



To subscribe to the TELERAD Communication Letter [LINK](#)

View the video presenting TELERAD and its activities [LINK](#)



To download the TELERAD training catalogue [LINK](#)



Contact: communication@telerad.fr

Several partners



Editorial

The electromagnetic spectrum is a precious physical resource managed by the International Telecommunication Union. It is broken down into frequency bands allocated to different services. Thus civil, military aeronautical communications, radio-broadcasting or mobile telephony for example. The challenge is then to optimize the spectral resources attributed with the goal of offering the maximum of communication channels which can transmit the maximum of information.

Technological developments notably in the digital field and with SDR (Software Defined Radio) provide the best use of the spectrum by increasing the number of channels and/or the data rate, for offering new services and therefore new prospects. In 1999, TELERAD marketed its first multi-mode SDR, carrying voice and data transmission communications. Since then, TELERAD engineers have not ceased innovating for creating the Series 9000-2G radio family. This offers more wave shapes and more connectivity (IP) which makes it an ideal platform for the convergence of systems and their remote control.

We are pleased to welcome General Officer Christophe Vilchenon, Commander of the Air Force Maneuver Support Brigade (*in French brigade aérienne d'appui à la manœuvre aérienne - BAAMA*), for presenting BAAMA to us and clarifying the challenges of telecommunications means in the framework of its missions.

Patrice Mariotte
CEO of TELERAD

Three questions for the General...

Christophe Vilchenon

Commander of the Air Force Maneuver Support Brigade



Could you present the Air Force Maneuver Support Brigade (BAAMA) and its missions for us?

The command of the air forces is the major organic command of the French Air Force, in charge of operational preparations and supporting all conventional and special forces. Within the air force command (CFA - *commandement des forces aériennes*), BAAMA occupies the sector of operational infrastructure (aeronautical zones and external, internal and exercise operations infrastructures) and information and communication aeronautical systems (SIC - *systèmes d'information et de communication*), in France as in operations. This brigade has around 3000 men and women with 1800 specifically dedicated to SIC.

Our operating perimeter is very wide. We supply radar and radio coverage on behalf of the permanent air security posture (air defense), the permanent space security posture (satellite monitoring), airborne dissuasion, Government action in the air (search and rescue for example) and air force operational preparations. We also supply air traffic control resources, navigation and landing aids on all aerial platforms as well as command and aerial operations execution systems. During operations, we implement telecommunications means (satellite, Hertzian, telephony and networks) for forward air bases and occasional for special forces. We train our personnel on all systems while ensuring their cybersecurity. We also study the influence of wind turbines on radar detection and develop operational software for example in the area of digital ground-to-air fire support.

How does the convergence of means of telecommunication, detection and networks contribute to BAAMA's missions?

In the past during the time of "classic electronics", we had to have very different skills in all areas and performed almost no remote actions. In the future, with the generalization of digital systems and standard IP, we shall have a convergence of technologies and therefore of the skills needed and the possibility of remote control. At this time, we are in a transition phase with means belonging to a wide spectrum of technologies. Our current priority is to go to "all IP" and to withdraw the oldest systems from service.

What is your vision of the evolution of telecommunications within BAAMA?

Currently, we have different means for voice and data communications with aircraft. In the future, voice and data will be "mixed" and treated as data being totally integrated into the program of the future air combat system (SCAF - *système de combat aérien du futur*). They will transit via a secure, discrete and "cyber-monitored" channel. Telecom equipment must become physical interfaces between the "combat aerial cloud" (exchanges between aircraft) and the "combat ground cloud" (exchanges between ground systems), allowing the air force to have a "single combat cloud" including a generalized capacity for mass information exchanges in all possible forms (voice, data, images and video).

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.

60th birthday of ASECNA



Born in 1959 in Saint-Louis, Senegal, the Agency for Aerial Navigation Safety in Africa and Madagascar (ASECNA) [Agence pour la sécurité de la navigation aérienne en Afrique et à Madagascar] grew up in Dakar and has just celebrated its 60th birthday. International Government Organization, ASECNA supplies air traffic services on behalf of its 18 members.

These community air traffic control missions require radio links between ground centers and aircraft over an area of 16.5 million km². The radio resources implemented for providing these radio-communications, are often operated under extreme conditions, whether in terms of accessibility or of climate.

In this context, ASECNA has had confidence in TELERAD for more than 40 years, for supplying equipment, guaranteeing the reliability required for its mission.

TELERAD today is proud to participate in the birthday celebration of the oldest institution for African and Malagasy cooperation and integration.

TELERAD, the first company to receive the label "Utilisé par les armées françaises" (UAF) [Used by the French Armed Forces]

TELERAD has been the first company to receive the label "Used by the French Armed Forces" from the Ministry of Defense in person, during the SIAE 2019 Paris Air Show [Salon International de l'aéronautique et de l'espace]. The label "Used by the French Military" is designed to favor new markets, especially internationally.



France: forest fire fighting mission

Within the Ministry of the Interior, the controllers of the zone, more specifically the operational centers (COZ), must be in communication with the water bomber aircraft

in order to assign their mission, then throughout their transit to the drop location.

The technically impossibility of using Government digital radio networks and the search for an un-scrambled frequency range, led us to propose a new architecture based on two essential constraints: avoiding modifying the aircraft equipment while allowing for interoperability with other contributing aircraft engaged in forest fire fighting, including foreign ones. The center for national expertise in aerial means networks supported by the SGAMI Sud¹, thus proposed to put an experimental program in place, using an aeronautical frequency range and based on the pooling of Hertzian waves from the Ministry of the Interior (converged network) to link COZ operators to three stations supplied by TELERAD. The TELERAD VHF transmission/reception sites are being deployed and operational trials must continue in 2020.



¹SGAMI: secrétariat général pour l'administration du ministère de l'Intérieur [General secretariat for administration of the Ministry of the Interior]

FOCUS

Offset Carrier Systems or CLIMAX mode

When the operational needs of air navigation require the use of a single, unique frequency over a difficult (mountainous type terrain) or very extensive (Saharan) coverage zone, a mechanism must be implemented allowing the aircraft to receive this frequency emitted simultaneously from several transmitting centers.

In the area of overlap of the transmitting stations, it is essential then to guard against simultaneous reception phenomena which lead to communications which are incomprehensible or inaudible for the pilot (perception of a tone superimposed on the voice). Offset carrier system allow this problem to be resolved from ground radio transmission stations. These systems also known as « CLIMAX » are widely used in Europe.

The solution implemented consists of offsetting the disturbing tone outside audio bandwidth. This is done using several ground transmitters emitting within the same channel (25kHz or 8.33kHz) by means of the offset of each of their transmitting frequencies.

In order to respond perfectly to the conditions for implementing CLIMAX, TELERAD transmission equipment are compliant with paragraph §7.2 Frequency Error of the standard ETSI EN300676 which determines the number of frequency offsets with regard to radio equipment frequency stability.

These offsets are defined in appendix 10 of the ICAO. Thus, in the case of 25kHz channeling, there can be up to 5 carriers and 2 in the case of 8.33kHz (see example below).

In parallel, to guarantee the correct reception of the signal on-board the aircraft in the framework of CLIMAX operation, the standard ED-23C defines the minimum operation characteristics of the equipment (MOPS) and requires that the receiver incorporate an appropriate band-pass filter.

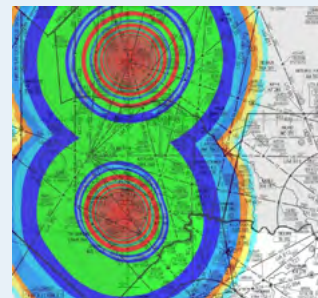
Depending on the operating class of the equipment, the receiver may or may not be able to receive a radio coverage system based

on offset carrier. Classes C, E and F are suitable for this operation. Aircraft today are equipped with receivers belonging to one of these classes.

Example of two ground based stations operated in CLIMAX mode

The aircraft must cross a zone within which only one, unique frequency F₀ is operationally available. This zone here is the geographical surface area symbolized by "8" which represents radio coverage from two transmitters.

In CLIMAX mode, their frequencies are offset by + Δ F et – Δ F with respect to the frequency F₀. This allows the aircraft's receiver, tuned to the frequency F₀, to receive an audible voice signal over the whole geographic zone, including in the zone of overlap of the two transmissions.



The specifications for operating in "CLIMAX" mode are standardized in the document ETSI EN300 676 for ground equipment and in EUROCAE ED-23C for on-board radios. "CLIMAX" was originally defined in VHF channels spaced by 25kHz. In 2004, in the framework of a feasibility study mandated by Eurocontrol, TELERAD offered a technical solution allowing an extension to be made to 8.33 kHz channels. Following that, TELERAD offered standardized evolutions to ETSI and the ICAO and presided over the "Task Force 8.33" at EUROCAE for the update of ED-23C.

You will regularly receive information concerning TELERAD, its products and its activities. In compliance with the European General Regulation on data protection (RGPD), you have the possibility of no longer receiving communications from our company by informing us of this by e-mail: communication@telerad.fr TELERAD pays great importance to the protection of your data. These are treated with the greatest rigor and are only used by TELERAD. They are neither loaned nor rented.