ICNS 2018 – keynote speech
Philippe Merlo, Director ATM, EUROCONTROL

Good morning, everyone. Thanks to Ben for that kind introduction. CNS is a key topic for Air Traffic Management in General and for us in EUROCONTROL in particular. We know that this annual ICNS conference is one of the most important CNS events in the world. I would therefore like to thank the organizers for inviting me to deliver this keynote address. It is an honour and a unique opportunity to present our vision of the evolution of CNS systems in the years to come.

I have spent my working life in Air Traffic Management and as far back as I can remember – even as a very young and enthusiastic engineer – I have been waiting for a CNS breakthrough. Waiting for something amazing that changes CNS dramatically. Something comparable to the revolution that has happened in the the internet, or in mobile telecommunications.

I am still waiting.

Of course, waiting alone will not make it happen. We have to adapt our strategy, focus our efforts and prioritise our work if we are to achieve radical transformation.

However, I think we are closer now than we ever have been before. Many of the foundations are in place. As traffic grows rapidly, the entire aviation sector is much more focused on how to improve performance. In addition, there are real opportunities in terms of data transmission. But there are also major challenges and I'll come back to those.

So how close are we? Well, I would like to start, in the first part of this talk, with the very significant progress achieved in CNS in recent years.

At the forefront of it is the impressive list of new CNS satellite systems; remarkably, this is true for all the 3 CNS components.

As regards communication, the new constellation IRIDIUM/NEXT springs to mind. Its full constellation will be operational before the end of 2018 offering all kinds of Aviation Communication services. I would also like to mention INMARSAT's new SWIFT-BROADBAND service that has demonstrated its performance and has been selected by major aircraft manufacturers and that is already supporting OPS Safety Services.

As for navigation, we have the European Galileo system . It will reach full capacity by the end of 2018 with 26 satellites. GALILEO will double the services already offered by GPS, enhancing GNSS redundancy and resilience to levels unknown at present.

But the most promising satellite system probably goes to surveillance, with the emergence of space ADS-B as a potential game-changer. The AIREON system will soon provide the first ATM global coverage surveillance service by the end of 2018.

For the significant proportion of aircraft that are already equipped with the appropriate transponders, the tracking will be immediately available.

Think of the immense consequences. No more blind areas in flight position tracking! Full oceanic coverage! Something that is very much needed, not just for normal operations but also in relation to tragedies such as MN370. This is such a radical innovation that other manufacturers like Airbus have already decided to study the development of a similar service.

We are thus witnessing a massive investment in CNS satellites. We are no longer talking prototypes here, but rather complete systems close to the operational stage. Major companies are in this area with strong investment capability and the willingness to offer global commercial services, in a competitive environment. It has the potential to bring about a radical change in CNS. This explains the present feeling that we may be close to a breakthrough. By the way, there is still one major challenge to overcome with equipping the aircraft. I will come back to that later.

In the meantime, other CNS systems on the ground are achieving significant progress as well. I am referring to the VDL2 datalink for communication and TERRESTRIAL ADS-B for surveillance.

In Europe, datalink has now overcome its initial difficulties. Multi-frequency capacity has been deployed, hence reducing congestion. Disconnections have been drastically reduced and the number of datalink messages is constantly increasing. The coverage area has expanded to most of European airspace, enabling the digital transmission of control instructions, in particular for radio-frequency management, thus reducing the workload of air traffic controllers and freeing up voice communication.

In the USA, the ADS-B program continues to gear up and is on schedule to meet the January 2020 mandate. It's at the heart of the NextGen programme and essential for the transformation of their ATM systems.

We have here two important projects, launched more than 15 years ago, both supported by an equipment mandate in 2020. These are terrestrial systems, more traditional and less spectacular than satellite systems, but are nonetheless essential, in particular to cover cases of jamming and spoofing to which satellite systems unfortunately remain too sensitive.

After many initial hurdles, their progress show us that perseverance pays off in the end. The mandates play a key role in progressing towards a critical rate of fleet equipment. They must remain until the objectives are completed otherwise the investment already made would be lost. We need to go all the way for ADS-B and Datalink.

Starting from 2020, the combination of these two systems will create a new basis on which additional developments will become possible.

However we have to admit that the feeling here is not really one of a breakthrough but rather of a tortuous step-by-step progression. There are particular reasons for this, especially the difficulty of equipping aircraft. I will come back to that later.

Before that, I would like to address another area with significant progress: decommissioning of the old conventional analogue radio navigation aids has begun.

In Europe indeed, some countries have pioneered such a rationalization. France for example, has already withdrawn some 50 Cat I ILSs from service in all small airports where new SBAS approaches were implemented. Note that a minimum network of Cat I ILS has been kept so that an IFR flight is never more than 30 minutes away from an equipped airport.

The European Commission intends to generalize this approach all over Europe through a specific regulation. Moreover, the Commission is about to launch a CNS rationalisation programme in the next SESAR deployment package. The idea is to start removing redundant systems: for radars for example, we believe we could decommission immediately around 30 radars without reducing the overall performance.

We are just at the beginning of such a CNS rationalisation effort but it is very significant to have already started it. It allows me to better define the notion of breakthrough: it seems to me that the real breakthrough will be when we can decommission all the old conventional analogue CNS systems. A fully digitalized CNS system is what we want.

However, we all know that we are not yet there. This leads me to the second part of my speech where I want to emphasise the persisting challenges that we still have to overcome.

A first challenge is to develop and maintain a common worldwide CNS roadmap taking into account the needs of all interested stakeholders. States, ANSPs, Airlines, airports, aircraft manufacturers, communications providers, system providers all these organizations are interested in new CNS systems, each with their own perspective.

The States within the ICAO framework have a critical role to play here, in order to secure international harmonisation and standardisation. We must pay tribute to the work of ICAO in this area, which has been able to develop and maintain such a common CNS roadmap for several years despite the diversity of stakeholders.

Let me also stress the very good bilateral cooperation between the USA and Europe, between NEXTGEN and SESAR that was instrumental in enabling such a common roadmap. We would also like to develop the same kind of cooperation with CARATS in Japan and with China.

This common ICAO CNS roadmap is not perfect but it does exist and it has potential. We know that we still need to clarify it on major points. How to complete GBAS R&D to enable the replacement of Cat 2 and Cat 3 ILS? What kind of high capacity datalink do we need to replace VDL2 around 2030? Should we accelerate the standardisation work already initiated by ICAO on LDACS? What will be the nature of the terrestrial APNT system needed to tackle satellite jamming and spoofing? All these issues need to be worked out. I am glad to see that Plenary session number 1 will address the global harmonisation perspective and all the related issues.

One point to keep in mind is that these new CNS systems are for operational profit. It is therefore crucial to listen to operational actors first. I am delighted that Plenary Session 2 will be devoted to this perspective, exploring the expectations of Airlines, airports, and ANSPs.

However, the biggest difficulty we face today in making this roadmap happen indisputably relates to deployment. More precisely, the challenge is to make sure that aircraft have the equipment needed to use all this new technology.

Indeed, even with those CNS programmes that have made most progress towards implementation, be they ADS-B, VDL2, or SBAS, equipage rates today are still far too low, despite the existing mandate.

This difficulty is hardly surprising: with a unit price in the $100,000 range, and with several thousand aircraft to be equipped, the cost of a retrofit would quickly reach a significant number, literally billions of dollars.

This often leads to a stalemate situation: not achieving fleet re-equipment prevents the decommissioning of old CNS systems, which in turn cancels out the benefits of the new systems, and discourages air users from getting equipped.

States have again a key role to play in solving this Catch-22 situation. Only States can make sure that the general interest prevails. This comes down to the old story of the stick and the carrot…

On the stick side, States may decide to mandate equipment by a given date. However, the experience of ADS-B and Datalink shows that such hard regulations are necessary, but not sufficient. There is first the classic wait-and-see behaviour. Moreover, some airspace users simply do not have the financial means necessary to equip themselves.

So, on the carrot side, I strongly advocate for States to accompany mandates with incentives. Several possibilities exist in this area. For example, the concept of "best equipped, best served" aircraft has been the subject of numerous studies. Similarly, the implementation of specific subsidies or rebates for users who agree to equip is an effective means that has already been tested in Europe and the United States. Europe has also already explored the possibility of lowering air navigation

charges for equipped aircraft. All these incentives for CNS equipment are of paramount importance and need to be relaunched.

I now move to the third part of my speech. My objective here is to look for opportunities and solutions beyond the traditional air navigation scope. We have seen that the biggest obstacle is the cost of retrofitting aircraft. Therefore, we need to think around this problem – to find ways in which CNS solutions can be combined with other services and can use the investment for those services.

A first opportunity concerns commercial communication services already existing or under development for aviation. In fact, many aircraft already offer WiFi services on board, as passengers want to stay connected to the Internet during the flight. There is a real demand, a good business case, commercial offers in constant development. We may assume that the provision of a WiFi service on board commercial aircraft will soon become a "must".

In the same vein, most aviation stakeholders, be they airlines, aircraft manufacturers or engine manufacturers, are increasingly requesting in-flight high-throughput datacom services for preventive maintenance or for optimising operations. Here again, projects are multiplying, some of which can legitimately use the aeronautical spectrum bands.

Is it not possible to take advantage of these new communication services to satisfy certain operational requirements of air navigation, in particular those concerning the implementation of a high-speed data link? Of course, proper investigations would need to be conducted to make sure that there will be no negative impact on safety. This is a very promising avenue for reflection and the main theme of Plenary Session 3, Part 1.

Another avenue rich in opportunities is the arrival of new entrants willing to access airspace, be they drones, at low or high altitude, stratospheric balloons, or suborbital flights. Powerful and wealthy companies are promoting all these projects. For them, mastering the ATM/CNS aspect is an essential prerequisite, but remains secondary in terms of costs.

Moreover, these new aircraft do not transport pilots or passengers, and therefore one could more easily consider, for them, new advanced CNS architectures. We should stop thinking about C, N and S as separate components, but rather consider their integration as an opportunity as well as a challenge: we need to think integrated CNS. Here again, safety cases will be of paramount importance.

We must therefore remain open and attentive to new entrants who could provide us with new solutions and with a welcome investment capacity. Again, I am happy to see that this is the theme of Plenary Session III, Part 2.

The third and last area of opportunity I wish to mention relates to the aeronautical spectrum. Spectrum has become the most critical scarce resource in radio communication. Aviation spectrum's value has been assessed at around $ 800 billion. We should note that only a small part of this sum would be more than enough to pay for all the needed CNS retrofits. This could suggest some win-win cooperation with commercial communication companies, as already mentioned before.

Moreover, we need to increase CNS spectrum efficiency. Aviation cannot indefinitely keep in service analogue systems like VOR-DME with very low spectrum efficiency.

So let us use this pressure on the spectrum as a lever to accelerate CNS evolution. Spectrum efficiency should become, in my opinion, the main driver to steer CNS evolution strategy. Thus, without going as far as effective payment, the definition of a virtual cost for using aviation spectrum should become mandatory in the cost-benefit analysis of all new CNS systems. It would make it possible to raise awareness of their increased efficiency, and to establish priorities. New CNS systems need access to appropriate and sufficient spectrum.

In conclusion, strong challenges still persist and are slowing down the implementation of new CNS systems. The difficulty with aircraft equipment is particularly acute. Hence the expected breakthrough is not yet there. I am still waiting, we are still waiting!

However, thanks to the combined impacts of regulatory mandates, states incentives, and perseverance regarding a global ICAO CNS strategy, the situation could evolve quickly in the coming years. The start of navaid decommissioning is the best early-warning sign of it. Moreover, many new opportunities are arising such as those linked to new CNS satellites, to the development of commercial aviation communication services, to the promotion of new entrants in controlled airspace, and to the growing pressure on the aviation spectrum.

All this creates a new CNS environment, one that again makes progress possible – if we know how to make the most of it. For that, we need a new CNS strategy, a strategy able to factor in these new opportunities. We need a new integrated CNS strategy.

This is a proposal that Europe and EUROCONTROL intend to promote at the next ICAO Air Navigation Conference. If we know how to play it right, a CNS breakthrough is within our reach in the not so distant future. For that, we have to work together, Asia, America and Europe united!

 Ultimately, it is up to us to make it happen.

Thank you for your attention!