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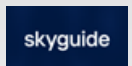
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Several partners



Strategic autonomy

TELERAD is the sole player in the French Defense Industrial and Technological Base specialized in the design, development and manufacture of the radio systems used in air and maritime traffic control, and as such is a perfect example of the technological SME in the service of French strategic autonomy:

Traditionally located in the heart of the Basque Country;

With an "agile" R&D department used to work most often on urgent innovative, and even disruptive solutions, including for the major integrators;

With sub-contractors anchored in the same economic territory;

With manufacturing capacities that allow us to face up to unexpected or very specific needs;

Having a dual culture for more than sixty years taking inspiration from two worlds, civil and military;

All this in the framework of the TELERAD Future Factory, the fruit of a global project, first envisaged several years ago.

Strategic autonomy, sovereignty, resilience... These are words with burning significance today but which for TELERAD and its employees, are anything but new.

Patrice Mariotte
CEO of TELERAD

Three questions to:

Klaus Meier

Chief Technology Officer (CTO)
Skyguide

skyguide

Could you introduce us to Skyguide and its main missions?

Skyguide is committed to providing safe, efficient and sustainable air traffic management in Switzerland and adjacent parts of neighbouring countries. With its 1'500 professionals at 14 locations, the company guides civil and military flights through Europe's busiest airspace. Through innovation and trustworthy partnerships Skyguide enhances Switzerland's appeal as a place to live, work and do business. Through innovation Skyguide also plays a key role within the European network. The company is majority-owned by the Swiss Confederation and headquartered in Geneva.

What are the challenges currently faced by Skyguide in the implementation of the Single European Sky and/or in the evolution of its ATM solutions?

The Single European Sky (SES) is a European Union project that intends to make Europe's air transport more efficient, more cost-effective and easier on the environment. As a non-EU member Switzerland can lobby on issues and participate in the committee's discussions, but does not have any voting rights in any committee decisions. The SES project has also spawned the Single European Sky ATM Research (SESAR) programme, under which European aviation stakeholders are working together to further develop the continent's air traffic management system. Switzerland has been a SESAR partner and member for many years, and in this capacity has been a key and innovative driver of modernising Europe's airspace, systems and operational processes, particularly, through the development of the 'Virtual Centre' and connected to that, a network-centric CNS rationalization. The Virtual Centre programme is Skyguide's main contribution to make Europe's fragmented and thus inefficient ATM landscape less costly, yet scalable and more resilient. Virtual Centre allows Skyguide to manage any piece of Swiss or delegated airspace from the Area Control Centre in Dübendorf or Geneva as if there was only one air traffic service unit. This solution is fully aligned with Europe's ambition of a digital European sky and Skyguide has thus been recognized in Europe as an early mover with its new innovative ATM concepts.

Skyguide has launched a major technical and operational modernisation plan for its tools and facilities. Among the new technologies, Voice over IP (VoIP) is currently being deployed. How does this contribute to the modernisation of air traffic services?

The Virtual Centre initiative will deeply impact our voice communication services. Our current solutions rely on hundreds of national and international point-to-point circuits to establish the communication between our air traffic controllers managing local sectors, the pilots and the adjacent centers. With such a setup, we operate in a static environment where telephone connections and radio frequencies cannot be easily exchanged between sectors and the adjacent centers.

Over the coming years, this situation will change. The so-called "location independence", which is at the heart of our virtual center operational strategy, triggers the ability that any air traffic controller can access any airspace with any frequency from any working position at any time. In this context, the static point-to-point solution shall be replaced by the possibility to communicate via a network location-independently and deliver dynamic air-ground and ground-ground connections.

The Voice over Internet Protocol (VoIP) and its EUROCAE standard (ED-136/137/138) will be able to fulfill this need.

With products and systems in more than sixty countries, TELERAD is specialized in the study, the development and the manufacture of radio systems used for the control of aerial and maritime navigation. A unique company in this area, it is a key player in the French and European defense, industrial and technological base.

The ocean, TELERAD's second element

For more than fifty years, TELERAD has offered a family of radio-beacons (NDB or Non-Directional Beacons) that guide aircraft or ships, day and night, in the most extreme weather con-



ditions. In a more specific case, such as offshore platforms, these systems are used by helicopters, transporting staff or equipment. Renowned for their reliability, this equipment is present on many platforms, particularly those of TotalEnergies off the coast of Angola.

TELERAD boosts its Production resources

With the continuation of its Future Factory, TELERAD has invested in new means of production, in particular, a line for installing SMC products (Surface-Mount Components), entirely compatible with the European directive RoHS (Restriction of Hazardous Substances in Electrical and Electronic Equipment) which limits the use of certain hazardous substances in electrical and electronic equipment (Lead solder). The installation process consists of four



main steps: depositing the brazing paste, placing the components, soldering and automatic optical inspection. At the heart of the system, the placing machine, equipped with "Hydra" and "Mydas" heads, multiplies by a factor of three, the capacity for assembly while increasing the range of components available for TELERAD's products.

FOCUS

Innovation on frequency

In the field of aeronautical communications and that of coastal maritime communications, a radio transmitter or receiver is usually linked to a channel. Thus, a radio receiver captures a single frequency. To respond to specific applications, TELERAD has conducted an R&D study on multi-frequency reception, and has come up with an innovation in rupture with the technological state-of-the-art, providing the opportunity to break free from the current paradigm, namely "one receiver for one channel". Thus, the new multichannel VUHF receiver makes reception over 10 to 20 channels possible simultaneously from one and the same item of equipment. Coupled with the best antenna available on the site, this receiver displays its prowess in receiving channels with performances similar to those of the current single channel receivers. In the civil field, the air traffic control centers and maritime communication centers will benefit from this major innovation which:

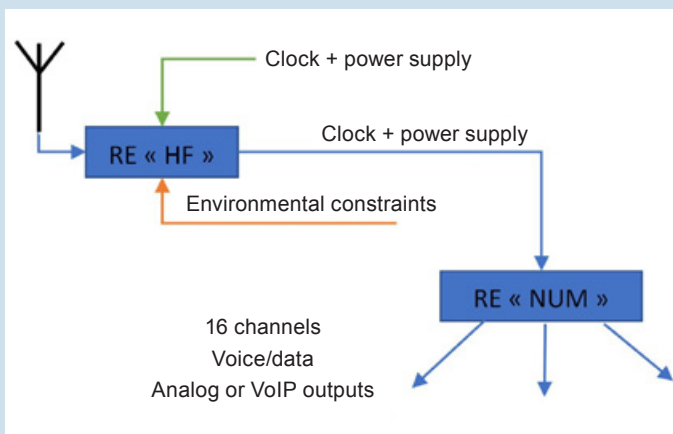
- Will considerably reduce the number of radio posts and their footprint,
- Will simplify the antenna array and the incorporation of antennas,
- Will provide increased security by facilitating redundancy and the monitoring of the emergency frequency.

Another benefit from the project is that moving radio functions closer to the antenna, opens the way to architectures that are also in rupture with those existing. The signals are sent to the operational part via an optical link, reducing any risk of electromagnetic interference, thus greatly simplifying the wiring at the centers.

VUHF multichannel receiver

The increase of the performances of components available on the market and their cost, make possible the industrialization of mass production of a product, offering two directions for innovation:

- Simultaneous reception of multiple signals: from one wideband signal, simultaneously channeling and demodulating several narrowband signals.
- Optical fiber transport: sampling the signal closest to the antenna and transporting it "raw" right to the receiver charged with processing and using this signal.



In addition, there are real opportunities in the area of "on-board" aeronautical communications, in particular the transport over optical fiber as a way to reduce the congestion of equipment in the aircraft. Indeed, coaxial cables between the antenna and the radios are heavy and complex to install on aircraft. To substitute them for optical fibers would represent a major savings for aircraft manufacturers. The new entirely digital, reception architecture developed by TELERAD, covers the aspects of multichannel reception and transport by optical fibers. This innovation opens the way to more integrated systems intended for multiple applications, both civil and military.

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