Safe, orderly and expeditious flow of air traffic

By Christian Faber

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"Safety First" from a Flow and Capacity Management perspective

"To ensure a safe, orderly and expeditious flow of air traffic" is the essence of what Air Traffic Controllers learn at the beginning of their career, probably on one of the first days of their training.

Most of us understand "expeditious" to mean "done with speed and efficiency", but fast and efficient may lead to an unsafe situation. From a Flow and Capacity Management point of view the terms "safe" and "expeditious" are somewhat contradictory, even though they proceed from the same source.

The aviation world has changed dramatically over the last 20 years and we are faced with challenges, such as the continuing increase of air traffic in the face of limited capacity. On top of that we are experiencing daily problems such as, lack of staffing, adverse weather, complex routeing schemes, etc. Air Traffic Flow and Capacity Management is expected to prevent congestion in the air and around airports through coordinated management, thereby enhancing safety.

Over the years ATC has evolved to become more service orientated; as a Service Provider, knowing that aircraft operators are faced with economic threats, controllers might conclude:

- Let's climb or descend the aircraft, in order to provide the optimum flight level.
- Let's give the pilot a direct routing, in order to reduce the distance, save fuel, and reduce the environmental impact.
- Let's clear the aircraft for take-off; everybody seems to be ready and it fits nicely into the planning of the departure sequence.

Controllers take a professional pride in providing the "best" service and there is no doubt that cost and flight efficiency are major concerns and amongst the key issues in ATM, but do we consider all the safety aspects?

Across Europe, sectors suffer from delays put in place to protect ATC from receiving more traffic than the air traffic controller can handle safely when other ways to balance capacity against demand are insufficient. However, it still often happens that more aircraft enter these sectors, exceeding the capacities by more than 10%. In those cases we talk about "over-delivery". When investigating those occurrences we find that in most cases flights were:

- not flying at the initial requested flight level; or,
- departing at times different from the original estimated off block time (EOBT) or calculated take off time (CTOT); or,
- arriving in the sector earlier or later than originally planned; or,
- deviating from their original planned route (direct routeing).

On one particular occasion a major ANSP asked CFMU to investigate the over-delivery of a specific sector in their area of responsibility. The capacity of the sector was 40 aircraft per hour but in reality 50 aircraft had entered that particular airspace. It turned out that flights had been re-routed in the air by a previous ATC sector to fly a more direct route. As a result they entered sectors which had not previously been planned and obviously over-deliveries occurred in those sectors.

In another case an upper airspace sector was penetrated by more aircraft than initially planned.

Investigation revealed that many of the aircraft were flying above their requested flight level. An analysis of the updated profiles indicated that they had climbed to higher flight levels approximately 300 to 400 nautical miles before entering the sectors concerned.

Did the pilots and controllers anticipate the consequences of a higher flight level on the traffic demand of a sector downstream on the route? Was the original flight plan realistic? Is all information available and utilised by Air Traffic Controllers to provide a safe service to the aircraft operators and pilots?

The examples above show that there can be considerable impact, if the initial and intended trajectory of flight is modified on an "ad hoc" basis. Following the initial plan is becoming more and more critical to safety.

What are the solutions?

One ANSP is about to implement a system which will detect the actual flight level of aircraft long before they enter their sectors. In the case of a deviation from the expected flight level an alert is raised at the relevant working position, which triggers a corrective action.

There may be other technical solutions, but the start of any solution must be understanding and awareness of the impact of our actions on the network. An increase of traffic goes hand in hand with an increased potential risk of overloading Air Traffic Controllers; adherence to flight plan, flight levels, routes and ATC slots becomes critical. In this light the "expeditious" flow of traffic is not always safe; instead we might have to consider an "optimised" flow of traffic which balances flight efficiency and safety.

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