

SMART AIRPORTS OF THE FUTURE BASED ON 5G

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Air transportation is the fastest and most expensive type of transport services, as it includes expensive operation and maintenance of airliners, their takeoffs and landings, complex regulations for the movement of goods, passengers and luggage, border and customs control, multilevel security systems, creation and maintenance of airport infrastructure. Minimizing service time, improving quality and safety, reducing maintenance costs in any of the operations are the most important tasks in air transport. The advantage of using 5G networks in air transportation – the breadth of their coverage, versatility, ease of integration of many heterogeneous complex systems.

Given that an airport is a complex ecosystem that brings together different stakeholders like airport operators, airlines, air traffic controllers, ground operators, retailers, governments and service providers jointly managing the dynamic global flow of passengers, aircraft and baggage, cargo to form one of the universal mobile communities. To support this flow, airports use digital technologies and innovations, including 5G technology, to address their core challenges, from the ever-increasing number of passengers and their high expectations to the growing importance of non-aviation revenues, reducing the airport's environmental impact and business continuity [2]. Smart airport based on using of 5G automates work of all land and air transport management services, providing scheduling, monitoring and control of aircraft and special equipment online, robotic loading/ unloading, a range of services for passengers – self-service kiosks, electronic check-in, navigation personal luggage. To increase comfort and security at airports with 5G it recommended to organize ubiquitous video surveillance and automatic analysis of video streams, identity recognition, detection of abandoned luggage. This provides the expected benefits: optimization of the flight schedule and reduction of delays; increasing the capacity of airports; reduction and elimination of check-in queues; reduction of errors in luggage delivery and the risk of its loss; increasing passenger satisfaction; increase of security level.

In addition, "smart airport" is the defining subsystem of the "smart city". The main principle of "Smart City" and "Smart" Airport is to share resources: infrastructure and I-data, which allows us to consider the airport as an important destination and economic driver of the region. An integrated airport system is serviced by an information control center, and ground handling companies are connected to the integrated system through "internal" information links to optimize individual processes and airport operations, as well as increase passenger satisfaction. Thus external communications are realized with the following subsystems of "smart city": intellectual systems of public safety; communication network infrastructure; tourism and service;

intelligent environmental safety systems; energy supply information systems; human resources; "Smart" public transport; city government, environmental facilities, human resources.

The main task of the center of operational management of the airport is organization of uninterrupted operational management of operational activities of the airport and centralized management of customer service processes. The center combines different structures in order to minimize the time of management decisions in the process of interaction of structural units of the company that manages the airport and external organizations. Airports seek to increase efficiency through the introduction of digital technologies: saving time per passenger by using face recognition technology in the solution for examination formalities, reducing the minimum transfer time by speeding up baggage handling, reducing infrastructure costs by up to 10% through energy efficiency systems – it's just some of the most striking examples.

Smart airports need to assess their overall digital maturity against the desired end state of successful digital technology implementation, so this assessment should include at least the following criteria:

- data (size and complexity), communications and infrastructure required for a potential solution(s), compared to what is already available at the airport;
- stakeholder groups that can benefit from a potential solution compared to the security and confidentiality procedures that need to be established to ensure their cooperation or use [1].

For example, at Beijing's the newest and the largest airport in Daxing, China, a Huawei vendor has introduced a 5G-based automation system operated by China Unicom. 5G combines the aerodrome, a lot of terminal devices in the check-in and waiting areas with a network data center, integrating and coordinating operations in different parts of the airport. Based on the technology of virtual networks in a single 5G architecture organized dedicated layers for different segments of airport automation: production, flight control, security, integrated and external networks of airport services. [1].

However, many airports find it difficult to use all the power of data as a key resource of the digital age. Too often, data remains isolated from various stakeholders, processes, systems, or only available in an unstructured form. Many stakeholders are reluctant to share their data for fear of losing commercial control, but the advantages of the new type of airports are clear, they will gradually displace the traditional model of airports, where an airport terminal is the main "element" of a commercial airport, in order to provide passengers with a desirable, efficient and comfortable flight.

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