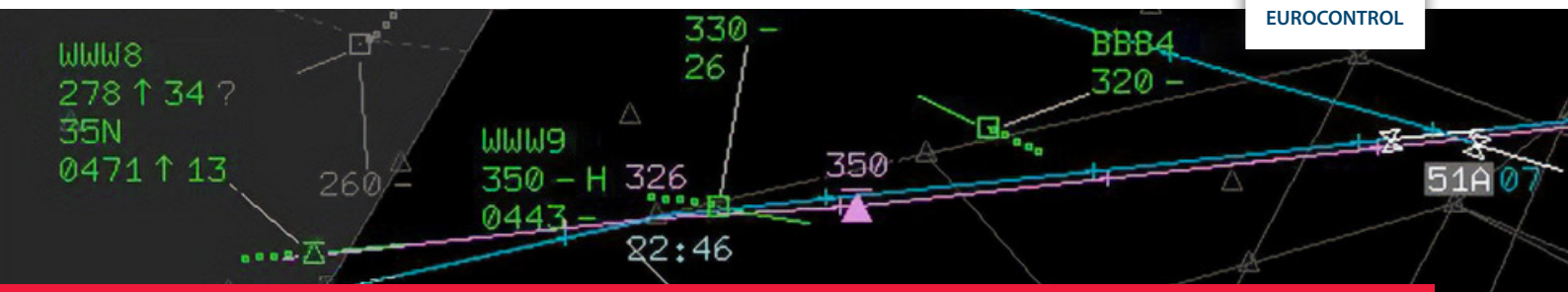


Maastricht Upper Area Control Centre

Automatic Dependent Surveillance–Contract (ADS-C) operational at MUAC

ATS B2 ADS-C is an ATN Datalink-based way of requesting different types of information (aircraft's intentions) directly from the aircraft's Flight Management System, without pilot interaction. It enables aircraft to automatically log on and downlink aircraft intent to the MUAC system, which can be displayed on controllers' screens and used as input for ground-based tools. This leading-edge technology enables MUAC to offer aircraft operators enhanced air navigation services.

ADS-C benefits for aircraft operators

Greater efficiency of air navigation services

Thanks to ADS-C, MUAC will be in a better position to predict more accurate sector traffic loads, ultimately improving operational planning efficiency and reducing the need for flow management procedures.

ADS-C provides greater awareness of flight plan changes, even if these are not received in advance, enhancing flight predictability and thereby capacity management.

Top of Climb (ToC)/Top of Descent (ToD) indications allow better air traffic management and smoother climbs/descents.

Connected aircraft have a better chance of earlier direct routings and smoother climbs to their requested levels (owing to better controller awareness of an aircraft's intended flight profile), as well as cruising level adjustments at the most optimal times (as pilots don't need to request them) and possibly fewer speed restrictions on conversion.

Enhanced safety

An automated warning is displayed when a 2D discrepancy is detected between the air and ground predicted trajectories, saving time spent on the radio and reducing mistakes.

Loadable complex clearances, an ATS-B2 related new functionality in the cockpit of Airbus aircraft, will add clarity, reducing the risk of human errors and providing the possibility of uplinking closed trajectories containing co-ordinates, replacing the need for radar headings.

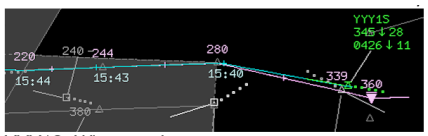
Medium-term conflict detection could also be fed with ADS-C values, enhancing safety.

Reduced fuel consumption/emissions and route extension

ADS-C also provides useful information that can have a positive effect on fuel efficiency. For example, the timing information downlinked via ADS-C can be used to assess whether a flight can exit a military area before it becomes active, ensuring that the aircraft can fly the shortest routes for as long a period as possible.

Thanks to the display of the ToC, controllers can get a better estimation of climb performance, which can result in earlier direct routings and thereby in fewer miles flown; earlier clearances to the requested level (traffic permitting); or continuous climbs to their preferred FL as opposed to a step- climb. This can be translated into an average saving of up to 12 kg of fuel on an A320 and 35 kg on an A330 per flight.

Thanks to the display of the ToD and optimal descent profile, controllers can allow aircraft to start the descent later than normal and possibly even fly the optimal descent profile, resulting in a few minutes more at the cruising level, more optimal descent profiles and fewer step descents (traffic permitting). It has been observed that in those cases the ToD can be delayed by 10 to 20 nautical miles, which — based on input from Airbus — can result in an average saving of up to 10 kg of fuel (31 kg CO_2 emissions) on an A320 and up to 24 kg of fuel (77 kg CO_2 emissions) on an A330 per flight.



YYY1S, When ready, descend FL280 be level at NOGRO

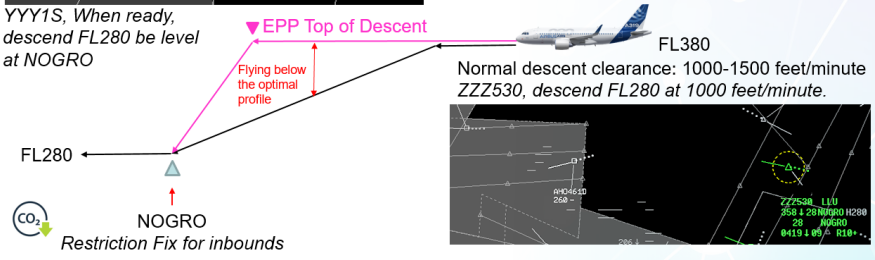


Illustration 1: Through an indication of the ideal Top of Descent (ToD) and descent profile, controllers can more easily allow descents without descend rates if traffic permits.

ADS-C benefits for air traffic control

From the controllers' point of view, the display of the aircraft's Extended Projected Profile (EPP) trajectory and the 2D discrepancy indicator ("?" symbol used at MUAC) are good safety improvements, which increase situational awareness, save time on the frequency and further reduce the risk of mistakes.

By using the EPP's more accurate ETA data for improved sector load predictions, some regulations might not need to be issued. Additionally, the display of the Top of Descent (ToD) and Top of Climb (ToC) allows for better traffic management. Based on the preferred ToD and the optimal descent profile received in the EPP, controllers will try to allow the aircraft to follow the most economical profile, facilitating continuous descent operations and optimal descents whenever traffic allows.

A first step towards more future automation

Overall, the potential of downlinked ADS-C data is clear, as well as the possibilities offered by the associated CPDLC v2 message set in support of more complex clearances. For instance, DESCEND WHEN READY was introduced at the end of 2022 and in 2023 MUAC is planning to introduce the uplink of route clearances as part of closed trajectories

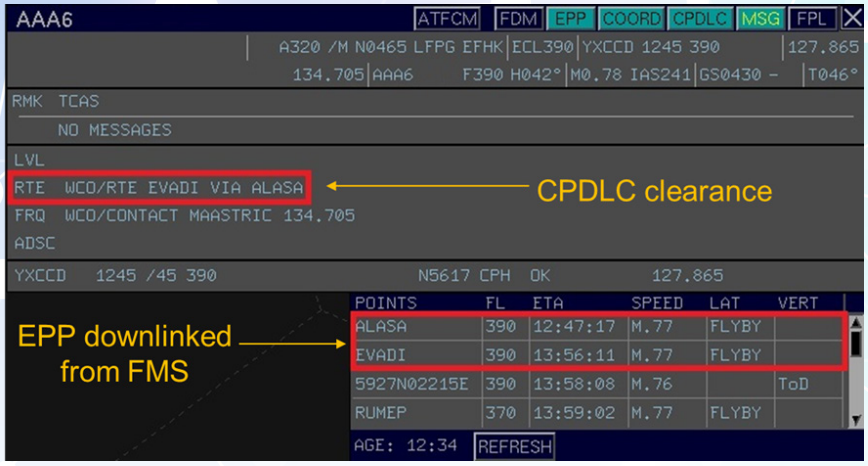


Illustration 3: With ADS-C, controllers can more easily check if route clearances have been implemented correctly

by including push-loadable coordinates (Lat-Long) for ATS B2 equipped aircraft to further reduce flown miles where possible and to reduce the use of less efficient radar headings.

MUAC confirms the need for an ADS-C Common Service (ACS) once more air avigation service providers start implementing ADS-C and as MUAC moves to the ACS set-up for the CP1 mandate. For the time being, with the gradual increase in the number of aircraft being equipped, MUAC continues with the current set-up without causing major problems in the VHF Datalink Mode 2 network.

MUAC follows an evolutionary approach, as we feel that this is the best way to drive change and extend ADS-C related functionality in the years to come. MUAC sees the current implementation as a major step towards Trajectory-Based Operations, a first step towards future enhancement of existing tools and an enabler for automation.

MUAC is committed on multiple fronts to helping the industry share the benefits of this technology by sharing the knowledge and experience gained through the usage of the technology and assisting the bodies in charge of ADS-C implementation in Europe. MUAC is also heavily involved in the further development of ADS-C and CPDLC through international working groups, which will bring several additional benefits in terms of both efficiency and safety.

Airlines with capable aircraft and ATS B2 CPDLC-trained crews are already able to notify MUAC about the equipped airframes (ICAO 24-bit address) and MUAC will include them in the list of users to benefit from the enhanced services by MUAC. This is required because flight plans do not contain reliable information about ATS B2 ADS-C capability (G1).

Please contact MUAC to coordinate: muac.datalink@eurocontrol.int.

Illustration 2: Display of Top of Descent (down-pointing pink triangle) and Extended Projected Profile to controllers.

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