Communications fit for the future

Maastricht Upper Area Control Centre controllers now have a voice communications system with capacity to last for the next twenty years

Maastricht Upper Area Control Centre (MUAC) became the first facility within the Functional Airspace Block Europe Central (FABEC) to deploy the New-generation Voice Communications System (N-VCS) to meet the common specifications drawn up by all FABEC members in the 2000s. Supporting live operations since October 2017, the N-VCS is also being rolled out across five French area control centres as a result of a joint procurement contract awarded by MUAC and Direction des Services de la Navigation Aérienne (DSNA) to Frequentis and partner CS in 2011.

"Predictions that voice communications will some day become secondary to digital exchanges are still a long way from reality," said MUAC Project Manager Tom Goossenaerts. "We need a technology that will put us in a comfortable position for the lifetime of the system. We had the foresight to select internet protocol (IP) a decade ago and we now have the foundations that allow us to integrate VCS into the complete ATM (air traffic management) environment with minimum adaptation. The industry is rapidly moving away from an environment based on classical point-to-point digital connections towards a network-centric infrastructure favouring IP-based services. We anticipated this from the beginning and have oriented our system requirements accordingly."

MUAC controllers are already taking advantage of new features provided by Frequentis' VCS 3020X end-to-end IP communications solution. Sector handovers involving frequency changes, previously carried out verbally between controllers, are now conducted via a dedicated role-allocation tool which automatically assigns the correct set of frequencies to the intended controller. "We used to deselect the frequencies manually, but N-VCS automatically populates the communications panel with the correct frequencies. Furthermore, the old system was limited to eight frequencies whereas now this limit is so high that it is no longer considered as an operational constraint," explains Ivan Pelegrin Morales, who has worked with N-VCS from the outset.

"The N-VCS also enables you to use the radar screen to initiate a voice connection towards an adjacent centre. Using the communications panel is time-consuming and you have to take your eyes off the screen. Now we can use the screen to make inputs with the mouse that will be picked up by the N-VCS. I can select an aircraft and tell the N-VCS to call the next unit. It saves me searching for the correct page, relevant sector, and panel button," Morales adds.

The system is also connected to MUAC's radio direction finder system, operational since February 2017, where it helps with situational awareness by determining which aircraft

Tom Goossenaerts
N-VCS Project Manager at MUAC, EUROCONTROL

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is calling at a given time, and displaying this on screen.

Tom Goossenaerts says more features will be accessed via the radar screen in future, with the aim of improving safety and easing controller workload.

N-VCS uses Voice over Internet Protocol (VoIP), whereby the voice signal is digitised and divided into IP packages which travel over two separate networks to ensure security and coverage. The switch is also backwards compatible in order to support traditional point-to-point connections still prevalent in legacy systems. However, by replacing traditional circuit-switched networks, VoIP links multiple locations using a distributed network that opens up many new opportunities for cooperation. "In a network-oriented environment, if you take out one node, the intelligence itself remains in the network so the data stream can be redirected to another position with the same capabilities," explains Goossenaerts. This means, for example, that one air navigation service provider (ANSP) could handle aircraft crossing another partner's airspace, possibly at night when traffic levels are low, or for contingency reasons.

More dynamic airspace management between countries or sectors operating with voice communications system of the same generation is a key objective of FABEC's common specification initiative. In addition to 100 operational controller working positions, MUAC also operates 30 standby positions – all equipped with N-VCS. "If another centre had a calamity, we could host controllers here provided they have access to radio resources over the same network and the adjacent centres can still be contacted for coordination," Goossenaerts adds.

MUAC is the largest centre to introduce the new technology, bringing with it specific challenges. "We tested small portions of the system, for example frequencies at one specific radio site, before including additional radio sites. We moved in small steps in order to address any issues and introduce improvements," he continues. Finding slots during the busy summer months proved especially hard, when it might be weeks between one test and the next, while MUAC's multi-national territory added further complexity. "We eventually communicate with 10 radio stations, but each country uses a different radio supplier. We have to adapt to the local requirements and their limitations. Working with external partners introduces a degree of uncertainty not encountered with just one ANSP," says Goossenaerts.

The extended trial period concluded in the second half of 2017, resulting a system that feels almost identical to the previous system, but with capability that extends over a time horizon of 20 years or more. ■

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Ivan Pelegrin Morales
MUAC Air Traffic Controller,
EUROCONTROL

How big data is helping meet Europe's capacity challenge

EUROCONTROL controllers are using innovative machine-learning techniques to track and predict real-time flight routes and better manage demand and capacity

"It is a conceptual change for the user to use big data, but it is just a transparent functionality in the background that provides better prediction of flight trajectories.."

Herbert Naessens
TPI Project Manager

The first big-data project in an air traffic management (ATM) environment is taking shape in one of Europe's busiest airspaces, under the control of Maastricht Upper Area Control Centre (MUAC). Faced with growth rates in excess of 4% annually, Maastricht began using machine-learning techniques in 2017 to access more accurate data for traffic flow management purposes. The centre is using new Traffic Prediction Improvements (TPI) software to calculate the route an aircraft is most likely to fly, not by looking at the filed flight plan, but by looking at historical flight data. Initial findings in the first few weeks of testing show the tool reduced the degree of error between the predicted trajectory and the real flight, on average, by half.

The tests involved about 10% of Maastricht's total traffic, in an area where prediction today often changes, largely due to close proximity of military airspace. When extrapolated to all traffic, the improvement was still substantially better than previously, according to TPI Project Manager Herbert Naessens. "It is a conceptual change for the user to use big data, but it is just a transparent functionality in the background that provides better prediction of flight trajectories."

Two years' historical trajectories provides the basis for the machine to learn the most likely statistical route. TPI relies on a neural network to predict the statistically most likely route based on a set of input parameters per flight, as well as time, day of the week, and status of military areas. The tool has been developed so that weather, too, can be included in the future. ▸