CLOUD SERVICES OFFER CRITICAL FLEXIBILITY IN TURBULENT TIMES

A mix of public, private, and hybrid cloud computing solutions can be implemented to provide efficiency and flexibility benefits

John Hickey, senior director of KVM and R&D for Black Box

As a naturally conservative and particularly safety-conscious industry, air traffic control (ATC) has taken a cautious approach in embracing the cloud. But dramatic changes to travel patterns resulting from the coronavirus pandemic are making the flexibility offered by the cloud more valuable.

In traditional architecture for the air traffic space, different areas of aviation — air navigation service providers, aircraft operators, OCCs, national aviation services, etc. — buy and maintain their own functions and services. By moving aspects of these operations to the cloud, the ATC industry stands to realize many of the benefits already enjoyed by other industries already working with cloud-based services.

Migration steps

In many cases, the first step involves migration to a private cloud, for which the owner can control quality of service, uptime, reliability, and latency — all of which are vital to mission-critical operations in ATC and air traffic management (ATM). In subsequent steps, the cloud is implemented gradually at different levels of infrastructure to support operations with less stringent performance requirements. In practical terms, this means that users connect to

services via a very thin client or device, with remote back-end devices becoming essentially invisible to the user. Because functionality is delivered through software, changes and updates can be managed across users and sites quickly and cost-effectively. New services can be introduced without the time and expense required in a conventional architecture. Operations and maintenance costs become more predictable.

The elastic capacity of cloud infrastructure provides the scalability needed to ramp up availability with added redundancy. Standardized methodologies

and processes allow for automated resource alignment via software-based architecture and workflows.

In moving toward the cloud, the next step could see management moving to a matrix-driven KVM (keyboard, video, and mouse) model. Connected to multiple machines and devices rather than one individual server, workstations can be repurposed to accommodate changing operational requirements. It becomes possible to create agnostic services, with stations throughout an airport being adapted for multiple uses — customer service, ticketing, wayfinding, and

more. Over time, the back-end resources could be migrated from physical servers located on site to virtual machines. While the shift is seamless for end users, the IT department could also see numerous benefits ranging from more efficient use of resources to more flexible implementation of new solutions and features.

With the migration into the hybrid world, some devices will remain physical as virtual machines are brought into the infrastructure. Thus, the KVM system supporting signal extension and switching will need to be able to support this type of incremental transition.

Latency and security
Because the move to the cloud can introduce hundreds of milliseconds of latency, it is vital to manage latency across different services. For safety-critical services, both latency and availability are key considerations, and one challenge of moving to cloud-based services is that they cannot guarantee 100% uptime. They may ensure 99.9% uptime, but they are still maturing into high-reliability networks. Security is another important factor, as the move to cloud-based services does affect

confidentiality, integrity, availability, and secure system access.

So, while mission critical operations may remain on physical infrastructure, the many non-critical safety elements of ATC operations are good candidates for migration to the cloud. While dealing with the impact of COVID-19 and dramatically different passenger flows, the ability to re-provision systems throughout the airport will be tremendously useful.

With the expected downturn of the air traffic industry in the next two to three years,

the option of using virtualisation technology and remote virtual terminals to manage multiple smaller airfields from a central location becomes more appealing and important to keeping those sites economically viable.
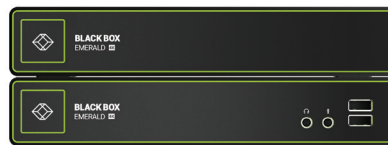
The shift to the cloud can bring meaningful improvements in efficiency and flexibility for ATC. While the circumstances are less than ideal, it's exciting to see the industry moving to capitalize on the much-needed benefits delivered by virtualization and the cloud. ❖