

## The Ascent SmartAirline<sup>®</sup> Operations Center<sup>™</sup> solutions



### Deploy your resources to the greatest advantage and control your costs

With Ascent's SmartAirline Operations Center solutions, you can forecast, schedule, and manage the use of your resources so you can handle your flights and accommodate your customers efficiently and cost-effectively.

Ascent's SmartAirline Operations Center solutions are a coordinated set of intelligent software products that handle your resource-management needs ranging from long-term planning to day-of-operation deployment to historical reporting and analysis. Ascent's SmartAirline Operations Center solutions:

- Coordinate your long-term planning, short-term scheduling, and day-of-operation management of runways, gates, stands, baggage belts, check-in counters, and departure lounges, avoiding costly duplication of effort
- Minimize the impact of unavoidable disruptions when unplanned events and irregular operations disrupt previously planned schedules
- Ensure your flight-schedule information and day-of-operation flight information are consistent, correcting errors before they become costly mistakes
- Respond quickly to the changing needs of your customers, while at the same time ensure most advantageous use of your resources
- Identify and resolve potential resource conflicts and chokepoints before they derail your operations
- Enable you to handle more flights and greater passenger traffic with existing runways, gates, stands, baggage belts, check-in counters, and departure lounges
- Show how introducing different schedules, aircraft types, and airlines affects your future operations, so you can design and build the facilities you actually need
- Manage long-term and short-term planning and day-of-operation resource allocation for unlimited numbers of gates, stands, remote parking positions, check-in counters, baggage belts, and departure lounges at airports of all sizes

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## Who we are

Since our founding more than 30 years ago by members of the Massachusetts Institute of Technology Artificial Intelligence Laboratory, Ascent Technology has helped organizations deploy costly resources as efficiently, effectively, and economically as possible. Our highly trained and capable team of technologists, problem solvers, and solution designers has broad domain expertise and substantial experience in artificial intelligence, computer science and engineering, system design, mathematical optimization, operations research, and resource optimization, planning, scheduling, and management.

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- Maintain all information in a secure repository, readily available for reporting, auditing, and analysis purposes
- Distribute accurate and timely information to planners, operations managers, passenger-service staff, security agents, ramp workers, service partners, and passengers
- Track the use of fee-based ground resources for invoicing purposes
- Coordinate smoothly with the Ascent WorkZone workforce manager to assign your staff to work assignments and locations
- Interface with external systems, such as flight-information, baggage-information, and check-in counter displays; CUTE systems; and financial systems
- Produce comprehensive management reports.

When you use Ascent's SmartAirline Operations Center solutions, you can be sure the right resources are available at the right times to operate your airport efficiently and economically.

## Handle your resource-allocation needs—past, present, and future

Ascent's SmartAirline Operations Center solutions optimize your use of baggage belts, check-in counters, departure lounges, gates, remote parking positions, and stands for maximum efficiency and profitability. The resource allocation decisions you make on the day of operation follow the same rules and assumptions you use when you develop your long-term plans.

With Ascent's From Touchdown to Takeoff® seamless technology, and its coordinated management of operations, you can handle flights, accommodate passengers, and manage your resources efficiently and economically. You can be sure the right resources are available at the right times to ensure smooth operations.

### You can plan

Using the business knowledge you enter into the SmartAirline Capacity Analyzer® strategic planner in the form of simple rules, you can build and compare what-if scenarios that enable you to determine the most advantageous ways to operate in the future. You can analyze different ways to deploy your resources, how changes in flight schedules and aircraft affect your operations, and which factors have the greatest effects on your costs, revenue, and profitability.

### You can deploy

Because the same business rules that guide your long-term plans also guide your day-of-operation decisions, the SmartAirline Operations Manager® resource allocator enables you to manage rapidly-evolving situations on the day of operation in the best possible way. When operations do not go according to plan, Ascent's SmartAirline Operations Center solutions provide schedule-recovery tools to minimize the impact of unavoidable disruptions. They ensure that you deploy your resources to the greatest advantage, even in the face of unavoidable disruptions on your operations.

### You can report

Ascent's SmartAirline Operations Center solutions embrace the premise that resources are used most effectively when resource-allocation decisions are coordinated, rather than treated as isolated activities. This coordination is made possible by the ARIS/SmartBase® database, which provides a consistent, up-to-the-minute view of flight-schedule, resource,

and operations information to Ascent's SmartAirline Operations Center solutions. Because information about resources, plans, and actual operations is maintained in a central relational database, Ascent's SmartAirline Operations Center solutions enable collaborative decision-making by communicating timely and accurate business knowledge throughout your organization.

You can distribute long-term plans months in advance, you can communicate operations information in real time, and you can analyze and report about operations as soon as they happen. You can also track the use of fee-based resources and produce billing reports and invoices.

The ARIS/SmartBase database not only simplifies information sharing among the staff using Ascent's SmartAirline Operations Center solutions, but, in combination with the ARIS/SmartBus® communication manager, it also simplifies importing data from and exporting data to external systems.

Information processed by Ascent's SmartAirline Operations Center solutions is readily available to provide coordinated views of schedule, current, and historical information to external systems, and it can be used to drive the Ascent WorkZone workforce manager, FIDS, BIDS, and check-in counter displays. Information can also be distributed through the Internet and wireless devices to airport web sites, to airlines, to security personnel, and to information displays at car rental facilities, hotels, and transit facilities.

### You can mix and match

You can implement Ascent's SmartAirline Operations Center solutions in modular steps, mixing and matching the components that best fit your needs, budget, and growth plans.

Ascent's SmartAirline Operations Center solutions are available as a subscription service from Ascent's web-hosting facility via web browsers running on PCs connected to the Internet.

Alternatively, you can license Ascent's SmartAirline Operations Center solutions for operation on a variety of client-server and web-hosted configurations. Typically, larger operations are supported by a centralized client-server configuration in which the tools run on Microsoft® Windows® client computers, while the ARIS/SmartBase database runs on an Oracle® server installed at your location. Communication between the client software and the ARIS/SmartBase database server is handled through a local area network. Communication between the ARIS/SmartBase database and external applications and data sources is handled through the ARIS/SmartBus communications middleware.



## Ascent's SmartAirline Operations Center solutions

- A graphical interface enables you to analyze, update, and manipulate seasonal flight schedule, flight-leg, and day-of-operation flight information
- Manual data entries are automatically checked for errors, so common mistakes, like invalid dates, are automatically flagged
- Contextual menus and help wizards train users as they work, so a broad range of users can start using the system immediately
- Users can browse using any one of large number of fields such as schedule, airline, or specific flight, so users do not need to know what they are looking for in order to find it
- Administrators can control which users can access which views and functions, so each airline, handling agent, rental car company, or other service provider sees only what is relevant
- The way in which data is presented can be customized, so one system can accommodate the needs of many different service providers and partners
- Future flight schedules can be created and manipulated for planning purposes
- Up-to-the-minute flight-position data can enhance knowledge about current conditions
- Schedule and flight information can be viewed and edited from any place there is a web-enabled PC
- Turns can be generated automatically when seasonal schedules do not supply turn information
- A real-time chart of gate, stand, and remote parking position utilization is displayed in bar chart format
- The system scales to accommodate any number of concurrent users, so it will not become obsolete as the airport grows or new service providers and partners are added
- Seasonal schedule information can be received from schedule aggregators and integrated automatically
- All flight schedule and day-of-operation flight information, business rules, and other critical data are maintained in a single relational database so users of SmartAirline Operations Center solutions can work with information from all sources at once
- World-class open technology offers a universal hub linking diverse systems and data stores
- Accurate and timely schedule and day-of-operation information can be communicated automatically to planners, operations staff, passenger-service staff, security agents, ramp workers, service partners, and passengers
- Detailed reports based on planning, operations, or historical information stored in the ARIS/SmartBase database can be created.



## Take control of the future with the SmartAirline Capacity Analyzer strategic planner

To forecast future operations, you need to know when and what kind of aircraft will arrive and depart and what kinds of gates, stands, parking positions, check-in counters, and baggage belts you will need to accommodate them. If you need to build additional facilities to accommodate increased traffic, you will need to know how you will operate through periods of construction and other disruptions. You will also need to know how you can use those new facilities efficiently and profitably.

With the SmartAirline Capacity Analyzer strategic planner, you can visualize your future operations, so you can ensure you will have the facilities you need and can use to their fullest potential.

The SmartAirline Capacity Analyzer strategic planner contains two tools, the ARIS/CA capacity analyzer, which helps you develop and analyze future plans so you can determine your future capacity.

### Create models with the ARIS/CA capacity analyzer

The ARIS/CA capacity analyzer lets you model your airport by creating what-if scenarios with various types of resources in various configurations. Then, it lets you visualize how your model would operate using alternative flight schedules.

With the ARIS/CA capacity analyzer, you can:

- Analyze how different flights schedules, aircraft types, and traffic volumes affect your operations now and in the future
- Predict the outcome of running any flight schedule against any configuration of airport resources
- Determine which combinations of resources and flight schedules are possible, so you can isolate chokepoints in future operations
- Look across all resources at once—runways, gates, stands, remote parking positions, baggage belts, check-in counters—so you can understand the affect of each resource on all other resources
- Determine the most efficient combination of runways, gates, stands, parking positions, check-in counters, baggage belts, and other facilities
- Identify when and where passenger and cargo traffic peaks and valleys will occur
- Change one variable, or several, and see how operations are affected so you can be creative in the ways you solve problems and generate business opportunities.

The ARIS/CA capacity analyzer displays the results of each scenario as bar charts that show when gates, stands, parking positions, check-in counters, and baggage belts are in use and available for use, indicating overlaps and congested periods. It also displays the results as spreadsheets that show how many gates, baggage belts, and other resources are used at specified times, such as in 15-minute intervals or on all Mondays in September, 2018.

Each scenario starts with an actual or hypothetical model of an airport, which you enter by specifying the kinds of resources you want to analyze, and you specify the capacity of the resources you create and the rules that need to be followed while the resources are in use. You then enter rules about how resources will be used or you link to rules you already entered in the SmartAirline Operations Manager resource allocator. The system stores the rules in the same ARIS/SmartBase database so that both the planning and the operations tools rely on the same rules.

The other part of capacity analysis is to see how the scenario actually performs when running schedules. You can create future schedules with the ARIS/SB® schedule builder, a tool that is also used to create and update schedules during actual operations. You enter the start and end dates, airlines, days of operation, arrival and departure times, and so forth. You can also test scenarios against actual schedules you are already running. Then, you can conduct what-if analyses to see how changes in a schedule can create an overload on a specific type of resource at a very precise time in the schedule period. You can define success in your own terms—for example, the level of congestion, or profitability, or volume—so you can identify and prioritize changes most likely to produce the desired results.

## **Take control of today with Ascent’s SmartAirline Operations Manager® resource allocator**

Every day, airport-operations schedulers perform remarkable feats. Using decision-support tools often no more sophisticated than status boards, hand-written notes, photocopied scheduling forms, a supply of pencils and erasers, simple PC programs, and some computer printouts, they plan and manage the day’s parking position, check-in counter, and baggage-belt assignments.

On a good day—which means flights are on time, the weather is reasonable, and there are no equipment problems or unexpected routing changes—it is possible that most resource assignments go according to plan. As a result, ground resources are used effectively and efficiently. No fuel is wasted by aircraft waiting for gates. Passenger queues at check-in counters and security areas move rapidly. And, best of all, passenger satisfaction is high because the scheduled assignments have ensured efficient check-in, convenient connections, rapid baggage claim, and quick exit from the airport.

Unfortunately, in today’s highly complicated operations environment, the good days are few and far between. Manual systems or simple PC programs, even in the hands of seasoned and highly knowledgeable schedulers, simply cannot deal with the dynamics of today’s scheduling and security requirements. Thus, when unplanned events require immediate changes to planned assignments, schedulers must make decisions immediately with no way of determining exactly what impact these decisions will have on the schedule for the rest of the day and on the cost of operating that schedule. Frequently, what may seem like a logical decision to resolve a near-term gate-assignment problem initiates a chain reaction of expensive bottlenecks and delays that can quickly ripple throughout the airport and the airlines it serves.

Fortunately, help is available. It is called SmartAirline Operations Manager resource allocator. Ascent’s SmartAirline Operations Manager resource allocator uses advanced logic techniques to think through each allocation decision’s impact in much the same way an experienced human scheduler would...if only he or she had the time. Think of it as a set of quick-thinking and tireless assistants capable of assimilating all of the variables involved in the scheduling process and always being able to recommend the most efficient ways to deal with last-minute changes and with the implications of those last-minute changes.

Ascent’s SmartAirline Operations Manager resource allocator manages short-term planning and day-of-operation resource allocation for an unlimited number of gates, stands, remote parking positions, check-in counters, baggage belts, and departure lounges. It also handles long-term planning of gate, stand, and check-in counter allocations for entire schedule periods for one or more airports. On the day of operation,

it resolves conflicts and recovers rapidly when unplanned events and irregular operations disrupt previously planned schedules.

Ascent's SmartAirline Operations Manager resource allocator can keep track of an almost unlimited number of resources and resource constraints and automatically factor them in its decisions to ensure the ideal balance between resource-assignment efficiency, passenger convenience, and effect on related schedules. Because it is scenario-enabled, Ascent's SmartAirline Operations Manager resource allocator bases its decisions on the appropriate conditions for specific days of operation. For example, whether a change in operating conditions involves modifying an airline's parking-assignment preferences for a particular day or making gates inoperative for several weeks due to construction, Ascent's SmartAirline Operations Manager resource allocator uses the appropriate rules without asking the user to switch database accounts manually or load separate airport configuration files.

It supports what-if analysis of proposed resource assignments and schedules, which enables the system to share its decision logic with schedule-planning personnel as a means of validating the feasibility of the schedules they create. It features an open-ended design that readily accommodates changes in resource availability as flights are changed, aircraft types are introduced or reconfigured, and airport facilities are constructed or modified.

Ascent's SmartAirline Operations Manager resource allocator contains three tools for managing airport resources for and on the day of operation, the ARIS/BB® baggage-belt allocator, the ARIS/CI® check-in counter allocator, and the ARIS/GM® gate manager.

### **Assign your baggage belts**

The ARIS/BB® baggage-belt allocator assigns baggage make-up belts to departing flights and baggage reclaim carousels to arriving flights, taking into account facility layout, belt capacity, flight schedules, gate assignments, and passenger loads—so you get the best allocation decision possible. You can:

- Allocate baggage make-up belts for departing flights and baggage reclaim carousels for arriving flights
- Override automated allocations as necessary
- Reallocate belts dynamically when a belt is inoperative or flights are delayed
- Distinguish automatically between domestic and international baggage-handling constraints
- Distinguish automatically among early, normal, and first-class requirements
- Coordinate baggage-belt allocation decisions with scheduling decisions made by the ARIS/GM gate manager
- Keep belt capacity balanced throughout the day based on knowledge of the maximum passenger load for an aircraft series or the exact passenger count on a given flight
- Handle changes in airport layout
- Manage belts and view belt-assignment information from an unlimited number of areas
- Interface with BIDS through the ARIS/SmartBus® communication middleware.

## Assign your check-in counters

The ARIS/CI check-in counter allocator automates the creation of long- and short-term check-in counter allocations based on planned flight schedules, actual day-of-operation flights, and availability of check-in agents to staff the counters. Users can match counter allocations to aircraft type, schedules, last minute updates, activity at adjacent counters, and construction-related closures—whatever impacts smooth operation. You can:

- Handle airline alliances
- Tailor views of check-in counter allocations based on need by sharing check-in counter information with over-the-counter displays, public information displays, and other systems
- Increase flight-operation efficiency by matching allocations to aircraft capacity, market sectors, and other criteria
- Reduce check-in counter disruptions and delays by allocating counters based on the most recent flight-schedule data and availability of check-in staff
- Ensure that check-in capacity will meet long-term needs by creating long-range allocation plans based on anticipated schedules
- Accommodate temporary closures and construction projects by generating check-in plans that reflect short-term changes
- Avoid check-in bottlenecks caused by seasonal changes by generating plans that incorporate those changes
- Ensure fair allocation of counters among airlines and flights by enforcing contingency plans when demand exceeds capacity.

## Assign your gates

The ARIS/GM® gate manager provides near-term scheduling and real-time day-of-operation management of gates, stands, remote parking positions, cargo positions, maintenance positions, and departure lounges. You can:

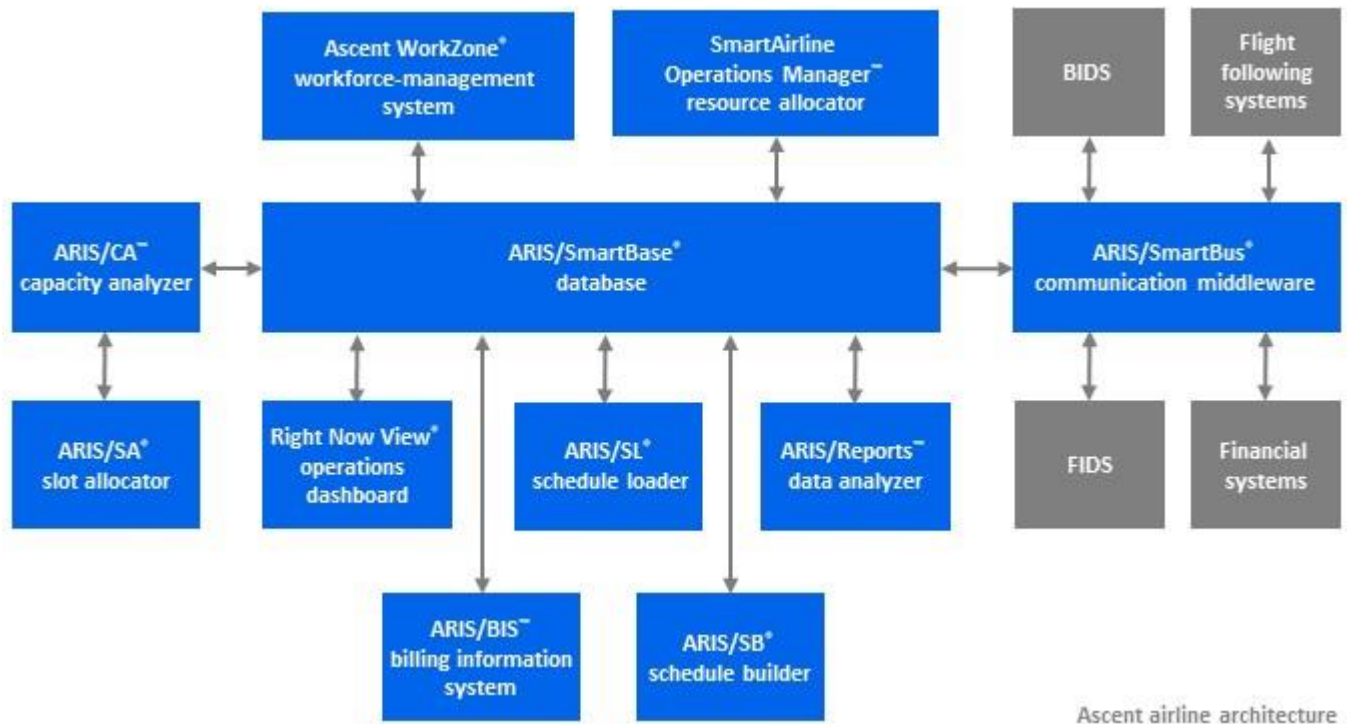
- Manage resource allocation automatically for airports of all sizes
- Create and adjust the business rules that govern all gate, stand, remote parking position, and departure lounge allocation decisions
- Receive recommendations in real time to resolve conflicts caused when unplanned events disrupt the schedule
- Link arrivals and departures automatically
- Reduce fuel wasted waiting for parking assignments
- Perform what-if analyses before making changes to planned assignments
- Reduce airline operating expenses and ground-service errors by assigning the same gates more consistently to the same flights when possible
- Provide a consistent view of operations by sharing gate information with airport and airline staff and with FIDS, BIDS, and other systems.





## The ARIS/SmartBase database coordinates, distributes, and maintains plan, schedule, and day-of-operation information

The ARIS/SmartBase database is the resource, planning, and operations data and knowledge base, flight-schedule server, and communications server for SmartAirline Operations Center solutions.



The ARIS/SmartBase database contains comprehensive, consistent, and accurate information about resources, plans, schedules, and operations. It also contains flexible, user-specified business rules that control the decision-making logic for the creation of resource-allocation plans and scenarios, models of future operations, operational schedules, and real-time responses to irregular operations and other unplanned events. It maintains accurate and secure records of the plans and day-of-operation activities it manages, providing the data needed to produce reports, to generate invoices, and to perform analyses.

The ARIS/SmartBase database ensures that all users have access to the same up-to-the-minute information about scheduled and actual operations at the same time. By accessing and sharing valuable information stored in the ARIS/SmartBase database, users can work collaboratively to make better decisions.

The ARIS/SmartBase database environment is further enriched by its ability to transfer information seamlessly to and from a wide range of data sources, systems, and applications beyond the SmartAirline Operations Center solution, in combination with the ARIS/SmartBus communication middleware. Communications protocols enable the ARIS/SmartBase database to:

- Receive information from external sources, such as airline flight-following systems, airline passenger and crew systems, ATC, and radar feeds

- Drive systems, such as FIDS, BIDS, web servers, and other systems that provide flight information to airport and airline staff, handling agents, service providers, service partners, and passengers
- Supply real-time information to and retrieve real-time information from other airport systems, ranging from simple forms-based data-entry programs to CUTE to docking systems
- Feed operational information to business and financial systems, such as ERP systems, Oracle Financials, and other SQL-compliant applications
- Retain data archives needed for accurate reporting, year-to-year comparisons, auditing, and analysis.

## Reports

The Ascent SmartAirline Operations Center solutions store information in the ARIS/SmartBase database, which runs on the Oracle® database. We can create reports for you, and you can create your own reports from a synchronized reporting database using Oracle-compatible report-generator tools, without interfering with the integrity or performance of the ARIS/SmartBase database.

## Ways we can help you

**Advisory and consulting services.** We provide unbiased advice about resource allocation, optimization, planning, scheduling, management, and deployment methodologies; develop cost-benefit analyses; analyze business processes; manage projects; gather and document technical requirements; develop functional specifications; and specify hardware, software, and devices.

**Project management services.** Our project management team works closely with you, following our time-proven delivery methodology, and uses face-to-face meetings, teleconferences, web conferences, and email exchanges to keep you informed every step of the way. We believe careful project management is the key to successful on-time and on-budget deliveries of SmartAirline Operations Center solutions.

**Knowledge engineering services.** Knowledge engineering is the process of identifying your business knowledge—the business rules, policies, procedures, preferences, and requirements that guide the way your organization operates—and then codifying your business knowledge in the knowledge base at the heart of SmartAirline Operations Center solutions. The business knowledge in the knowledge base determines how the solutions behave. Our knowledge engineers work with you to gather and enter the business knowledge that enables the solution to behave exactly the way you want it to.

**Implementation, integration, and installation services.** Our implementation team provides system integration and testing services; develops product extensions, enhancements, and connectivity software for importing data to and exporting data from external systems; and creates reports. The team also configures, installs, and tests hardware, software, and equipment for you when you choose to integrate the SmartAirline Operations Center solutions in your IT environment, and quickly sets up an environment in our hosting center for you when you choose to gain access to the solution over the web.

**Training services.** We provide a wide range of user, administrator, trainer, and refresher training classes in person at your location, at our Cambridge, MA, headquarters, and remotely over the web. We also provide operational training services in person and remotely when you begin to use the SmartAirline Operations Center solutions in production.

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**More information**

To learn more about how Ascent Technology solutions can help you optimize your resources to greatest advantage and to schedule a demonstration of our products, send email to [sales@ascent.com](mailto:sales@ascent.com) or call our Sales and Marketing department at +1.617.395.4800.

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**Maintenance and support services.** We offer Standard Support Services Monday through Friday during our normal office hours in Cambridge, MA, and Premium Support Services around the clock. Both provide comprehensive remote user support services via telephone, email, and Internet, as well as software maintenance, such as product updates, patches, and releases. We provide a web-enabled support portal that enables you to ask questions and receive responses, request service, report problems, and track issues.

## Technology Platform

You can gain access to the SmartAirline Operations Center or SmartAirport Operations Center solutions in two ways: you can integrate the solution into your own IT environment, or you can gain access over the Internet to the solution running on Amazon Web Services (AWS) platform.

Ascent Technology Products	Your own IT environment			Amazon Web Services (AWS) platform
	Server	Client desktop	Web browser	
	Server: Microsoft® Windows® Server™ 2012 or 2016 operating system or Red Hat® Enterprise Linux 7; if virtualized, our solutions are certified to run on VMware® server virtualization products Database: Oracle 12C SE2 Desktop: Windows 7, 8 or 10 with 4GB of RAM Browser: Latest Microsoft Edge, Google Chrome or Mozilla Firefox Minimum internet access for remote support: 512 kbps			Browser: Latest Microsoft Edge, Google Chrome or Mozilla Firefox; Internet connection (1 Mbps or better)
ARIS/AV® aerial-view display	✓		✓	✓
ARIS/AR® aircraft-routing system	✓	✓		
ARIS/SmartBase® database (including Resource Editors)	✓			
ARIS/BB® baggage-belt allocator	✓	✓		✓
ARIS/BIS™ billing information system	✓		✓	✓
ARIS/CI® check-in counter allocator (including ARIS/IQ® queue manager)		✓		✓*
ARIS/CX® crew-connection analyzer			✓	✓
ARIS/GateView® real-time display	✓	✓		✓
ARIS/GM® gate manager		✓*		✓*
Right Now View® operations dashboard	✓		✓	✓
ARIS/PX® passenger-connection analyzer	✓		✓	✓
ARIS/Reports™ data analyzer	✓		✓	✓
ARIS/SB® schedule builder	✓	✓	✓	✓
ARIS/SL® schedule loader	✓		✓	
ARIS/SmartBus® communication middleware	✓			
ARIS/SP® stand planner		✓*		✓*
SmartAirline/SmartAirport Capacity Analyzer strategic planner	✓		✓*	✓*

Ascent WorkZone® workforce management system	✓	✓*	1200x768 minimum resolution for ARIS/WorkNet® bid and trade manager
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\*Minimum display resolution (pixels): 1600 x 1200

ARIS, ARIS/AR, ARIS/AV, ARIS/BB, ARIS/CI, ARIS/CX, ARIS/FR, ARIS/FW, ARIS/GateView, ARIS/GM, ARIS/IQ, ARIS/LegGen, ARIS/PX, ARIS/SA, ARIS/SB, ARIS/SE, ARIS/SL, ARIS/SmartBase, ARIS/SmartBus, ARIS/SP, ARIS/Tow Panel, ARIS/WorkModel, ARIS/WorkNet, ARIS/WorkOptimize, ARIS/WorkPlan, ARIS/WorkRelay, ARIS/WorkTime, Ascent Technology, Inc. (stylized), Ascent WorkZone, Ascent WorkZone (stylized), GateKeeper, Right-Now View, SmartAirline, SmartAirline Capacity Analyzer (stylized), SmartAirline Operations Manager (stylized), SmartAirline WorkZone, SmartAirline WorkZone (stylized), SmartAirport, Smartairport.com, SmartAirport Capacity Analyzer, SmartAirport Capacity Analyzer(stylized), SmartAirport Information Manager, SmartAirport Information Manager(stylized), SmartAirport Operations, SmartAirport Operations Center, SmartAirport Operations Manager, SmartAirport Operations Manager (stylized), SmartAirport WorkZone, and SmartAirport WorkZone (stylized) are registered trademarks of Ascent Technology, Inc., in the United States.

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