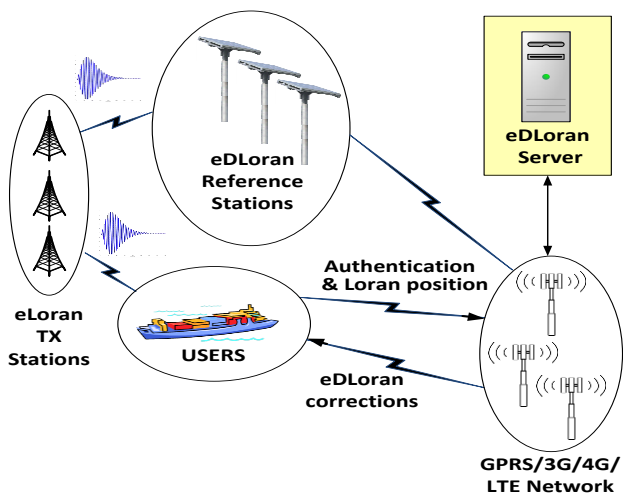# eDLoran

Solar-powered eDLoran reference station

enhanced Differential Loran

- provides best possible position accuracy with eLoran, Loran-C or Chayka navigation systems

- applicable in all areas where Loran-C, eLoran or Chayka is available

- applies GPRS instead of Loran Data Channel for correction data transfer

- eDLoran reference stations are low-cost, physically small and hardly visible in landscape

- operates autonomously, independent from external power or wired Internet connection

- all eDLoran reference stations are linked to a protected central server

- eDLoran is robust against lightning, intruders or terrorism due to redundant multiple stations

- user sends raw Loran/Chayka position and requests provider for correction data

- if acknowledged, provider replies with optimal correction data

- all eDLoran reference stations monitor GPS to detect possible jamming/spoofing

- eDLoran system may simply install Public-Private-Partnership technique for revenues
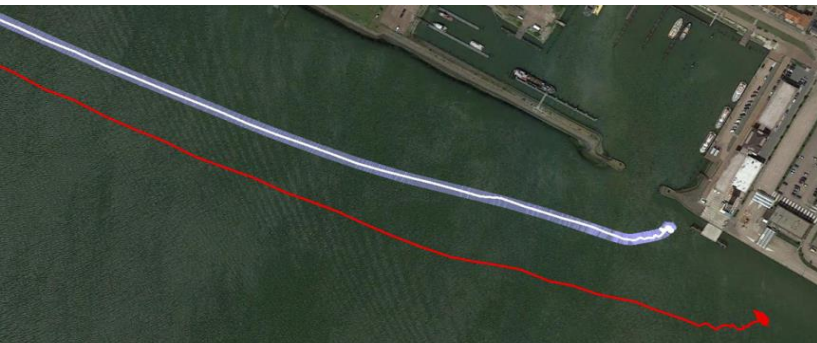
What is eDLoran?

To achieve high accuracy with eLoran, the receiver corrects the found position with data from an ASF database which is stored in the memory of the receiver. Although the resulting accuracy is quite good, it is not adequate for very demanding applications like piloting ships in dangerous waters. Therefore, so-called reference stations measure deviations from the stored ASF database which are caused by slowly changing wheather conditions and possible small but rather fast varying timing errors in the eLoran/Chayka transmitters. These ASF deviations are sent through a mobile network from the reference station to the eDLoran server which in turn makes these data available to the user, again via a mobile network.

The intelligence of the eDLoran network is at the server in a protected area. All reference stations send their measurements to this server which therefore can calculate the best possible corrections for the user at its current location. It further allows to monitor all reference stations as part of the integrity control of eDLoran.

All reference stations are also equipped with a GPS receiver to monitor its position outputs on correctness. This offers a GPS alarm trigger in case of jamming or spoofing which can be forwarded to the users in the area. It may help also authorities to locate and disable the disturbing source quickly.


The resulting accuracy can be impressive as is shown above. The red track is eLoran without ASF and eDLoran corrections. The blue line is the 'true' track achieved by GPS-RTK. This track is widened to 10 m. The white track is eDLoran and the picture shows that it stays within 5 m from the centre line. All measurements have been done on board of the MS Polaris, a very modern high-tech pilot station vessel of the Dutch Pilots' Corporation.

A special small portable battery-powered eDLoran receiver has been designed for use by pilots. It receives eLoran signals and sends these via bluetooth to the pilot's laptop which also receives the eDLoran corrections via the mobile network. The laptop processes the corrections and depicts the result on the electronic map together with the GPS and/or eDLoran positions. The red marker on the map below depicts the eDLoran position while the center of the ship is the 'true' GPS-RTK position.
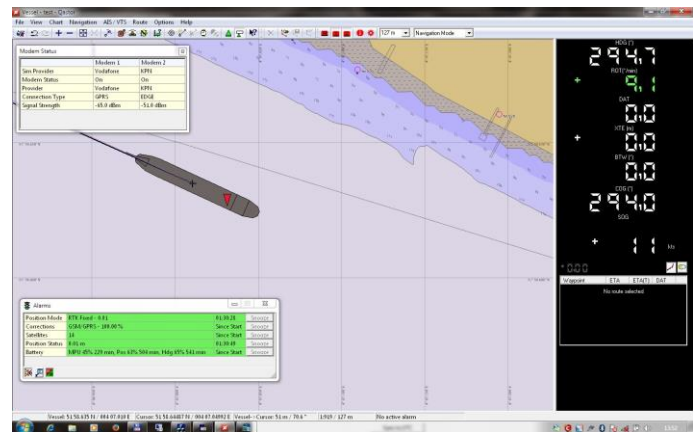
For futher information please see:
www.gpsworld.com/dloran-surprise-european-navigation-conference-2014

www.gpsworld.com/edloran-the-next-gen-loran

For more Reelektronika eLoran products please see:
www.reelektronika.nl

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