



## Airlines schedules – a balancing act

Scheduling is a key element of an airline’s commercial strategy and of the customer travel experience; it requires complex decision-making and accurate forecasting despite many variables, with revenue and operational costs being the most critical factors.

Over the past years, and in particular post-pandemic, airlines have increasingly incorporated buffer times into their flight schedules and we can see a growing number of flights departing late but still arriving on-time. Whereas this strategy is a response to market, geopolitical and legislative pressures (e.g. EU261 Passenger Rights legislation on financial compensation in case of long delays on arrival at the final destination), an excessive use of buffers can have a counterproductive impact. A high share of early arrivals can create demand/capacity imbalances, resulting in an overall deterioration of Network efficiency.

As technology advances and data analytics become more sophisticated, airlines will be better equipped to refine their commercial and operational scheduling strategies. This will not only enhance operational efficiency but also improve passenger satisfaction.

*"If you want to be a millionaire, start with a billion dollars and launch a new airline."* Richard Branson once humorously highlighted the challenging nature of the airline business, emphasising how difficult it is to make a profit due to the industry's high costs and competitive environment. One particular challenge for an airline is designing its schedules.

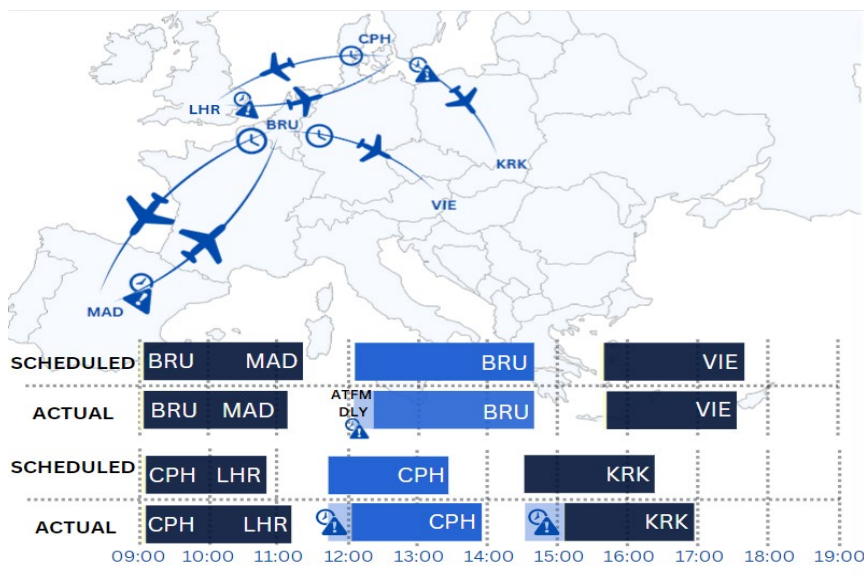
Here the airlines have two competing interests. The operational challenge is to have schedules that are **robust** enough to handle a certain level of delays, thus ensuring schedule integrity – in other words having aircraft ready to depart and, more importantly, **arrive on-time**. This improves the customer experience and minimises difficulties with making connections. Robust schedules also reduce the chance of compensation being paid and also of aircraft failing to arrive before an airport closes for the evening (curfew) – which can result in very costly

diversions. Schedule integrity improves predictability, not just for the airlines but also for the many other players in the complex interrelated aviation system (ground handlers, airport operators, ATC, slot coordinators, etc.).

The economic challenge however is not to build too much slack into its schedules, because of the significant costs and other issues. Airlines want to maximise the utilisation of their costly resources – the aircraft and the crews – and time spent on the ground is not generating revenue. There are also issues for airports (particularly when there are no delays) with early arrivals and long turnround times potentially resulting in a lack of gate or stand availability.

So, while schedules generate revenue, they can also become significant cost drivers if they are not managed effectively. Careful planning and optimisation of schedules, including time buffers, is required.

**FIGURE 1:** Visualisation of scheduling buffers in practice



# European Aviation Trends

18 December 2024

To better understand how schedule buffers affect flights in the network, have a look at Figure 1 where two scenarios are depicted. The **first scenario** shows a sequence of flights flown by the same aircraft. The first flight of the morning arrived ahead of schedule in Madrid. The return flight to Brussels experienced an ATFM delay which caused a later departure. However, the schedule robustness mitigated the departure delay and resulted in an on-time arrival in Brussels, ensuring that the subsequent flights in the schedule were not disrupted.

In the **second scenario** the morning's first flight arrived later than planned, leading to a delayed departure for the return flight to Copenhagen. This, together with waiting for late passengers from a connecting flight, caused a delay for the next flight to Krakow. The schedule was unable to absorb the initial delay. In the case of an additional delay, recovery would be even less likely.

The decisions of an airline on its schedules are not made in isolation. It is a highly **strategic and data-driven process**. Air traffic has seen high growth rates – particularly during the recovery from the COVID pandemic, when the industry struggled to accommodate the rebounding traffic. Russia's invasion of Ukraine and other geopolitical events have also changed traffic patterns significantly, with south-east Europe seeing particularly rapid growth. In both 2023 and 2024 adverse weather and a lack of air traffic control capacity in some areas have contributed to increasing delays. Punctuality levels in Europe have decreased to the worst levels on record in the past 20 years.

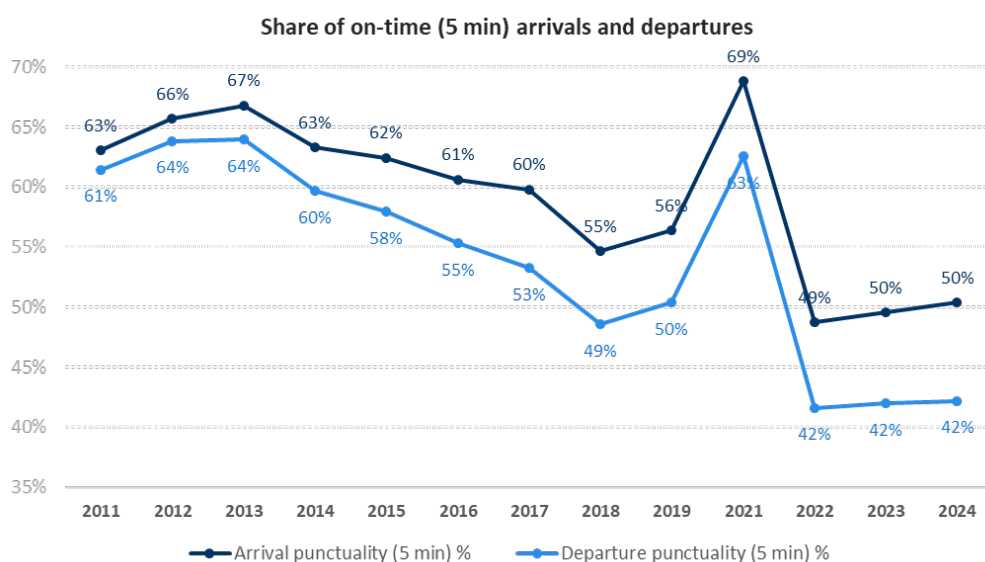
With high average departure delays in 2024 in Europe, airlines are faced with the difficult task to come up with scheduling strategies that strike a viable balance between commercial interests and operational integrity. *'Realistic airline schedules'* is also one of the 5 priorities put forward by the EUROCONTROL Network Manager in the *'All Together Now 2024'* campaign.

Another significant driver for airlines has been the EU legislation on **compensation** (EU261). This sets out how airlines should compensate passengers when flights are cancelled or arrive late. Over the years, the regulation has evolved (typically through clarification on when compensation is payable, partially through case law) and avoiding EU261 compensation is now a strong motivator for airlines. In fact, **MIRROR**, the EUROCONTROL tool to assist airline schedulers and dispatchers, generates specific EU261 alerts when it detects the potential for EU261 being applicable – so that airlines can take action.

## On-time performance trends throughout the years

To illustrate how the behaviour of airlines has evolved over the years, we have looked at **on-time performance** during the IATA summer season (effectively April–October). **In this paper, a flight is considered 'on-time' if it departs from, or arrives at the gate with a delay of less than 5 minutes relative to the published schedule.**

**FIGURE 2:** Share of on-time (5 min) departures and arrivals for IATA summer seasons



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Figure 2 presents the trends in on-time arrivals and departures during the IATA summer seasons from 2011 to 2024 (excluding 2020 due to the impact of the COVID-19 pandemic resulting in very low traffic). The figure illustrates the percentage of flights that departed and arrived with delays of less than 5 minutes.

Over this period, we can clearly observe a **downward trend** in both on-time departures and arrivals, with the most significant decline occurring in 2018 during which there were very high ATFM delays in the Network. 2019 showed an improvement in on-time performance, an encouraging sign as it was the busiest year for air traffic in Europe. The good performance in 2021 was largely driven by a less congested network, reflecting the impact of the pandemic.

In 2022, on-time arrivals and departures dropped significantly below 2019 levels as air traffic rebounded sharply post-pandemic. On-time performance remained consistently low between 2022 and 2024. This analysis underscores the dynamic relationship between traffic volume and on-time performance over time, particularly in response to the global disruptions caused by the pandemic and the subsequent recovery in air travel.

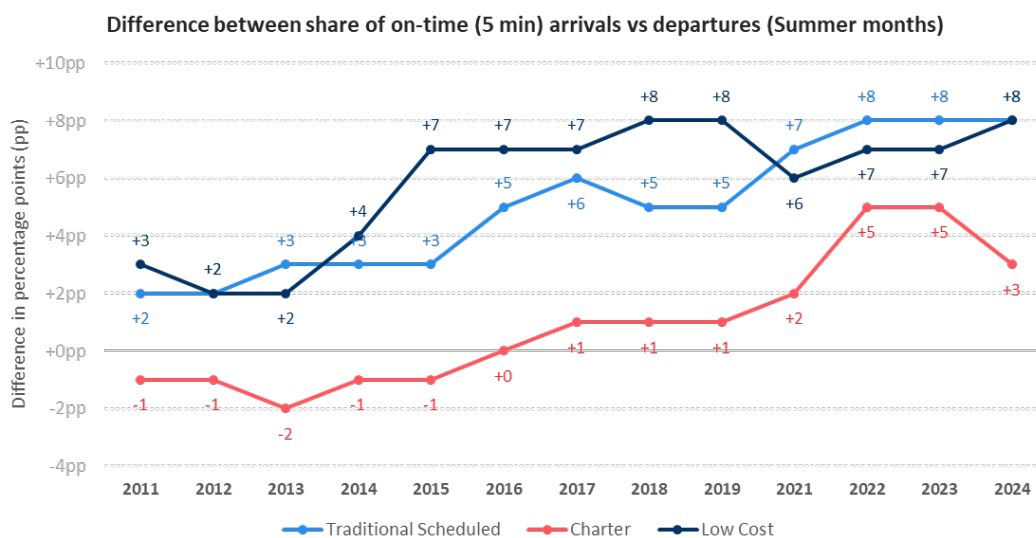
One key observation is that the **gap** between on-time departures and arrivals has widened over time. This

suggests that airlines have focused on putting buffers into the flight element of their schedules, rather than the ground element (turnaround) of their schedules. This helps to improve arrival on-time performance.

Figure 3 illustrates how this gap between on-time departures and arrivals has evolved since 2011. It shows how increases in this gap have been a particular feature both for traditional scheduled airlines<sup>1</sup> (including Mainline and Regional) and for low-cost airlines. The most notable changes occurred **after 2014, when the use of scheduling buffers became widespread** as airlines adapted to leverage these buffers.

Post-COVID, both traditional scheduled and low-cost airlines seem to have adopted a more conservative approach by incorporating larger buffers into their flight schedules. This shift is evident in the rising gap between on-time departures and arrivals, which peaked at 8%, indicating a notable increase in the number of flights arriving on-time compared to those departing on-time. The jump from around 2% to 8% highlights a **significant change in airline behaviour**, with airlines adding more buffers to ensure on-time arrivals, suggesting a more cautious and strategic approach than before.

**FIGURE 3:** Difference between the share of on-time (5 min) departures and arrivals for IATA summer seasons



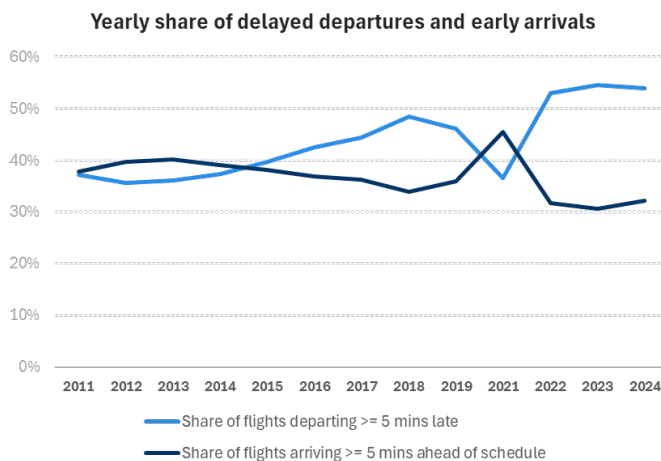
<sup>1</sup> Market segment definitions can be found @ <https://www.eurocontrol.int/publication/market-segment-rules>

## Share of early arrivals remained stable despite an increased share of delayed flights

Over this period, we can clearly observe an **upward trend** in the share of delayed departures (and increase of 17% from 2011 till 2024) with a relatively smaller reduction in the share of early arrivals (a decrease of 6% from 2011 till 2024).

Early arrivals are perceived positively by passengers but may potentially have a negative impact as the turnaround times are extended. In the absence of the anticipated delay the share of early arrivals may significantly increase if schedule buffers are not adjusted.

**FIGURE 4:** Yearly share of delayed (5 min) departures and early (5 min) arrivals



## Conclusions

The growing gap between on-time departures and arrivals, with many flights departing late but still arriving on-time, suggests that airlines have increasingly focused on incorporating buffer times into their flight schedules. Caution must be exercised to avoid excessive use of buffers, which could have a counterproductive impact on overall network efficiency as they may drive early arrivals and therefore create demand/capacity imbalances.

Airline scheduling requires complex decision-making and accurate forecasting despite many variables, with revenue and operational cost being one of the most critical factors.

Improved data allow airlines to refine their commercial scheduling strategies to boost revenue. Airline schedules also need to balance the **operational impact** (on-time performance goals and predictability of schedule execution) and **operational costs** (especially those linked to Passenger Rights compensation in case of long delays on arrival).