GEMAC
Enterprise Network

GEMAC SMART TRAIN

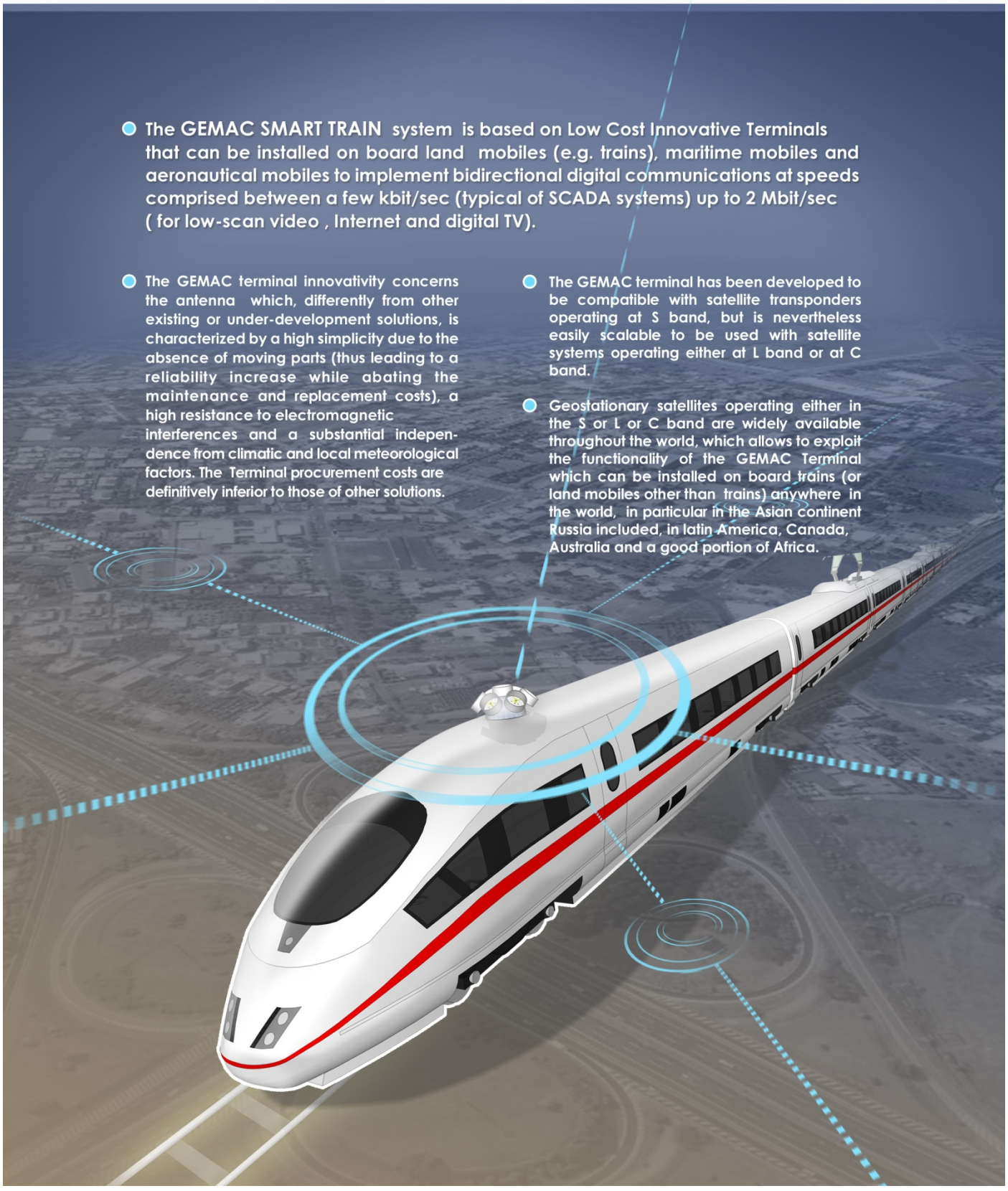
INTERNET ON TRAIN EVERYWHERE AND ALWAYS

- The GEMAC SMART TRAIN system is based on Low Cost Innovative Terminals that can be installed on board land mobiles (e.g. trains), maritime mobiles and aeronautical mobiles to implement bidirectional digital communications at speeds comprised between a few kbit/sec (typical of SCADA systems) up to 2 Mbit/sec (for low-scan video , Internet and digital TV).

- The GEMAC terminal innovativity concerns the antenna which, differently from other existing or under-development solutions, is characterized by a high simplicity due to the absence of moving parts (thus leading to a reliability increase while abating the maintenance and replacement costs), a high resistance to electromagnetic interferences and a substantial independence from climatic and local meteorological factors. The Terminal procurement costs are definitively inferior to those of other solutions.

- The GEMAC terminal has been developed to be compatible with satellite transponders operating at S band, but is nevertheless easily scalable to be used with satellite systems operating either at L band or at C band.

- Geostationary satellites operating either in the S or L or C band are widely available throughout the world, which allows to exploit the functionality of the GEMAC Terminal which can be installed on board trains (or land mobiles other than trains) anywhere in the world, in particular in the Asian continent Russia included, in latin America, Canada, Australia and a good portion of Africa.



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TECHNICAL DESCRIPTION

The high efficiency of the system has been achieved divind the visible sky hemisphere in N angular sectors assigning to each of them an elementary radiator and rigidly connecting these radiators on a supporting structure in such a way to obtain the wanted connectivity with a geostationary satellite.

The radiating elements are interconnected with the Terminal transceiver by means of a MEMS switch matrix, being the high technology MEMS switches characterized by low RF losses, switching delays of the order of 10 microseconds, and a power handling capability in the 1 to 10 W range.
An open-loop prediction algorithm defines the angular coordinates of the satellite-to-mobile line of sight in the mobile reference system. The prediction is compared to the time-varying directions (in presence of the mobile motion and attitude variations) of the individual radiating elements boresights.
The control system selects, and activates, the radiating element which exhibits the least angular distance from the satellite-to-mobile line of sight.

The Control System processes the following data:

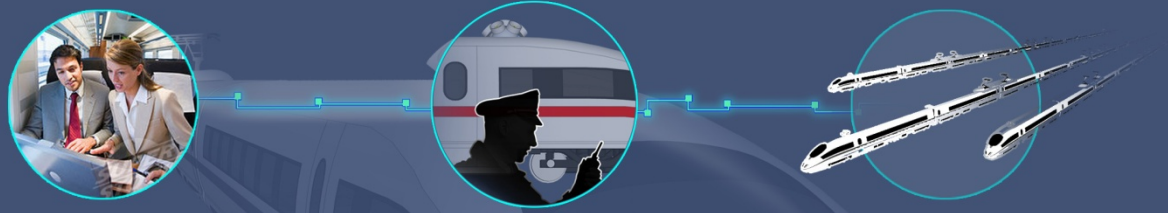
- The geographical position of the mobile; given by a GPS receiver
- The instantaneous direction of the mobile given by a compass
- The instantaneous mobile attitude in pitch and roll, given by fast inclinometers
- The geostationary satellite orbital coordi nates, generally known in advance and time-stable

The sensors providing the above data can be integrated in the antenna or else can be provided by a mobile navigation system. In a technology demonstrator the control system can be replaced by a notebook, while for production units it will take the form of a microcontroller integrated in a PC board becoming part of the system.

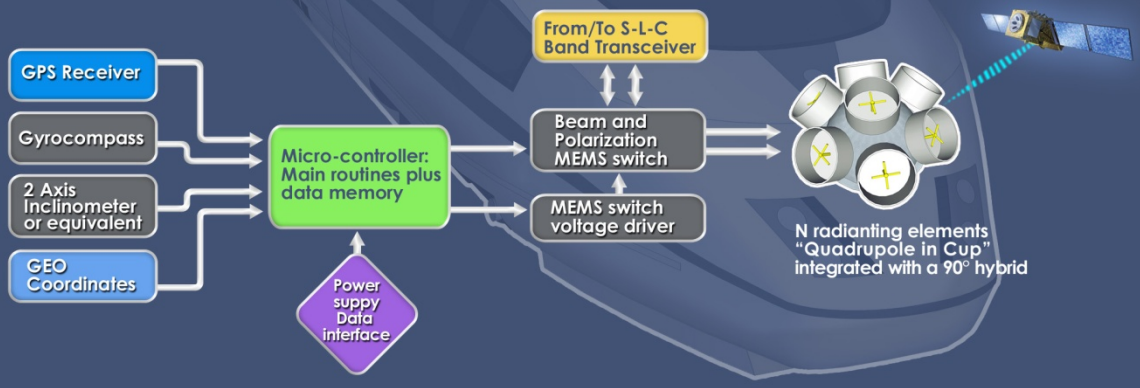
APPLICATIONS

On board coverage:

- Connected Passenger
- Connected Staff
- Connected Fleet



And many more: • Voice • TV • Maps • Velocities • Vehicle Condition • Mission Data.



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