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Impact of «enhanced Loran» on the European Community

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Summary

Dear sirs,

I am sorry, but I did not know really what is "«enhanced Loran»". That question has been already put on the table at the last Far East Radio Navigation System meeting I attend in Tokyo, some weeks before. But as for a so important man in the radio navigation community that is Mr. Peter Kent, he was asking what could be the definition of those words, that has to be written, I must confess that it will not be possible to me, young fellow arriving very recently in this world, to do all the job. I think that every person in this room has his own definition. But when I had that discussion with Tom Celano, to prepare this presentation, it was obvious that beneath those words was a kind of worldwide arising concept, and I will try to give you some inputs about (and from) Europe on that topic.

Europe

NELS and Loran C

I am sure that you all know that the service offered in the respect of the North-West Europe Loran C System (NELS) within an international agreement for the implementation of the Loran C, signed in 1992 by six countries (Denmark, France, Germany, Ireland, Norway and The Netherlands), will not be available after 2005. Some of these countries think that this system no longer corresponds to needs of users for terrestrial and maritime sectors, or if they think that there exists a need, that this is not the appropriate manner to respond to it.

Despite the success of the improvement of the signal by the implementation by the NELS (developments realized by the Direction des Constructions Navales, entry in service of the Control Centre of Brest, …), the service offered by the Loran C alone was not enough competitive as compared to the GPS. Suppliers of equipment have not therefore developed new receivers (the architecture has remain of analogical concept, …), and the number of users (mariners, meteorologists, …) has remained very weak. We also have to remember that those users were obliged to buy new receivers when the decision was taken to modify the chains frequencies. NELS was trying to implement new technical specifications, and did not care of the market!

It is necessary to me to stress that this will result in a dramatic loss of Loran and GNSS/Loran knowledge and working ability in Europe. The teams in charge of the NELS stations will be dismantled, and it will be very difficult to reconstitute a technical support in the future.

NELS and «enhanced Loran»

The concept of the integration of systems appeared first in a 1999 NELS statement. It is only since 2001 that the decision to equip 4 stations (Lessay, Sylt, Vaerlandet, Ejde) in order to distribute Eurofix corrections has brought a few operators and potential users to interest themselves in the possibilities of this integrated system which would be available all the time and nearly everywhere.

A very low number of companies have launched new receiver development, allowing calibrating the Loran C signal from GPS differential correction. This expected equipment, of very reduced size, associated to magnetic antennae newly developed of smallest size and

more effective than E-field antennae, use digital technologies. The final objective is to integrate the whole in chips.

Galileo and Loran C

During the last years, it was obvious in Europe that supporting Loran C was interpreted by nearly everybody as a willingness to fight against the new European project, Galileo. Out of the limits of the very few people supporting Loran, everybody was considering (may I say thinking?) that Loran was only an old-fashioned system, and that to dedicate any budget to his re-furbishment will lower the budget allowed to Galileo, and so reduce the chances for that new GNSS system to be decided to be implemented. When the budget decision has been finally taken, allowing to the Galileo project the needed money, as there have been some problems to put in application the decisions, it was again the same situation during several months.

But now, the Galileo project is going along well, and we could expect that hearing people speaking about Loran C would be more easily accepted. Some signs show that we are going in that direction, but there is always a tremendous amount of work to be done.

Especially, it is necessary to inform those people about what is new in the Loran world. Most of them, when they heard "Loran", think in term of old type equipments, with tubes and lamps, covered with dust and spider nets. So the definition of an "«enhanced Loran»" concept could be of some help.

Some European countries and «enhanced Loran»

Germany has implemented a Eurofix monitoring station. Germany is working on business case and users markets to implement a private solution over whole Europe.

At the last European Maritime Safety Agency meeting, a note prepared by the United Kingdom Department of Transport has been submitted, making a suggestion for the analysis by EMSA on:

- the merits of a fallback system to support GPS
- whether Loran C could be such a system for EU
- what extension or adaptation of the system could be necessary?

It will be put on the agenda of an other EMSA meeting.

ERNP and «enhanced Loran»

The Galileo MRD indicate that, as a satellite based system, Galileo alone will not meet all the requirements needed by the users, and so, Loran C is clearly designated as an associated system for local components of Galileo.

If some European Commission members considers that there is no other possibility than the GNSS/Loran integrated system to meet the users requirements in some very specific situations, then that could be strategic for the decision to launch the development of mass market applications.

The European Commission had decided to develop a European Radio Navigation Plan. A presentation of the ERNP study and a discussion on the Terms of Reference and the future work programme will be made during the 8th Meeting, scheduled in Ferrol, Spain, the day after tomorrow.

It is expected by some EC people that the need for a coordinate European action on Loran C will be so obvious in the future ERNP report that that report will be put on the Transport Council agenda. The UK observer at the last NELS SC meeting said that they needed an EC line, which they will follow.

But this is in the mind of only a few people, and the calendar (the study will last 9 months) will clearly contribute to expected decisions to be taken after the end of NELS.

Actions have been already conducted to inform and persuade participants in Europe of the need to consider that "«enhanced Loran»" concept and its application. I have organised several meetings with EC members, representatives of administrations (in France, Norway), to inform them about the interest of the "«enhanced Loran»", showing the quality Eurofix and of the results of the Gloria tests. Presentations have been made in Europe (GNSS 2003) and outside (12th FERNS meeting).

GNSS back-up and «enhanced Loran»

An important part of the debate to have on "«enhanced Loran»" is the back-up role.

At the 12th FERNS meeting, it was decided, on a proposal by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) to organise the 27 and 28 November in Korea a meeting which would consider the extent of the risk to GNSS to deliberate interference, and will try to give answers to the following questions:

- what is understood by back-up to GNSS?
- does GNSS need a back-up? If so, what is the justification?
- do Loran C and Chayka qualify to provide the services required?

A study for the EMRF, on the «GNSS Vulnerability and mitigation measures», has been produce by Dr Nick Ward. The European Maritime Radionavigation Forum (EMRF) has been asked by the EC to extend this study to all kinds of marine aids to navigation.

In Europe, it will be necessary to make an analysis of that back-up role, for Galileo at least, with the Galileo Centre for Safety and Security.

France

France and Loran C

In France, Loran C directly concerns two Ministries. The Ministry of Defence owns the two stations (Lessay and Soustons) and the Control Centre in Brest, implemented to fulfil its own policy, especially for the maritime sector. People belongings to the Ministry of Infrastructures, Transport, Housing, Tourism and the Sea, in fact the Lighthouse and Buoys Division, manned the station, for the first level maintenance.

The users were, at the beginning of NELS, very specifics, in relation with the maritime. In 1997, a study was ordered by the Directorate for Research and Scientific Affairs of the Transport Ministry, and the conclusions were clear: it was to the market to identify the needs and to define, promote and implement the dedicated services, and it was not part of the state domain action.

But is it realistic to decide that a system have to be implemented directly in response to a users' demand? Looking in the past, many systems have been implemented by national authorities, without waiting for a huge demand. But also, a system cannot survive if there are no users.

France and «enhanced Loran»

In France, the Ministry of Defence is not satisfied with only one positioning system. Currently, it uses the GPS, but to the reception, the power of this system is weak (the perceived signal equals to that a bulb of 25 watts to 30 000 kilometres of distance). This renders, on the one hand risks of very important jamming and on the other hand the impossibility of receiving the signal inside a building.

Whatever are developments to come in terms of inertial systems, and also due to the fact of the very good Loran C capacity concerning repeatability, the decision has therefore been taken to use the Loran C until 2015.

Thanks to the implementation of the Eurofix concept, it is possible to have an interesting alternative to the other systems, because it gives an adequate answer to the National Navy for its units of surface (mine sweeper, …), as well as to the Army terrestrial units (small receiver interest for infantrymen in operations inside buildings).

You all know the letters send by ILA to people in charge of policy and/or technical matters in Europe. They have been very helpful. In France, the French Navigation Institute wrote to the Research and Scientific Affairs Directorate of the French Ministry of Infrastructures, Transport, Housing, Tourism and the Sea, to point out the advantages of the "«enhanced Loran»". So it has been decided to conduct trials in 2004, to give a good knowledge of the subject, especially for terrestrial users, and to see if some solutions could be found to specific needs (transport of hazardous goods in tunnels, ..). The Ministry has already answered several letters sent by members of the National Assembly, asking for more information.

French proposal

As is has been confirmed at the last NELS Steering Committee, last week in The Hague (The Netherlands), the NELS system will be stopped in 2005, and France is trying to implement a new system, at least in South of Europe, on the basis proposed in June 2002, during a meeting with Germany and Italy. This is a minimal concept, based on the implementation of stations delivering the Loran C and Eurofix signals, so of an «enhanced Loran» type. It will allow every country, running or not today an existing station, or wanting to implement new one's, to join the project.

This project is dedicated to offer a service to the maritime users first, but to the terrestrial users also.

The reduce project that France can implement nearly alone, with the minimum of international work, is the chain made of the two French stations (Lessay and Soustons) and the Danish station (Ejde), with the Control Centre and the Maintenance Centre in Brest. To do so, the French Ministry of Defence had decided to offer to cover the running costs of the Ejde station (estimated at 0.4 M€), and an international agreement will be to conclude between Denmark and France.

It is necessary to incorporate the German station (Sylt), but it will need an international agreement to be concluded between Germany and France. As you know, Germany thinks that there is a need for an integrated system (GNSS and Loran) for many types of specific users, whose needs could not be satisfied by only a GNSS service, and that that system had to be out of the state domain. Private initiatives are under studies at the present time in Germany to offer in the near future a global European coverage. The French proposal is to be implemented if those initiatives cannot be finalised and in that case, an international agreement will be to concluded between Germany and France.

To improve the coverage, a possibility is to renovate the northern Italian station (Sellia Marina). France asked the NELS Coordination Agency Office to determine what is the technical and funding situation of the equipment already bought by NELS for the never implemented Irish Loophead station (transmitter, antenna, …). This information will allow determining the cost of the renovation, using that equipment. At the last Steering Committee, the first financial elements have been presented. As they were not sufficient, new actions have to be done, especially in Ireland and France, to be able to have a complete description of the situation in January 2004. Since the meeting in June 2002, Italy has expressed interest to re-establish Loran-C, but, as in many countries, there is a risk that, mainly for budget reasons, decisions could be taken, as to destroy stations (remember the Spain Estartit station). Confirmation of the French proposal will be given to Italy, and to go further, it will need that an international agreement will be concluded between Italy and France.

Due to the baseline distances between Soustons and Sellia Marina (1605 km), and between Sylt and Sellia Marina (1880 km), as no measurements of signals have been done, it could be necessary to create a new station to improve the service. There are several options, for example in the Provence, Alsace or Lorraine regions.

Actions

The actions have been defined as a common aim for the two French ministries, and presented to the other NELS members, and the observers, at the last 25th Steering Committee..

At the NELS level:

- The NELS system figures must be the best as possible, compared to the international agreement specifications, as it is necessary to demonstrate the quality of the service, and therefore the credibility of the NELS organisation

- Analysis must be conducted, to point out what is due to operator errors, weather conditions (i.e. lightning), or other reasons. The data must be compared to what is mandatory, and proposals of actions to reduce the gap must be made and implemented

- The work done on the External Time References in a few stations shows clearly that it is necessary to extend it at all the NELS stations

- The NELS CAO must give all the needed information about Loophead equipment status and cost sharing. It was partly done at the 25th NELS SC, and is to be finalised

Decided by France:

- Technical analysis about the implementation of a new chain including Sellia Marina. First elements have been already received from DCN and Megapulse, which will be completed by DCN. Any help of interested parties will be useful

- A draft report on the expected performances of the SELS chain, the costs of equipments needed to implement that chain, has to be established before the end of 2003 by DCN. Any help of interested parties will be useful

- Funding of a new station in 2004. The budget has not been allowed, in the maritime part of the 2004 French Ministry of Infrastructures, Transport, Housing, Tourism and the Sea budget, as presented at the National Assembly

- So the research of other ways of funding, for example by the French Ministry of Infrastructures, Transport, Housing, Tourism and the Sea, Terrestrial Directorates, or by the French Defence Ministry, are under analysis

- Research of land possibilities in Provence, Alsace or Lorraine regions to support new Loran C stations is to be launched. A short draft list of parameters, issued from Megapulse documentation, is to be established and distributed in November, to be used by French Infrastructures, Transport, Housing, Tourism and the Sea, and Defence Ministries to do a first selection of potential sites

- Letters will be send by France to the NELS members representatives for Germany, Italy and Denmark, to launch the technical work, before to have the first contacts at the Foreign Affairs level

To be proposed by France:

- Technical meeting between France, Germany, Italy and Denmark, in January, to validate the draft reports.

Conclusion

I hope the use of that term "«enhanced Loran»" in my presentation has not hurt you. But if it is the case, do not hesitate to make me know about it. It will certainly help us to go further, and I am persuaded that it is by exchanging, working together with all our differences that could bring us to a better future for radio navigation, for the people in charge of the policy and technique, but above all, for the users.

Thank you for your attention.