

MUNICH SATELLITE NAVIGATION SUMMIT 2007:

Session 2 – Munich Flashlights – News from Bavaria

The chairman Dr. Stefan Sassen, CEO, teleOp GmbH, welcomed the participants to the "Munich Flashlights – News from Bavaria".

The first speaker of this session Dr. Reinhold Lutz, Senior Vice President Earth Observation, Navigation & Science, EADS Astrium, denoted Satellite Navigation as a key asset for security and defence applications. GPS and Galileo have certain limitations and therefore solutions are required. These limitations are decreasing performance in urban terrain, poor indoor signal reception and vulnerability against jamming.

Among various solutions he stressed the pseudolites. These generate GNSS like signals but are flexible enough for more demanding applications. The capabilities range from improving accuracy in high precision applications and a decrease of vulnerability against jamming to higher integrity and the improvement of geometrical conditions. Some exemplifying scenarios of interest like precision approach and landing or indoor navigation were presented and analysed.

He finished with the presentation of technology developments at EADS Astrium, like signal generator or indoor positioning which is independent from local infrastructure.

Prof. Wittmann, Director, German Space Operation Center (GSOC), German Aerospace Centre (DLR), used the opportunity to introduce the DLR in Oberpfaffenhofen, mainly the two most relevant departments involved in navigation, the GSOC and the Institute of Communications and Navigation. He presented results on DLR measurements of the

GIOVE-A signals like interference assessments done in the different bands during interference campaigns.

The GSOC which successfully operates missions since 38 years and the centre in Italy (Fucino) will constitute the control centre of Galileo. The control centre is under construction since November 2006 and will be finished in 2008.



Lutz, Wittmann, Dittler, Sassen, Heinrichs, Bedrich, Eissfeller (left to right)

He described the tasks of the Galileo Control Centre (GCC) which include a wide range from satellite constellation control to key management. The GCC will finally host 150 equipment racks, 120 work stations in five control rooms and a communication hub for worldwide communication to remote sites. Finally, he emphasised the importance of the Galileo Test and Development Environment (GATE), which is going to be operated by the DLR and will start operations in May 2007. The main developer has been IfEN GmbH. GATE will foster the early testing of Galileo signals. He underlined the role of DLR in providing expertise and operational experience.

Thomas Dittler, CEO, IABG, gave a short presentation on the status of the Global Moni-



toring System of Environment and Security (GMES). Bavaria is participating in eight out of ten services of GMES. Among other, these services to be developed are land monitoring, natural disaster recovery, security/safety, atmospheric research and space technology. He gave a glimpse on the market for GMES products and services accounting for the socio-economic benefits which are expected. The GMES value chain pushes innovation to the market if there is an articulated demand. The GMES value chain comprises: infrastructure, sensors, data processing and services. He continued explaining the GMES architecture, as well as the potential customers and drivers behind the decisions made in the past.

Two major drivers in the decisions of GMES were illustrated:

1. having infrastructure in place to deliver more accurate data
2. the need of having money coming from member states and private sector

Finally, he described his vision of the role which GMES will play in Bavaria around 2015 when Galileo is in operation. He emphasised that Bavaria has to be a driving force, a pilot region in satellite navigation and pointed out the need to design a "GMES Governance".

At the end of his presentation he gave an outlook of the Bavarian GMES Cluster.

Dr. Stefan Bedrich, Head of Satellite Navigation Department, Kayser-Threde GmbH (KT), showed the activities and prospects from the point of view of KT.

He outlined the importance of the company in the business of the satellite navigation and gave a short overview of the Galileo infrastructure activities which were carried out by Kayser Threde, the prime contractor to develop the Galileo Time Reference System. This includes the design of the Precise Timing Facility (PTF) which is now under detailed design. After certification, it will be the reference time scale for the satellite atomic clocks. Moreover, electrical cable connections for the

satellite payload will also be carried out by KT for the IOV satellites

In addition he described other SatNav application activities in which the company is involved and emphasised especially its participation in the GATE project. In this project, Kayser-Threde was in charge of providing the six signal transmitters and doing their calibration.

To conclude he described the involvement of KT in ongoing studies and projects focusing on early applications with Galileo.

Prof. Bernd Eissfeller, Vice-Director and University Professor, Institute of Geodesy and Navigation, University FAF Munich, described the latest status of the PC based software receiver which is under development at the Institute. He illustrated the general architecture of the receiver and emphasised the fact that any usual software platform should be capable of running the software receiver as well as the performance should be comparatively similarly to any typical hardware implementation. In fact a standard Intel core2 processor is used at the moment.

He continued showing results on the wave forms of L1 C/A and L2 CM. Thereby he underlined the potential of the receiver to use multi-correlator architectures with no great difficulties to carry out the operations in software.

Furthermore, real results from GIOVE-A reception with the software receiver were presented and different performance figures were shown.

Another topic was the performance of the software receiver for high sensitivity applications such as indoor with a so-called "vector receiver". High-sensitivity is enabled by a proper navigation filter. Now it is possible to implement aiding data from other sensor or data sources. Finally real measurements of an indoor scenario were presented.

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Exhibition Area Max-Joseph-Saal

Dr. Guenter Heinrichs, Director Business Development, IfEN GmbH, presented the first results of the German Galileo Test and Development Environment (GATE). He emphasised the importance of the GATE project giving an outline on the project status and planning. Currently, the assembly integration and verification phase is taking place. This means that the six transmitting stations have already been built up as well as two monitoring stations.

After describing the transmitting segment and the monitoring stations, he presented a video of the GATE platform with the six transmit stations. Currently the transmitters are working and the antennas have been assembled. The result of the first static measurement has already been presented. One-sigma accuracy of 1.55 m was achieved with only four satellites in use.

Moreover, he showed the world's first dynamic positioning with real Galileo signals. Operational mode is planned for the beginning of June 2007. Afterwards GATE will be open for potential users.

As he stated, "we are on the way of finalising the Galileo project" and are about to finally be able to take advantage of this powerful tool for GNSS engineers. Finally he expressed his hope that the GATE project will be widely used by everyone.