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An Idea of Future Oriented Active VTMIS

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The European Union and the European Space Agency are considering investments amounting EUR100 billions until 2010 in the transportation infrastructure of the countries just joining the EU, in order to complement the EUR400 billions already estimated on 1996, for a Trans-European network of transport infrastructure (TEN-T). This implies a complete reconfiguration - for *"the first time since the Roman era*" - [EU Vice-President Loyola de Palacio: "Trans-European networks - the way ahead", in page 2 of http://www.europa.eu.int/comm/transport/themes/network/doc/2002_brochure_ten_t_en.pdf] of the continent's trans-national trade and travel flows. Galileo is [as Project 15] a key component of this infrastructure. It will deliver - as an advanced service - the time and space stamp for any vehicle and any fright which is moving across this immense economic region, allowing the planning, synchronization, segregation, consolidation, tracking and tracing of the logistic flows of humans and goods, of services and money; generating herewith economic growth, wealth and quality of life for the majority of the Europeans. The interweaving of the economies along the present European east-west borders is in this scenario a particularly difficult task of high responsibility for the involved actors.

The Odra/Oder River, separating - yet - Germany and Poland, is a backbone of such a Trans-European logistics corridor. The Maritime University Szczecin in Poland and the German company LOPOS Technologies in Hamburg developed together a design for an advanced IT infrastructure in a corridor Berlin-Schwedt-Szczecin-Baltic Sea, in which the waterway Havel-Odra and the parallel rail and road lanes may be monitored, synchronized and controlled by an EGNOS-Galileo-based multimodal traffic system.

The single vehicles sailing on the waterway will be connected there interactively by wireless broadband communication together and with the traffic control centers. This interactive technology will allow supplying the vessels - continuously or on demand - with added-value services. This may increase the profitability of the complete logistic chain along this waterway, no matter which neither nationality vessels nor the transported goods may have. The immediate profit consists however in the optimal use of the unsaturated waterway capacities, by overcoming the present traffic bottlenecks (locks, ship elevators, narrow river segments, frozen channels, etc.) and by synchronizing the land-based transloading capacities at the ports (both, inland and oversea ones). This will foster herewith intermodal logistics, generating more traffic at less costs per 100 tones/kilometer freight (relationship: 4,1 liter for a truck, 1,7 for rail and 1,3 for a vessel of diesel oil consumption, to transport it) and substituting road-based transportation.

The ports and quay areas become in this system the cross points in charge of the synchronization and optimization of the intermodal transit. The just-in-time access to these ports from the rail, road and water side is the main planning service of an A-VTMIS Active Vessel Traffic Management Information System. This implies a complex task of real-time data fusion and communication, with customized access rights to selected users: Controlling with high accuracy ship's positions, sailing, speed and course and identifying these ships unambiguously in real-time, delivering to service ships (tugs, bunkering, catering, cranes, police, customs, pilots, dredgers, sounding survey boats, etc) the complete traffic image; providing large excursion vessels and family leisure ships with additional information about shore-based services, water depths, tides, accidents, waterway occlusions, critical meteorological or hydrological conditions, medical services, etc.

Such an A-VTMIS will reduce voice communication ship-to-shore and allow broadband internet access to the involved traffic actors both, aboard and ashore. The wireless communication ship-shore will be implemented regardless of the chosen technology (GMS, GPRS, EDGE, UMTS, Beyond3G/NGN, WLAN, LEOS, Inmarsat, etc.), depending on the local availability and on the communication task to be accomplished (precision navigation of a ship's convoy maneuver in a port area needs by far more broadband data traffic than individual leisure-sailing in quiet inland waters).

A particular relevance will become the 3-dimensional visualization of the vessel's movement - both, below and over the water line - in confined or ecologically sensitive areas, in which navigation is only possible with the high accuracy provided by EGNOS/Galileo. Spatial perception of these navigational tasks by the watch officer at the helm is a source of increased safety for all traffic participants, especially long before a difficulty appears, e.g. at the non-visible sectors of the waterway before a

maneuver, in a curve, etc. The task to integrate all these information by advanced data fusion techniques at the traffic control center of the respective port or waterway segment, including in certain extreme cases real-time satellital or aerial survey data (for example about water pollution flowing down the river), or including hydrological simulation forecasting of a river inundation, as well as the shore-based long-range radar of a coastal monitoring service, - all of them conform extreme valuable services to the economy and the ecology of the surveyed area. Adding - if available - the AIS self-positioning signals of emitting ships in the same area, a traffic image can be transmitted on board of any vessel sailing to a predefined shore destination, where some other participants of the logistics and services chain will link to this ship, both as a source or as a sink of intermodal transloading (e.g. the restaurant waiting for the passengers of an excursion vessel at an expected time; or the just-in-time transboarding of freight of a river vessel from Berlin to a coastal one, scheduled to leave Szczecin seawards to Scotland).

Once a first edge of the Transeuropean Corridor Berlin-Schwedt-Szczecin-Swinoujscie-Baltic is implemented at the Polish-German segment between Szczecin and the Baltic Sea, the transportation industry of this cross-border region will promote a growing interaction and reciprocity of the border economies, generating new jobs, innovation opportunities due to the interlacing of transnational services and economic activities, interweaving educational systems and organizations, with a relatively reduced amount of public investments. The export opportunities once concentrated in this region, may flourish again, in view of the intermodal logistic facilities arising from this satellite-supported transportation ways. The A-VTMIS at the corridor Berlin-Szczecin may therefore accomplish what EU Vice-President Loyola de Palacio remarked: Linking - yet - peripheral regions and neighboring countries "to the heart of the European Union".