The German GAlileo Test and Development Environment (GATE)





Outline

- Basic Information & Background
- GATE (Development) Consortium
- •Test Area
- Technology / Test Modes
- Outlook

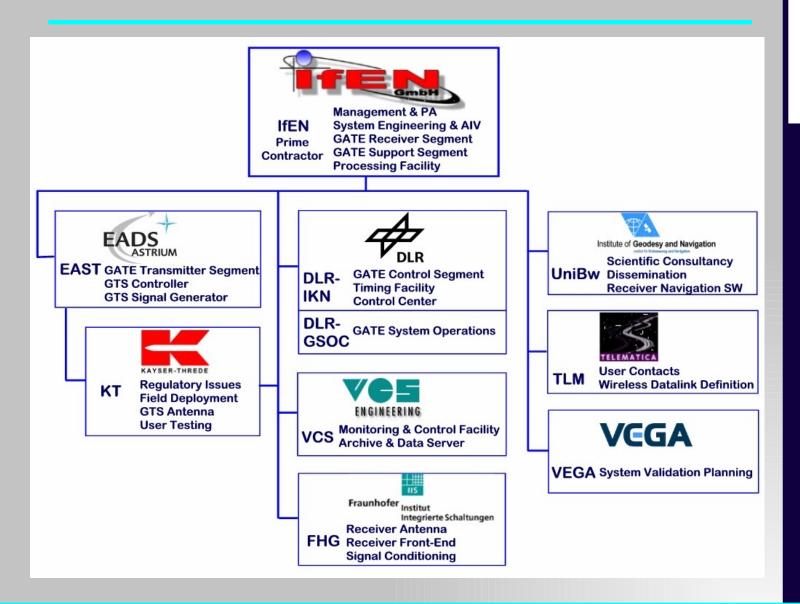


Basics

- Galileo outdoor testbed in Germany
- Operation after midyear 2006, till 2010
- Financed by the German Federal Ministry of Eduction and Science (BMBF) / German Space Agency (DLR)
- Support the GALILEO system development
- Support the GALILEO receiver development
- Support the GALILEO application development
- •Six terrestrial Galileo signal transmitters placed on mountains
- •Coverage area of ~65 km²
- Core test area of ~25 km²

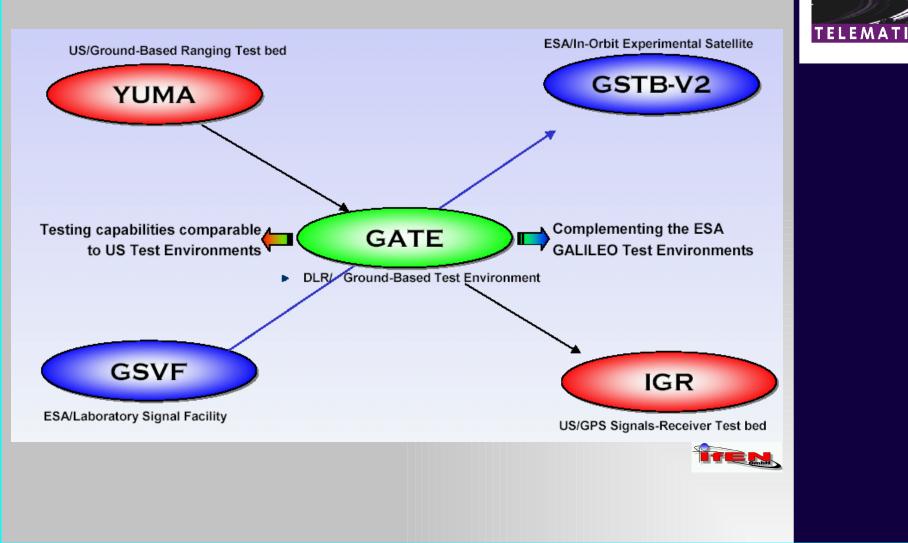


GATE Consortium

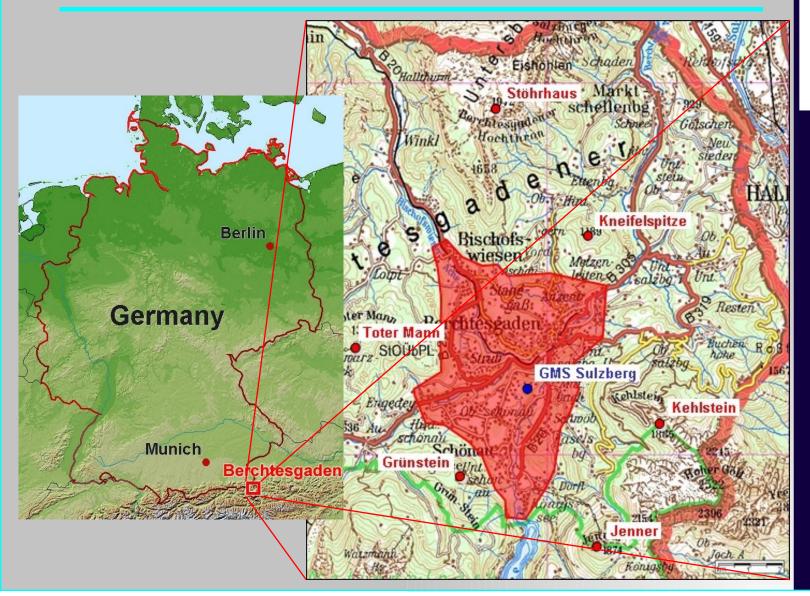




Relation to other Testbeds



Location Overview and Test Area





Impression of the Test Area



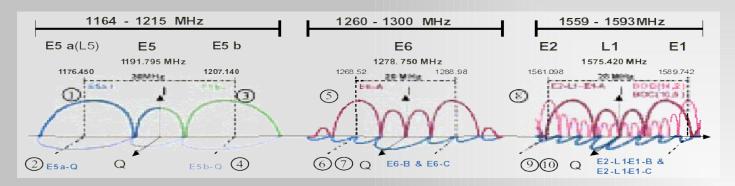
-> Mountains, forest, railway, streets, settlements, lake, tour



Signal Options

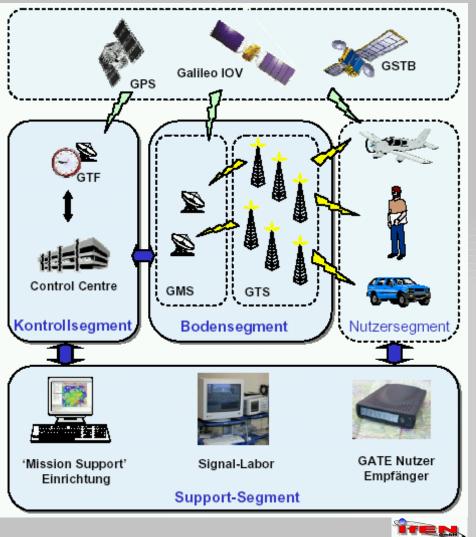
Due to the high flexibility of the signal generators many possible signal options can be tested. GATE offers the following signal options:

- 3 frequencies: L1, E6, E5a,b
- E5ab broadband signal
- Variable Doppler shift on the signal
- Different modulation schemes
- Flexible navigation data





GATE Infrastructure



Ground segment: - 6 terrestr. transmitter (GT5) EMATICA

- 2 monitoring receiver (GM

Control segment: - Monitor- & Control facili

- UTC Lab at DLR (GTF)
- Data processing
- Data archiv

Support Segment: - Mission support facility

- GATE signal laboratory
- GATE test Receiver

User Segment: - User Galileo Receiver



GATE Ground Segment



Terrestrial transmitter (example "Störhaus", 1894 m)

2 monitor receiver (Sulzberg)

TELEMATICA

Test Modes

Pseudolite Mode (PM)

-> constant power levels

-> no signal steering (wrt. Phase and Doppler)

-> serving an arbitrary number of users (within the test area)

Extended Pseudolite Mode (EPM)

-> compensation of the near / far effect by dynamic adjustment

according to user position

-> fed back user position into the system via data line

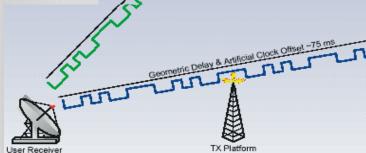
Virtual Satellite Mode (VSM)

- -> Optimization power level -> Computing signal delay
- -> Shifting code phase, Doppler

Emulating signal from orbit using user position !







GATE potentials

3 Major objectives to be covered by GATE:



Gain Experience in Building a GALILEO Ranging System SIGNAL EXPERIMENT Gain Experience with new Galileo Signal Structure ✓ Keep signal generation flexible (AltBOC(15,10), PRS) ✓ Keep signal generation extendible (GPS-L2, L5) Keep signal generation adaptable (Interference, Jamming) Test Facility for GALILEO Receivers **RECEIVER TESTING** Testing of new BOC receiver algorithms ✓ Requires realistic signal behaviour (Doppler, ...) Realistic atmospheric effects simulation Provide Test Receiver Flexibility in Signal strength to Users USER APPLICATION Provide an Environment for Test of User Applications Especially for hybrid GPS/GALILEO applications ✓ Extendible for local applications (CAT I-III, …) even beyond GALILEO FOC

Outlook

- •System design fixed in April 2005 (CDR)
- AIV till mid 2006
- Afterwards operation for:
 - $\cdot \alpha$ Tester
 - β Tester
 - Commercial Tester



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Thank you for your attention!



