

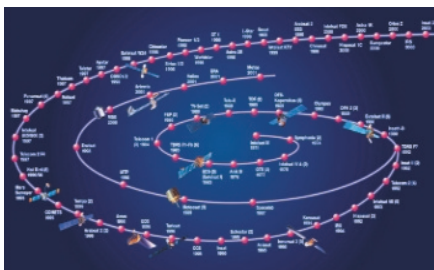
COMED - Constellation and Multimedia Development - Demonstrations



■ COMED - Scope and Goals

The increasing globalisation of the society leads to an ever increasing requirement in information exchange, distribution and processing. New, globally available teleservices are needed in the new century like Internet in the Sky, telemedicine and e-commerce. These services cannot be provided without a global multimedia infrastructure.

Fundamental building blocks of this infrastructure are big satellite networks, providing high quality communication services.



Bosch participation in space programmes

At the moment satellite constellations with over 200 satellites are planned. With these quantities satellites are becoming more and more industrial 'assembly-line' products in a market, where a competitive price is of first-order importance.

This means a revolutionary change for the satellite industry, which traditionally is oriented on building satellite in quantities of 1 or 2 pieces. These changes bring big chances, but also a big risk in worldwide competition. The involvement of the German aerospace industry in the fast expanding, but highly competitive multimedia market is of essential relevance for the entire German industry. A successful involvement in this multi-billion Euro market means new jobs in this industry sector. The German Aerospace Center (DLR - Deutsches Zentrum für Luft- und Raumfahrt) supports a number of industry projects on the basis of Public Private Partnership, i.e. a public funding equivalent to the industry involvement.

The goal of these projects is the development of innovative technologies and production techniques for future satellite systems.

The projects in the COMED framework are oriented towards factors, which are essential

for the marketability of future satellites systems like:

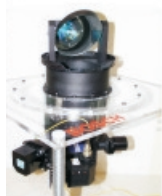
- fast packet switching through an asynchronous transmission technique
- on-board processing, i.e. low-cost and fast processing of information in the satellites
- synchronisation and communication between the satellites by means of intersatellite-links
- development of technologies for serial production of sub-systems and components
- reduction of the overall mass of the satellites by reduction of the component masses

The fortification of the position of the German industry in these areas is the basis of the goal of being accepted as a partner on the system level in the international market. The COMED program is structured into two main parts:

- Satellite Bus (incl. satellite structures, power supply, control and steering); coordinated by Dornier
- On-board Processing (incl. new switching technologies and system like ATM, optical Inter-Satellite Links, sub-systems and devices); coordinated by Bosch

■ FOKUS Involvement

GMD FOKUS takes part in the on-board processing project, coordinated by Bosch. Its main role includes studies and basic developments in the areas ATM switching and on-board processing. The first step in these studies is the specification of requirements



optical terminal for inter-satellite links

for the on-board processing. This is based on the analysis of application scenarios; a list of typical applications as well as communication protocols and communication requirements are used to extract traffic models as input into simulations. On the basis of these studies, the protocol architecture for future multimedia satellite systems is developed, which includes protocol stacks for satellites and end systems as well as the partition of functionality between space and earth, between satellites, end users and Network Control Centers (NCC).

This leads to an architectural design of the control and management plans - protocol architectures for user-satellite, satellite-satellite and satellite-NCC communication. A key aspect of the protocol architecture is the integration with existing fixed networks to enable seamless communication on a global basis. For this reason the protocols will be derived from existing ATM protocols with modifications, necessary due to the nature of satellite communication (long delays, high error rates, highly dynamic topology changes). A major part of the on-board processing is the resource management. This includes topics like air resource management (up-link and down-link), access methods for multiple access, data link control, medium access control, connection admission control and the interface between resource allocation modules and the protocol stacks. A key aspect in this area is the scalability of the system: a single satellite must support any number from hundreds of users (in LEO constellations) up to hundreds of thousands of users (in GEO systems). Other aspects of the FOKUS involvement in COMED are security issues on the protocol level, mobility management and system management. FOKUS will also take part in the realisation of a demonstrator and the tests of this demonstrator.

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