Aviation is a massive industry, contributing $2.7 trillion to the global economy. But industry size and growth projections do not necessarily translate into business success for airports. Many struggle with infrastructure challenges, both physical and technological in nature. This paper examines the critical infrastructure changes airports need to consider, explores why they are important, and offers recommendations for how to perform upgrades with minimal disruption.
A High-Growth Industry at a Crossroads

The aviation industry plays an important role in today’s global marketplace. In part because of its sheer size: it contributes 3.5% to the world’s GDP and supports 63 million jobs. But even more significantly, we live in a connected, mobile world and airports help make it possible for the world’s population to move within it. The already sizable number of air travelers is expected to surge even higher in the next couple of decades. IATA expects 7.2 billion passengers to travel by air in 2035, almost doubling today’s 3.8 billion.

While this tremendous growth bodes well for the industry as a whole, there is no guarantee any individual airport will prosper. That is because most airports are not equipped to capitalize on the growth that will accompany the spike in demand. The biggest barrier to success is infrastructure – both physical and technological. Many airports fall short of meeting modern day demands on both fronts, and these deficiencies will prevent them from fully capitalizing on the growth expected to accompany rising passenger levels.

Most airports are lagging behind industry growth and cannot support the volume of travelers passing through. Physical infrastructure is aging and needs to be updated. Inadequacies such as degradation of runways, roadways and buildings are becoming more pronounced. Facilities need a much-needed facelift and to be expanded.

IT infrastructure also needs updating to support the growing demands placed upon it. It is the backbone for supplying the services that keep an airport functioning, so sufficient bandwidth must be available to accommodate the growing number of users of new mobile services, and network capacity must keep up with the growing amount of data being transmitted. The only way to accomplish this is to upgrade legacy systems to modern standards. Otherwise, the airport is at risk of not being able to deliver the quality services needed to operate the airport and support the new digital services their customers expect.

Airports must ensure their infrastructures are optimized for maximum throughput at all levels to provide uninterrupted service delivery to all its customers: travelers, vendors and airlines. Doing so requires airports change the way they operate, and these changes will impact IT and cable network capacity and complexity.

Both types of infrastructure upgrades are equally important. The airports that will win a share of the expected market growth will be those that make the investment.
Construction is not the only concern. Performing IT upgrades for critical airport systems such as flight operations, ground handling, security services, airside services and air traffic control also require reliable cable management. So do enhancements to equipment installation and baggage handling systems and replacement and modernization of components of the energy plant. These systems are all dependent on technology for managing the data, power and telephony networks within and throughout the airport. Detailed knowledge of every asset, its location and what services it delivers is essential to maintain functionality. While not customer-facing, these technologies indirectly impact customers and directly impact their airport experience.

Why Change Now?

Upgrading the IT infrastructure is a necessary and time-sensitive initiative. Delaying exacerbates customer satisfaction issues. The degree to which an airport can satisfy its passengers, airlines and vendors is a major factor in customer retention. Customers have choices, and they are fickle. It’s up to the airport to give them the positive experience they desire for them to continue giving your hub their business.

Different customer segments want different things. Passengers want a pleasant journey, which includes access to mobile and self-service apps, real-time information and flights that are on time. Airlines want to optimize throughput and minimize turnover time for airplanes. Airport vendors want their kiosks in a consumption-friendly environment, their requests for service additions and changes handled promptly, and to be billed correctly.

Delaying a technology upgrade also has cost consequences. Operational inefficiencies that make airport services unreliable and inflate costs can easily be avoided by standardizing and shortening workflows, using IT to automate and streamline processes. Process automation based on workflow capabilities structures and speeds up daily tasks, enabling the airport to provide better service at lower costs and avoid the service disruptions that makes customers unhappy.

The airport’s cable infrastructure is a vast array of cable networks and IT services, and only a network that is properly managed can meet the diverse demands placed upon it. Upgrading the IT infrastructure to modern standards will equip airports to better handle the increasing number of passengers in an efficient and cost-effective way, deliver the digital services passengers, airlines and vendors want, and manage growth efficiently.

Investing in Software-Based Cable Management Pays Off

Most airports recognize the need to invest in infrastructure. A study by PricewaterhouseCoopers and Oxford Economics estimates global growth in capital airport investment to be $750 billion between 2015 and 2025. While both physical

Incident Resolution in FNT Command

1. Receive Monitoring Alert
   A monitored active switch in Terminal B is overheating, which leads to a failure. The monitoring system sends an alert that services are no longer available.

2. Perform Assigned Service Analysis
   Check for other affected services. Any connected to this switch and its ports are at risk.

3. Switch to Backup System
   Check for redundancy systems and switch to the backup network system.

4. Plan the Repair
   Plan the replacement of the failed switch. The software automatically checks warehouse inventory, orders if none are in stock and generates the work orders.

5. Generate and Export Work Orders
   Work orders are exported to the field service team for immediate execution.

If an asset is damaged during construction, service interruption is minimized with FNT Command’s detailed inventory of all airport assets and planning functionality.
Planning a New Network Connection in FNT Command

1. New Service Order Entry
   The network infrastructure planner receives a request from the airport’s business development manager to set up a new vendor.

2. Capacity Analysis and Planning
   Run standard reports to identify suitable active and available network ports and switches, and plot the signal path.

3. Asset Procurement
   Check the warehouse for inventory and order any required hardware not available.

4. Generate and Export Work Orders
   Work orders for all affected departments are generated and exported.

5. Customer Data Assignment
   Add business customer data to the planned business service and assign related contracts and SLAs.

6. Billing
   Initiate the billing process to invoice for the implementation and auto-bill for the monthly fee.

When airport upgrades require new services, FNT Command’s planning functionality makes it easy to establish network connections and assign services to the right customers.

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infrastructure and IT infrastructure need modernization, the best approach is to focus on the technology upgrade first. Specifically, the cable infrastructure. The reason is that a strong and stable cable network infrastructure is required to withstand the rigors of facility upgrades. An airport’s cable network is expansive, with elements located:

Inside the terminal:
Nodes to operate systems such as check-in equipment; information boards; IP video cameras; self-service counters; wifi-infrastructure; VOIP phones; POS support/connectivity

Outside the terminal:
Traffic control/guidance systems; information boards; parking (payment machines, IoT status information boards); IP video

Outside the main building of the airport:
Backbone across campus (including redundancy and non-cross); control-cabling for lighting; power cabling and lights throughout campus including runways and taxiways; asset identifiers and GIS-location; taxiways, apron and airfield lighting including trays, ducts, manholes for ground power supply

It is not advisable to attempt any facility construction without first ensuring the stability of the cable network, which supports both the physical and IT infrastructure inside the terminal and across the airport campus. Expansion of an operating airport can be complicated. Construction projects involve structural changes and require careful coordination to maintain ongoing airport operations while the work is being performed.

The cable networks that sit behind the scenes at an airport are vast and tap into almost every aspect of day-to-day operation. Before you begin any physical work at an airport, it’s therefore important to have a reliable source for detailed knowledge of all service assets. A service outage of any system can have a ripple effect with the potential to deal a significant blow to an airport in terms of cost, customer satisfaction and passenger and employee safety.

Take London’s Gatwick Airport, for example. In August 2018 the U.K.’s second busiest airport suffered a display board outage when an underground fiber optic cable was accidentally cut, causing every digital departure board in the south and north terminal to black out. Or McCarran International Airport, which experienced an outage in June 2018 when an off-site cable

Visualization using schematic network representations provides seamless navigation and the ability to drill down and view details such as cable data, splice enclosures with cassette view, devices and interconnection schematics.
serving the airport went down. TSA screening process and multiple lighting sources were affected, which resulted in flight delays for multiple airlines and cancelled inbound flights.

While these outages were not the result of construction mishaps, the outcomes were the same. The difference is that construction-related accidents are entirely avoidable if the location of all assets is known. A comprehensive cable management solution would inform airport personnel not only exactly where all physical assets are located, but also how each one is connected. This is critical because it allows re-routing of services if planned downtime is needed or, in the case of construction, if an asset is inadvertently damaged. Unnecessary network downtime is avoided, customers remain happy.

When assessing your current method of cable management, you should ask yourself three important questions:

1. Do you have documentation you trust, that is accurate and complete?

Airports are complex ecosystems containing many critical systems. To maintain their integrity, you need a complete as-is inventory of all the resources in your network. This includes physical, logical and virtual assets and how they are connected, both inside the terminal and across the campus. It’s the only way to ensure minimal airport downtime, avoid service interruption, and that the resulting modifications stand the test of time.

If you are lacking such an inventory, it is advisable to look for a cable management solution that not only documents all service resources but does so holistically across operational silos. Only a unified resource inventory across telecommunications, IT and your data center give you a central resource data hub that provides accurate information to all relevant systems. This single source of truth easily meets the airport’s diverse needs because all resources (facility, physical, logical, virtual, services) are centrally managed. Such a system gives you the ability to:

- View the contents of a rack in the data center
- Trace a signal end-to-end
- See cables in a GIS representation
- Examine the contents of a manhole or a cassette
- Integrate with other systems to support data enrichment

2. Can you scale your network to adapt to the airport’s changing needs?

Agility to adapt to customers’ changing demands is an essential capability of the airport’s cable infrastructure. Careful and precise planning is the only way to ensure that moving, adding and changing any assets in your network happens flawlessly. There are software solutions available that facilitate network planning. Look for one that:

- Identifies the best connections for new services using optimal routes across network resources
- Provides guidance and validation rules to minimize human error when planning network changes
- Flags redundancy violations for review and correction before changes go live
- Automatically checks inventory and generates work orders so planned changes can be implemented
- Integrates with workflow applications to push work orders to the field
- Integrates with the resource inventory to update when changes are implemented

3. Do you have the means to monitor and act on the changing conditions within your network?

Any management system should provide full control of operational processes and all related information that is required to keep the network operating. This control will make it possible to adapt your network as necessary to take advantage of new opportunities.

It will also help identify problems quickly, so you can speed up issue resolution time and minimize the damage of disruption. Look for a cable management solution that simplifies management with:

- Reporting capabilities to inform network operation personnel of bandwidth
- Capacity analysis to ensure bandwidth to support new and expanded service needs and maximize asset usage
- Incident management features that ensure airport customers and personnel have uninterrupted technological services
- Signal tracing to identify the source of an outage and all affected devices and customers
- Alerts to notify users when thresholds are exceeded for swift remedy
- Visual depiction of physical and logical network structures, including georeferenced representation of networks, which is helpful for the large sites and the many buildings at airports.

Implementing a three-component infrastructure network management system – one that aids documenting, managing, and planning – will position airports to undertake the upgrades necessary to not only remain competitive in the changing digital world, but to capitalize on new market opportunities as they arise.

Practical Applications of Software-Supported Cable Management

A centralized cable management and optimization solution
is vital to deliver the level of IT services needed to support airport operations in today’s dynamic environment. It enables streamlining of operations for greater cost efficiency. It enables delivery of emerging technologies demanded by customers. It enables accurate documentation and management of retail and consumer activities, to make accurate and timely billing for airport service usage possible.

This type of infrastructure management applies to all the airport’s internal IT networks, cable network or other network infrastructure in the inside plant facility, as well as to the extensive and heterogeneous telecommunication type of backbone and broadband networks in outside plant. All types of fiber, copper and coax networks, including all topologies and available technologies, should be described in terms of geo-referenced representation using GIS or schematic network maps.

Typical scenarios where an airport would benefit from such a software solution include:

- Avoid mistakenly cutting off service. Airports need to know where physical assets are before breaking ground. This costly mistake is easy to sidestep with accurate documentation of all assets and resources and GIS data.
- Shorten issue resolution time. Identify all objects and users impacted by an outage immediately, locate faults using OTDR measurement data, and correct errors more quickly. Assign services to connections and customers, provide impact analysis, and re-route services while repairs are done to minimize disruption.
- Lay new cable or upgrade existing. Access to survey information and GIS data streamlines planning. Signal tracing and capacity information facilitates connectivity.

Access to the right tools makes these actions easier to execute.

The Right Cable Management Solution is Mission-Critical

The right cable management solution can help airport operators accomplish their goals. A software-based, comprehensive cable management solution makes it possible for airports to more easily plan and execute renovation and upgrade projects, inside and outside the airport, of both brick and mortar and IT infrastructure.

When shopping for a solution the key feature to look for is a centralized database that documents all relevant assets and connections across all the campus networks. The database should dynamically update as change occurs, so all IT users are accessing the same validated, up-to-date data. This central repository is the key to achieving complete visibility and transparency throughout the airport’s cable network infrastructure.

A solution like FNT Command meets these requirements. It is a standardized and complete solution that combines asset management, connectivity and maintenance, all of which are necessary to plan network changes, analyze the impact of planned changes, and optimize support processes. It provides network planners with the information they require to plan and execute any work to be done on airport grounds by managing all cable resources and serving as the central point of documentation for the airport’s structured cabling system, including the connection points and equipment connected at the endpoints. The results are quicker deployment of new technologies and reduced downtime, which positively impacts customer satisfaction, and reduced costs, which positively impacts airport profitability.