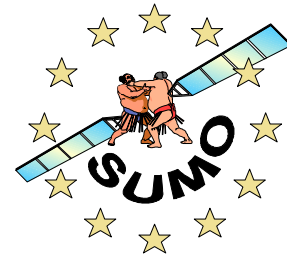


SUMO



Satellite-UMTS Multimedia Service Trials Over Integrated Testbeds

Main Objective

The SUMO project aims to identify and demonstrate generic approaches to UMTS service support and network control, focusing on the satellite segment. The issues addressed are especially:

- interoperability between complementary satellite systems (e.g. LEO & GEO) both real and simulated, as well as with terrestrial core networks (e.g. B-ISDN)
- automatic selection of alternative access network resources in an integrated UMTS system (i.e. different satellite or terrestrial networks) depending on services and mobile environments (e.g. urban, rural, ..)
- advanced S-UMTS services based on, for example:
 - bandwidth-on-demand flexibility of communications channels for application services
 - definition of the common signalling for service and network control between different access schemes (e.g. CDMA & FDMA) according to GRAN concepts.

The project will create an advanced satellite-based UMTS testbed to demonstrate the above techniques by combining and improving two ACTS testbeds developed in the SINUS and TOMAS projects.

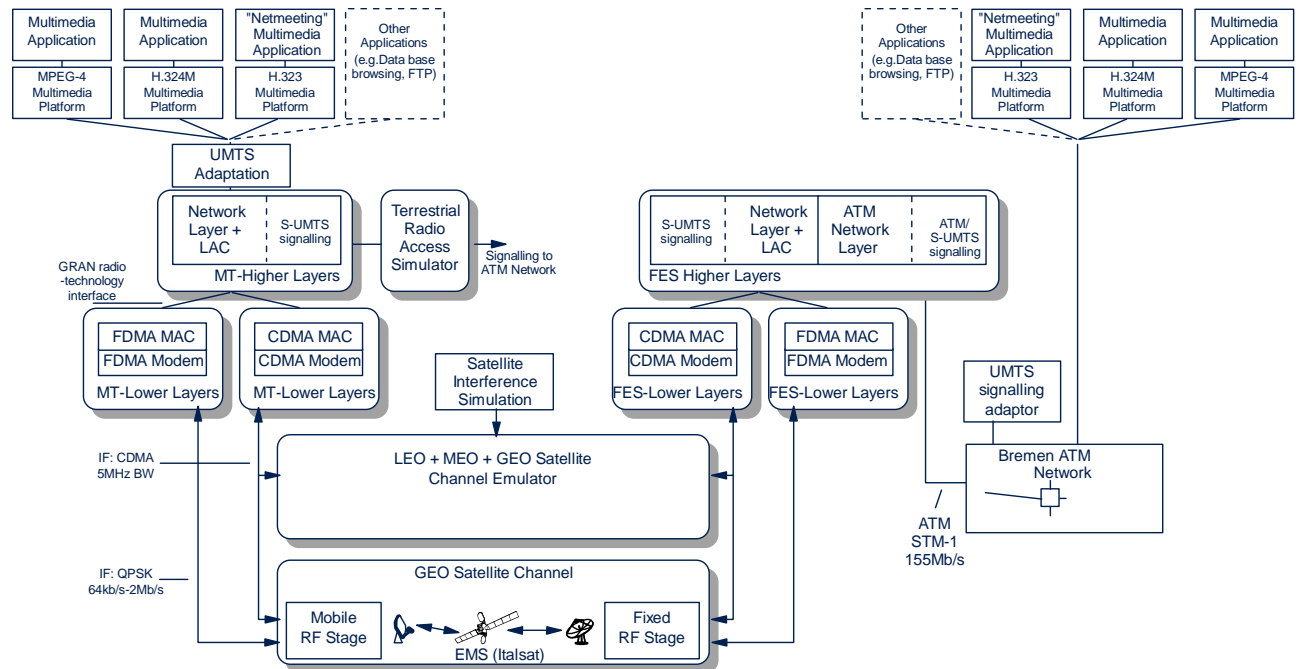
Technical Approach

SUMO will develop advanced service provision and interworking on the testbed for use in a range of integrated multi-satellite and terrestrial UMTS service trials. The main technical developments are:

- a UMTS Application Adaptor which provides interworking between multimedia applications and the mobile terminal (MT) and provides service and application control. Its architecture will comprise three parts: a user call control interface, an interworking layer consisting of the network and service control entities (software modules) and a UMTS adaptation layer subdivided in two parts: one independent of the mobile terminal connected consisting of bearer control software complemented by a Winsock 2.0 standard interface and one, terminal dependent, consisting of a set of network drivers,
- advanced S-UMTS service provision. The above network and service control functions provide automatic application-dependent resource selection and (user) bandwidth on demand. The above bearer control software will also select the available network access (LEO, MEO, GEO or terrestrial),
- a Generic Radio Access Network (GRAN) concept, compliant to the ETSI/ITU approach which separates the radio dependent and radio independent protocol layers. The TOMAS mobile terminal, not designed with GRAN in mind, will be updated by adopting and configuring the SINUS radio-independent layers and developing a (GRAN) adaptor to its radio dependent ones (represented by its FDMA physical layer and its equivalent MAC layer),
- other testbed equipments or adaptations required by the trials including a satellite interference simulator to take into account inter-satellite interference imposed by different competing satellite systems and a signalling adaptor to provide the mobility features within the B-ISDN core network.

Summary of Trial

The diagram below shows the ensemble of testbed equipments used in all trial configurations. The trials are scheduled (provisional date) for the last quarter of '99 in Bremen. An access to the Bremen city ATM network and to the ESA EMS satellite will also be arranged.



Trial Configuration (1)

This will involve the connection of an application (H.324M) through an integrated network including simulated LEO, MEO and GEO satellite systems and interworking through a B-ISDN network. The satellite simulator will be enhanced to include inter-satellite interference which will possibly occur in next-generation systems. CDMA satellite access is used.

The objective of this trial is evaluation of H.324M performance using bandwidth-on-demand over S-UMTS features and in simulated environments (including Satellite Interference emulation).

Trial Configuration (2)

In comparison to the first trial configuration, the satellite channel emulator is replaced by an existing (live) GEO satellite system with FDMA access. Thus the second trial configuration will involve the use of the FDMA + GEO satellite physical layers with the LAC + higher layers from the CDMA trial 1 plus the integration of UMTS signalling (including call control, radio resource management, inter-segment handover etc.) developed for CDMA/GRAN within the FDMA access scheme of the GEO satellite.

The main objectives are to validate the GRAN concept for different satellite access schemes, using several mobile multimedia transmission standards and applications (MPEG-4, H.324M e.g. conferencing and information retrieval applications).

Trial Configuration (3)

The GEO satellite system will be added in parallel to the first trial configuration and, if feasible, the CDMA access scheme will be implemented over a live GEO channel, in parallel to an emulator channel. The objectives are to demonstrate:

- inter-constellation (GEO-LEO or GEO-MEO) satellite resource selection,
- validation of the Satellite Simulator for GEO by use of CDMA transmission over a live link.

Key Issues

- Demonstration of multimedia applications in an end to end integrated UMTS network consisting of satellite network access, using complementary satellite systems in parallel (e.g. LEO and GEO), and a terrestrial B-ISDN core network
- Development of an S-UMTS GRAN terminal prototype, according to the Intelligent Network model, offering advanced services (bandwidth on demand and service-dependent resource selection)
- Evolution towards a generic S-UMTS terminal by development and installation of application adaptor software, running simultaneously with the application

Expected Achievements

- interworking and integration of satellite-oriented UMTS testbeds
- comprehensive testing of a range of mobile multimedia services through LEO, MEO and GEO configurations and under realistic communication conditions (simulated and live environments)
- QoS measurements using the above applications under a range of trial network configurations: e.g. BER, delay, service reliability and availability (blocking) and handover transparency
- demonstration and evaluation of advanced S-UMTS features: service integration, service-dependent resource selection and bandwidth-on-demand.

Expected Impact

- Encouragement of and contributions to S-UMTS standards,
- Major advances in the state of the art of integrated S-UMTS services
- Significant gain in expertise bolstering European competitiveness in the technology of advanced mobile satellite telecommunications.

Project Consortium

Alcatel Space Industries (Prime)	F
MARAC Electronics	GR
MediaMobil Communication GmbH	D
Nera	UK
Telenor	N
University of Bradford	UK
University of Bremen	D
University of Surrey	UK