



Vessels Manoeuvring and Docking Call for High Accuracy and Capacity - DockingAssist Solutions

Project Full name: Improved Port Efficiency and Safety Using a Novel Wireless Network and Differential Global Navigation Satellite System Providing Enhanced Vessel Navigation

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Project coordinator: CENTRE DE RECERCA I INNOVACIO DE CATALUNYA S.A.

Consortium Partners: CRIC, Marimatech, Net Technologies, Prodevelop, Runcom, Port of Cork, ASCAMM and VTT.

8 project partners from 6 countries: Denmark, Finland, Greece, Ireland, Israel and Spain.

EC Contribution: EUR 1,122,633.41

Website: <http://www.dockingassist.eu>

Project video: <http://youtu.be/HA4Z3NdwFBs>

Maritime transport services are essential in helping the European economy and European companies compete globally. Moreover, shipping and all related maritime industries – sectors that are uncharacteristically dominated by SMEs - are an important source of revenue and jobs in Europe. Despite the fact that the current financial crisis has also affected maritime transport, a doubling of transport volumes is expected over the next 15-20 years. The EU maritime sector has responded via the provision of highly accurate vessel location systems (centimeter-level accuracy) to assist with the critical docking / manoeuvring of container ships, bulk carriers, and other large vessels. Maneuvering such large vessels is not an easy task, especially when marine traffic is increasing. In addition, ports around the world will be placed under significant pressure to increase their capacity and efficiency in the coming years. Current accurate location systems suffer from limited range (only usable in the immediate vicinity of the dock), low efficiency and relatively high cost.

DockingAssist is a cost-effective location system, providing the necessary centimeter positioning/speed accuracy, but covering the complete port / harbour zone, thereby providing efficient and safe maneuvering within the entire port area. This enhances vessel trajectory and facilitates the constant monitoring for moored/docked vessels. The DockingAssist project started in November 2011 and will be finished in October 2013. The prototype has been developed and successfully tested/demonstrated at Port of Cork, Ireland in several trials and demonstrations. The performance is very promising and the SME participants are very excited and will exploit this technology for their future product lines.

The DockingAssist system consists of two main parts: (i) a DockingAssist Base Station (BS) installed at the harbour, and (ii) a Portable Pilot Unit (PPU) installed on the ship(s). The portable unit is used by the expert pilot in charge of docking all the vessels at the port without requiring any expensive berthing systems.



- **Base Station**

The DockingAssist BS is composed of three different elements (see Figure 1): (i) the GNSS/RTK (Global Navigation Satellite System/Real-Time Kinematic) receiver to obtain the GNSS reference (correction) data, (ii) the WiMAX BS in order to communicate with the vessels, and (iii) a control software to manage the GNSS/Differential Global Positioning System (DGPS)/RTK receiver and the WiMAX BS. The software is in charge of transmitting the correction data through the WiMAX downlink, and of receiving the accurate position, heading, and ROT data from the vessel through the WiMAX uplink.

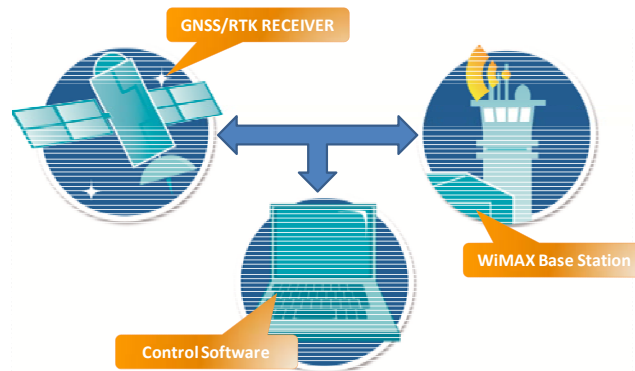


Figure 1: DockingAssist base station configuration.

- **Portable Pilot Unit (PPU)**

The configuration of the PPU is similar to the BS (see Figure 2). A PPU typically includes three components: (i) a GNSS/DGPS/RTK receiver (rover station) with two antennas to acquire the vessel's direction, (ii) one WiMAX Mobile Station (MS) to communicate with the BS, and (iii) a software responsible for connecting the GNSS/DGPS/RTK receiver with the WiMAX MS, that is further in charge of controlling the PPU receiving the reference data and transmitting the accurate position, direction, and ROT (Rate-of-Turn) streaming to the BS.

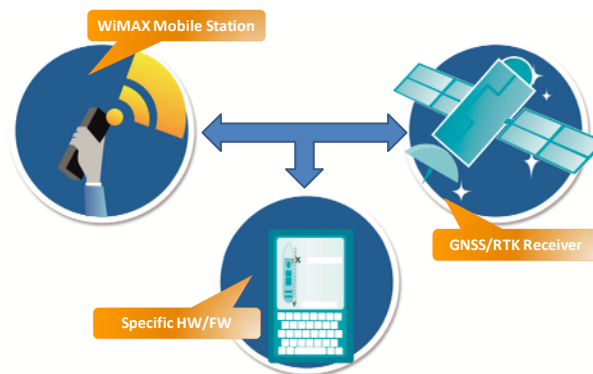


Figure 2: DockingAssist PPU configuration.

The prototype has been tested and demonstrated successfully at Port of Cork, Ireland. The performance complies with the defined system specification. In addition, in order to prove the its competitive position in relation to the current commercial products, we compared the performance with a current commercial product during the testing and field trials,. The comparison is listed in the following table.

Table 1: Comparison of DockingAssist system with a current commercial product.

	Commercial PPUs	DockingAssist system
Radio network	UHF Modem	Mobile WiMAX (IEEE 802.16e)
Multiplexing	TDMA	OFDMA
Number of vessels supported	Several	Up to hundreds of vessels
Data rate capacity	Tens of Kb/s (BAUD)	From Mb/s to tens of Mb/s in both uplink and downlink
Navigation and berthing capabilities	Navigation + berthing	Navigation + accurate berthing
GPS/DGPS/RTK capabilities	GPS/DGPS/dual freq. RTK	GPS/DGPS/dual freq. RTK
Coverage per BS	Tens of kilometres, according to the data sheet	From kilometres to up to tens of kilometres depending on the system parameters
Data transmission capabilities	BS – Rover: correction data streaming; Rover – BS: own position	BS – Rover: correction data, weather, etc.; Rover – BS: accurate position, heading, ROT streaming; And possibilities of sending other information, e.g. video/audio, internet services.

The DockingAssist project has the purpose of improving the competitiveness of both maritime equipments producer SMEs and the consortium end-user partner (Port of Cork). During the project life, we have successfully proved the principal idea of DockingAssist and transferred the technology from RTD performers to the consortium SMEs. The project has been disseminated by all partners nationally and internationally through workshop, exhibition, press, newspaper, radio, social media etc. In May 2013, the DockingAssist project participated in the EPA (European Projects Awards) 2013 event, and was finally nominated as one of the 3 finalists in the macro-category ONGOING Project.

The solution of the DockingAssist project has a massive economic impact on the SMEs in the shipping sector, as it will result in improved port traffic management and a reduction in operating expenses, CO2 emissions and fuel usage, lessening the environmental impact of shipping. The improved traffic efficiency will increase throughput in European ports with a minimum investment. Consequently, the related SMEs will also increase their business, taking advantage of this growth of goods, indirectly benefiting from the reduced operational vessel trip expenses.