

- Delivery of significant capacity enhancements with novel multiple HAP constellation strategies, exploiting proposed single HAP communications technologies, where users have directional antennas



- Rain fade mitigation strategies, exploiting temporal and spatial diversity, and caching (e.g. web-caching and content distribution)
- Cutting edge research examining broadband access to high-speed vehicles (e.g. trains), interfacing with on-board wireless LAN base stations. Data rates of up to 120Mbit/s to a moving vehicle travelling up to 300km/h are envisaged. The objective is to provide 'broadband access for all', efficiently and at low-cost to the user.

Trials

Preliminary proving tests using a tethered platform took place in 2004 with follow up trials using a stratospheric balloon in August 2005.



The second stage trials took place in Sweden with a 12,000 cubic metre balloon floating at an altitude of 24km for a duration of 9 hours allowing RF and optical communication trials to be conducted.

The mm-wave band (28/29GHz) tests supported data rates of 11Mbit/s and throughputs up to 4Mbit/s, using WIFI (IEEE802.11b), at distances ranging up to 60km.

Free space optical tests demonstrated the first known 1.25 Gbit/s downlink from the stratosphere to an optical receiver on the ground over a maximum link distance of 64km with nearly no transmission errors.

Further trials in conjunction with the Japanese partners are planned for 2006.



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Partner details

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BTextact - UK
Jozef Stefan Institute - Slovenia
Politecnico di Torino - Italy
EuroConcepts s.r.l. - Italy
Universitat Politècnica de Catalunya - Spain
Carlo Gavazzi Space SpA - Italy
Budapest University of Technology and Economics - Hungary
German Aerospace Centre (DLR) - Germany
Centre Suisse d'Electronique et de Microtechnique SA - Switzerland
Contraves Space AG - Switzerland
National Institute of Information and Communications Technology - Japan
Japan Stratosphere Communications Inc - Japan
Please see www.capanina.org for links to partner web sites



CAPANINA

will deliver low-cost broadband communications services to small office and home users at data rates up to 120Mbit/s - a staggering 2000 faster than today's dial-up modems and more than 200 times faster than a typical 'wired' broadband facility.

Users in rural and other 'hard to reach' areas will benefit thanks to the unique wide-area, high-capacity wireless coverage provided by HAPs. Additionally, use of 'smart' roof-top antennas on trains will provide the moving user with high speed internet connectivity.



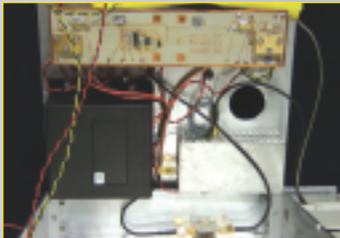
CAPANINA is a research and development project involving 13 global partners

Background

As the quest to improve communications continues at an increasing pace, the need to use efficiently our airways demands more innovative approaches. The CAPANINA consortium, led by the University of York, is developing wireless and optical broadband technologies for use on High Altitude Platforms (HAPs). Typically a HAP is an airship that floats



at an altitude of around 20km, well above any normal aircraft but, being in the stratosphere, substantially below orbiting satellites.



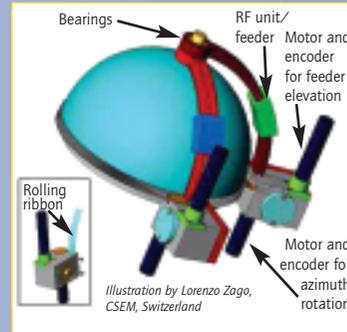
The consortium consists of academic and industrial partners from across Europe along with two Japanese partners.

The skills and experiences of the partners are diverse and complimentary, ensuring research, development and exploitation activities can be implemented.



Stratospheric broadband fills the gap between satellite and terrestrial wireless technologies. Furthermore,

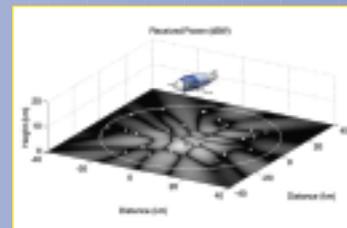
without the need to dig up roads to lay new cables it is of particular relevance to rural, suburban and moving users. Whatever a user wants to do, be it browse the internet, download a movie or song, select video on demand or use any other bandwidth hungry application, HAP broadband delivery systems will ensure more cost effective availability to all.



The programme includes research and development activities, establishing a foundation from which to exploit the technology in the near term and paving the way to longer term research programmes.



The technology can be used initially for short range missions including event servicing and disaster relief.



Objectives

The overall objective of the CAPANINA project is to develop a broadband wireless communications capability, at speeds up to 120Mbit/s, from High Altitude Platforms (HAPs) to stationary users on the ground and to users on moving vehicles at speeds up to 300km/h.

Focusing on:

- HAP broadband systems, applications, and services
- Broadband communications links, networking, and support infrastructure for HAP systems
- Broadband communications node technology for HAP systems

Technical approach

The technical activities include:

- Extension of terrestrial and/or satellite technologies to enable HAP service delivery
- Development of cost effective HAP architectures
- Development of a steerable directional mm-wave band antenna for vehicle use
- Low complexity signal processing algorithms that will support mm-wave smart antenna technology
- High data rate free space optical links for ground-HAP, HAP-HAP
- High-speed inter-beam and inter-HAP handover that is compatible, from a user perspective, with existing standards