a unified service provisioning.

Creating a sustainable and scalable solution: Intelligent power control is needed to ensure capacity is available when needed, but minimise power consumption at other times.

Expected Impact

BATS will ensure the economical sustainability of the EC Digital Agenda objectives, since the most appropriate access technology will be seamlessly selected depending on the application and the user location. BATS will strengthen the European telecommunications industry and will potentially increase the usage of satellite communications for BB access. The increased size of market will generate a virtuous cycle, driving down cost of satellite equipment. BATS will develop technology for the integration of future generation satellite networks with future wireless and wired terrestrial access technologies in order to boost QoE for users and expand the market addressable by satellite communications.

BATS is a unique opportunity for European ICT industry to take the lead and propose innovative SatCom architectures for future satellite BB access in relevant European standardisation organisations.