ACI EUROPE POSITION PAPER ON AIRPORT CAPACITY

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EXECUTIVE SUMMARY

Discussions on airport capacity tend to focus mostly on runway capacity. In reality, however, the issue is considerably more complex, as drivers other than runway capacity can have a significant impact on an airport's ability to process passengers and aircraft. In addition, discussions of airport capacity should distinguish between the often hypothetical 'Physical Capacity' and 'Actual Capacity', which is usually lower as it is limited by operating procedures, restrictions and regulations. Finally, the discussions around airspace capacity in the context of the Single European Sky (SES) have so far ignored the fact that capacity in the air and capacity on the ground are intrinsically linked and that one cannot be achieved without the other.

The second major topic addressed in this paper is the looming airport capacity crunch documented by EUROCONTROL in its 2013 Challenges of Growth report. The report considers several mitigation measures to counter this challenge, other than the obvious response of expanding physical airport capacity. However, these mitigation options would not solve the airport capacity crunch, even if they could be implemented - and serious hurdles would need to be overcome before these measures could be enacted. In light of all this, ACI EUROPE proposes a further mitigating option in order to address efficiency and capacity at airports: The Ground Coordinator Concept.

AIRPORT CAPACITY BY 2035 – A MAJOUR EUROPEAN CHALLENGE

According to the 2013 EUROCONTROL Challenges of Growth report, demand for air traffic in Europe is expected to grow by **+50% by 2035** compared to 2012 levels. This forecast is lower than previous estimates and reflects the impact of the recent economic and sovereign debt crisis in Europe. European aviation has entered a new era of slower growth prospects compared to the growth rates experienced over the past decades. While the annual average traffic growth rate (aircraft movements) across Europe in the past 20 years was **+3.6%**, it will be just **+1.8%** in the next 20 years.

Despite these slower growth prospects, the **airport capacity crunch remains as acute as ever: by 2035, 12% of demand for air transport will not be accommodated due to a lack of airport capacity in Europe**. This translates into **1.9 million flights** not taking place and **237 million passengers unable to fly**. This also involves airport-related flight delays increasing from less than 1 minute/flight to 5-6 minutes/flight – which means an **unprecedented level of flight delays and cancellations** affecting airlines and the travelling public.

One of the main reasons for this looming airport capacity crunch is the fact that airports have considerably reduced their capacity expansion plans and related investments in the wake of the crisis. Indeed, back in 2008, Europe's airports were planning for a +38% capacity increase by 2030. Now, they are just planning for a **+17% capacity increase by 2035**. This reflects increasing competitive and cost pressures on airports that are here to stay - resulting in more uncertain traffic developments, significant revenue pressures and generally higher capital costs. Moreover, a lack of political support, poor planning processes and decreasing confidence are all constraining airport development throughout Europe.

At the same time, the EU's **Single European Sky (SES) initiative** foresees the **tripling of ATM capacity**, halving related costs for airspace users and reducing aviation's environmental impact by 10% as its main objectives. While SES does not directly address airport capacity, it is clear that **capacity in the air and capacity on the ground are intrinsically linked and that one cannot be achieved without the other**. In other words, as long as the SES objectives are not aligned with ground capacity objectives, the airport capacity crunch will remain the most significant threat to their achievement.

Moreover, the lack of airport capacity will affect the **competitive position of European aviation**. Flight delays and cancellations will come with significant costs for European airlines, while the unavailability of sufficient airport capacity will also result in missed business opportunities and will have a negative impact on **Europe's global hub positioning**.

Finally, **the airport capacity crunch will hurt the European economy**. It will act as an impediment to increased connectivity for our economies, at a time when the Global shift to emerging and recently developed countries to Asia and Latin America gives aviation a new strategic relevance. The contrast with the airport capacity development plans of countries like China and the United Arab Emirates is already striking.

WHAT DRIVES AIRPORT CAPACITY

An airport is a system of processors, and the overall capacity is constrained by the capacity of the weakest processor.

Capacity is calculated on the basis of:

- Throughput capacity – transaction times
- Dwell times
- Physical layout
- Passenger Service levels (IATA LoS)
- Maximum queue lengths.

Theoretical peak hour capacity for each processor may be benchmarked against best-in-class airports and industry experts, but annualising capacity metrics (for example, into millions of passengers per annum) is a very coarse measure based on variable conversion factors and does not capture the diversity of peak hours. An airport's strategic planning objective is to balance peak hour capacities for all processors.

In general, capacity can be defined "as the practical maximum number of operations that a system can serve within a given period of time"[1]. If this definition is applied to airports, capacity can be expressed as the number of flights that can be scheduled to take off and land (i.e., the number of movements), the number of passengers or the volume of cargo that can be handled within a given period of time. Airport capacity can thus be considered as a combination of

- Runway capacity,
- Airport geometry,
- Terminal capacity,
- Apron/stand capacity,
- Airspace capacity and
- Surface access capacity.

These **capacity drivers** determine physical airport capacity.

Runway Capacity
Physical runway capacity is essentially determined by runway configuration, which is defined by the number of runways in use, their location, the design of exits, etc. Further factors limiting runway capacity are[2]:

- In-trail separation of aircraft - how closely aircraft can be spaced one after another when approaching the runway -,
- Lateral separation, especially in bad weather, between aircraft approaching the same airport on parallel runways,

1 Young, S.B./Wells, A.T. (2011): Airport Planning & Management. McGraw-Hill: New York et al., p. 428.
2 For this list compare Butler, V./ Poole, Jr., R.W. (2008): Increasing Airport Capacity Without Increasing Airport Size.

- The sequencing and separation of departing and landing aircraft on runways that intersect,
- The sequencing of departing and arriving aircraft on a single runway, and
- The sequencing of aircraft approaching airports located in close proximity to one another, where one aircraft must cross the path of another aircraft landing at a nearby airport (see also airspace capacity below).

Airport Geometry
The proximity of stands and gates to runways, and the taxiway capacity to deliver aircraft to and from the runway affect throughput, as does the availability of a holding area that allows the selection of the next aircraft for departure and the optimisation of the departure sequence.

Terminal Capacity
Terminal size is not dictated by annual capacity but rather depends on both annual passenger throughput and anticipated peak hour flows. In order to allow the efficient movement of passengers through processing points within an airport terminal, the passenger processing capacity of these processing points is decisive. Examples of processing points include security checkpoints, passport control. A further factor influencing the size of a terminal is the intended standard of service.

Apron/Stand Capacity
The size of an airport's apron and the number of stands required to handle a number of aircraft within a given period of time determine apron/stand capacity. Again, annual throughput and peak capacity are decisive while the apron/stand capacity is further influenced by, e.g., turnaround times and the mix of aircraft operating at the airport. Ideally, the mix of stands available matches the capacity requirements of the mix of aircraft operating at the airport.

Airspace Capacity
Airport capacity is influenced by the capacity of the airspace surrounding an airport. In particular the capacity of the so-called Terminal Manoeuvring Area (TMA) - a designated area of controlled airspace surrounding an airport - is decisive for an airport's capacity. The capacity of the TMA depends on a number of factors, e.g., the design of arrival and departure routes to and from an airport and on whether the TMAs of more than one airport are overlapping or not. The sequencing of aircraft approaching airports located in close proximity to one another, where one aircraft must cross the path of another aircraft landing at a nearby airport, particularly impacts the capacity of these airports. Further examples of factors influencing TMA capacity could be military or other airfields located in the area surrounding an airport or restrictions regarding the overflight of residential areas. The availability of divergent standard instrument departures (SIDs) and the impact of any noise mitigation by way of aircraft departure routing can also affect capacity.

Surface Access Capacity
The modal split - the modal share of each mode of transport passengers and airport employees choose to arrive at or depart from the airport - is a decisive factor for an airport's surface access capacity. When determining surface access capacity the capacity of the road network leading to and from the airport, the capacity of car parks and the 'kerb' (for pick-ups and drop offs) as well as the capacity of public transport modes have to be considered. Some airports are in fact multi-modal transport hubs integrating a number of different transport modes at their location. If this is the case surface access capacity is also impacted by the number of passengers that use surface transport facilities at the airport but do not intend to travel to and from the airport.

Decision makers often tend to take only runway capacity into account in their work on airport capacity. As demonstrated above, this approach is incomplete and **ACI EUROPE encourages decision makers to take other decisive airport capacity drivers, e.g., airspace capacity surrounding airports, the capacity of the terminal(s), the surface access infrastructure etc. into account in their work on airport capacity as well**. The interface between airports and airspace (or air navigation service providers) is critical in addressing the airport capacity crunch. However, the interface between airports and Air Navigation Service Providers (ANSPs) differs considerably across the European Union and even within some Member States.

DIFFERENCE BETWEEN PHYSICAL AND ACTUAL AIRPORT CAPACITY

As with any production process, the physical capacity of an airport is subject to constraints i.e. factors reducing actual capacity. Some examples of factors influencing physical capacity were already mentioned in the section above. In addition, actual runway capacity is also subject to:

- Aircraft mix operating at the airport (aircraft wake vortex categories which determine the spacing of aircraft approaching and departing the runway, runway occupancy time, separation standards…),
- Weather conditions (visibility, ceiling, wind direction and speed,…),
- Equipment (type of navaids provided, ATC equipment,…),
- Level of ATC staffing, etc.,
- Percentage of arrivals versus departures within a given period of time.

In addition to this, all **drivers of airport capacity are usually further impacted by operating procedures and regulations**, e.g., due to noise considerations, special approach and departure procedures or airspace design requirements, limitations to runway use, night curfews. Factors affecting terminal capacity include:

- The provision of state services such as immigration control points,
- Customs requirements, and at some airports,
- The state or municipality's provision of security staff,
- Compliance requirements.

The variability of passenger, aircraft flow throughout the day, week and season produces peaks and troughs of activity at many airports, as does the airlines requirements for hub and spoke operations with minimum connect times. As a result, actual airport capacity is usually much lower than physical airport capacity.

WHAT ARE THE OPTIONS TO ACCOMMODATE UNMET DEMAND?

The most obvious solution to accommodate unmet demand is the **expansion of physical airport capacity**. In order to do so, all capacity drivers determining airport capacity need to be considered.

However, the expansion of physical airport capacity is a very long and difficult process in Europe given the lack of public acceptance for large infrastructure projects (e.g. the expansion of airport capacity in the UK South East has been debated for many years now). In addition, the current economic situation impacts the ability of airports to finance these capacity expansions, while the new EC state aid guidelines (2014) are likely to make airport capacity expansion more difficult for some airports.

In recent years actual airport industry capital spend has been lower than initially forecast, and subsequent capital expenditure projections have been significantly reduced. For example, in 2012 capital expenditure of €9.5 billion was foreseen for the European airport industry in 2013. In the end the industry was only able to invest €5.7 billion. Similarly, €9.9 billion spend was forecast for 2014, while actual spend amounted to only €7.1 billion. A 2012 forecast envisaged capital expenditure of €10.3 billion in 2015, however current updated investment forecasts for the year now only amount to €6.5 billion.

Airports' ability to finance investments in infrastructure have been hit by flat or indeed negative real per-passenger aeronautical revenues in recent years, coupled with increased capital costs. While interest rates have dropped significantly in recent years, the legacy remains – in 2013 real per passenger capital costs were +18% higher than they were in 2008.

As demonstrated by the 2013 Challenges of Growth report, **mitigation measures** such as the use of local alternative airports, the further development of the High Speed Train network and schedule smoothing have the ability to reduce the gap between the projected demand levels and available airport capacity to some extent. However, even if fully implemented, these options would not solve the capacity crunch – but only make it less acute. Besides, there are significant impediments to the practicability of these mitigation measures – not least financing issues and the need to impose traffic distribution rules on airlines.

Under such circumstances, ensuring the use of existing capacity to the best extent possible is a must for airports – and amounts both to a business and social imperative. Optimising existing capacity is supported by technologies and procedures developed in the Single European Sky ATM Research Programme (SESAR). According to the 2013 Challenge of Growth report, SESAR offers the potential to reduce the capacity gap by -19%. However, it should be determined on a case-by-case basis whether the

developed technologies and procedures actually have a positive impact on capacity and efficiency of individual airports. A one-size-fits-all approach is likely to worsen the situation as the funding required for capacity expansion would be allocated to the implementation of technologies and procedures that may not necessarily benefit airport capacity and efficiency.

A further aspect to consider when discussing options to accommodate unmet demand is declared capacity. Declared capacity describes the maximum number of slots per unit of time that can be allocated for take offs and landings and as such is dependent on actual capacity. The slot regime encompasses all regulatory provisions impacting declared capacity and the allocation of slots. It is clear that an efficient slot regime would result in a better use of existing capacity, for instance, through the possibility to apply local rules at airports that could for instance favour larger aircraft, or through the introduction of a slot reservation system. Such a system would incentivise airlines to hand back their slots in time (before the slot return date) in order to allow the swift reallocation of the slots to other carriers. A proposal of the European Commission for a new Regulation on common rules for the allocation of slots at European Union airports has been in the EU legislative process in Council and the European Parliament since 2011. Although ACI EUROPE supports all measures that can alleviate the problem of airport capacity, the contents of the current text (in both Council and the European Parliament) and the overall political deadlock mean that the revision of the slots regime is far from providing a solution to the problem.

Overall, while only practical mitigation measures should be implemented, the reality remains that they will not be sufficient to address the airport capacity crunch. A better slot regime will also only result in a better use of existing capacity and not in additional actual airport capacity. **Ultimately, to achieve additional airport capacity, the only way forward is to further develop airport infrastructure where needed.**

INTRODUCING THE GROUND COORDINATOR CONCEPT

While securing the licence to develop future airport infrastructure and getting the appropriate level of funding are critical to protect the competitive position of Europe as a major trading block, it is also important to allow airports to **operate their existing capacity to the best extent possible.**

In order to allow airports to operate existing capacity to the best extent possible and in order to develop clear strategies for addressing the airport capacity crunch all stakeholders operating at an airport need to be involved. Otherwise, each stakeholder determining or contributing to airport capacity will try to optimize capacity within its domain. This would be suboptimal for the entire airport system as, e.g., runway capacity might neither be aligned to terminal capacity nor to apron/stand capacity. Additionally, the capacity of the different capacity drivers mentioned above is usually not determined by a single stakeholder alone but results from the efficient interaction of the different stakeholders involved (for example: the processing capacity of passport control is ultimately decided by border police or customs). **Therefore, effective coordination of the different stakeholders determining or contributing to airport capacity is required. This should include both strategic and tactical alignment based on extensive information sharing.**

The Ground Coordinator Concept addresses this issue. In essence, the function of the Ground Coordinator is very similar to the function of the conductor of an orchestra.

The function of a conductor is not only to stand in front and beat time, but also to harmonise and to hold together the different voices of the orchestra in order to shape them into an artistic and musical whole. **A conductor should first and foremost be a coordinator, combining the individual musicians to a whole.** Similarly, the **Ground Coordinator** should **coordinate all operational partners within a local collaborative environment at an individual airport**. The Ground Coordinator ensures the sharing of accurate and timely information between the operational partners in order to achieve common situational awareness and to improve predictability and efficiency. **It is desirable that the Ground Coordinator coordinates not only all airside and landside functions, but also landside access modes.**

ROLES OF THE GROUND COORDINATOR

Given the number of stakeholders determining or contributing to airport capacity and the risk of inefficiencies, **the Ground Coordinator is the only realistic and comprehensive operational mitigation measure allowing to address efficiency and capacity at airports**.

Moreover, the Ground Coordinator is not only relevant at a local level. The Ground Coordinator offers the opportunity for the Network Manager to have a single point of contact for each major airport – thus contributing to improved network performance.

The Ground Coordinator will:

- facilitate the integration of airside and landside functions and also (landside) access modes into a local collaborative environment in order to:
  - ✓ unlock and make best use of available and potentially available local capacity;
  - ✓ ensure efficient turnaround processes and
  - ✓ enhance performance in the broader landside accessibility process.
- Enhance A-CDM and build on it to share information and in this way enhance communication, cooperation, coordination and synchronisation of the different operations at and around airports.

WHO COULD FULFIL THE ROLE OF THE GROUND COORDINATOR?

The Ground Coordinator should have a good understanding of how a node in a transport system works (both airside and landside). **ACI EUROPE considers that airport operators are best-placed to fulfil the role of Ground Coordinator**:

- Airport operators provide ground infrastructure – from very essential parts like runways, terminals, roads,... to very advanced systems like communications infrastructure and sometimes even ATC infrastructure,
- Airport operators are responsible for establishing the overall policy for the proper functioning of the node,
- Airport operators are the only entities that interact with all users and stakeholders of the node.

The governance of a Ground Coordinator led by the airport operator needs to involve the different partners in a collaborative spirit, to carefully manage the potential conflicting interests and to avoid a negative impact on competition between different partners. **We invite all operational airport stakeholders to participate in refining the concept of the Ground Coordinator further.**

CONCLUSION

The issue of airport capacity is much more complex than and cannot be limited to the current public focus on runway capacity. In reality, a number of **key capacity drivers** determine the physical capacity of an airport. These are runway capacity, terminal capacity, apron/stand capacity, airspace capacity and surface access capacity. Actual airport capacity is further impacted by operating procedures and regulations. Therefore, assessing airport capacity requires to consider and factor in all key capacity drivers but also the impact of operating procedures and regulations prevailing at an airport.

In the light of the looming airport capacity crunch ACI EUROPE calls upon Member States to develop and coordinate national strategies for the expansion of physical airport capacity to ensure that investments are made where they are needed. These national strategies should also be coordinated and monitored at EU level to ensure consistency with the objectives of the Single European Sky. Ideally, this would be done through a **European Action Plan on Airport Capacity**.

ACI EUROPE calls upon the EU to align its airspace capacity objectives with ground capacity objectives and to recognise the central role played by airport capacity in achieving the objectives of the Single European Sky as well as for the European economy as a whole.

While we believe that the **introduction of the Ground Coordinator concept is key to optimise existing capacity**, which is a must in the current situation, **the only solution to mitigate the looming airport capacity crunch fully is the expansion of physical capacity**.

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