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### Determine how flight delays and cancellations affect connecting crews

The ARIS/CX crew-connection analyzer reduces departure delays caused when crews needed to staff outbound flights are delayed by late inbound flights or by long walking distances between inbound and outbound flights.

The ARIS/CX crew-connection analyzer obtains crew-rotation identifiers for each flight from the ARIS/SmartBase<sup>®</sup> database and then tracks flight crews through connecting airports. The ARIS/CX crew-connection analyzer can track flight attendants separately from cockpit crews, and it can handle split crews that combine from multiple inbound flights to staff outbound flights.

The ARIS/CX crew-connection analyzer enables you to assign aircraft parking positions that minimize outbound delays that occur when inbound crews are on aircraft waiting for parking positions. Actual crew-connection information is supplied to the ARIS/SmartBase database from an external system, such as a crew-assignment system.

### Representative features

**Scrollable connection matrix.** The ARIS/CX crew-connection analyzer display is a scrollable matrix, containing as many as 1,000 by 1,000 cells, that displays inbound flights across the horizontal axis and outbound flights down the vertical axis. Each cell of the matrix contains separate indicators for cockpit crews and for flight attendants connecting between inbound and outbound flights associated with the cell. The scrolling capability makes it possible to maintain a cell size that is easily readable.

**Flight information.** Actual or estimated flight arrival and departure times are displayed along the edges of the matrix, enabling you to assess the extent of the delays. When you place your mouse on a flight, the ARIS/CX crew-connection analyzer indicates the original schedule time. Flight status indicators provide information about the flight, such as inbound, in range, or taxiing to a position.

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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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**Accurate connection time model.** When the ARIS/CX crew-connection analyzer is installed, models of times required for flight crews to connect from each parking position to every other parking position are entered into the ARIS/SmartBase database. Because flight crews are usually the last to deplane, the ARIS/CX crew-connection analyzer considers aircraft deplaning time as part of the crew connection time.

**Alert indicator.** Using models, the ARIS/CX crew-connection analyzer computes the most reasonable connection times between flights and automatically selects and displays on each cell in the matrix one of four alert levels: no alert, difficult connection, unlikely to connect, and impossible to connect. Because each alert is associated with a different color, you can rapidly identify possible problems and select the best course of action.

**Connection detail information.** When you place the mouse on connection cells in the matrix, the ARIS/CX crew-connection analyzer displays crew information, such as crew ID, rotation start date, and active or ferry status. The connection detail information enables you to track crews and reassign crews to other flights.

**Aircraft turn indicator.** The ARIS/CX crew-connection analyzer displays an indicator when an aircraft makes the turn from an inbound to an outbound flight. Aircraft turn indicators may be used to identify departure times that are overly optimistic and that, if readjusted correctly, could reduce connection problems.

**Automatic sort and update.** The ARIS/CX crew-connection analyzer automatically places the most difficult connections in the upper left corner of the display. The system updates cells and flight information automatically as the ARIS/SmartBase database receives new information.

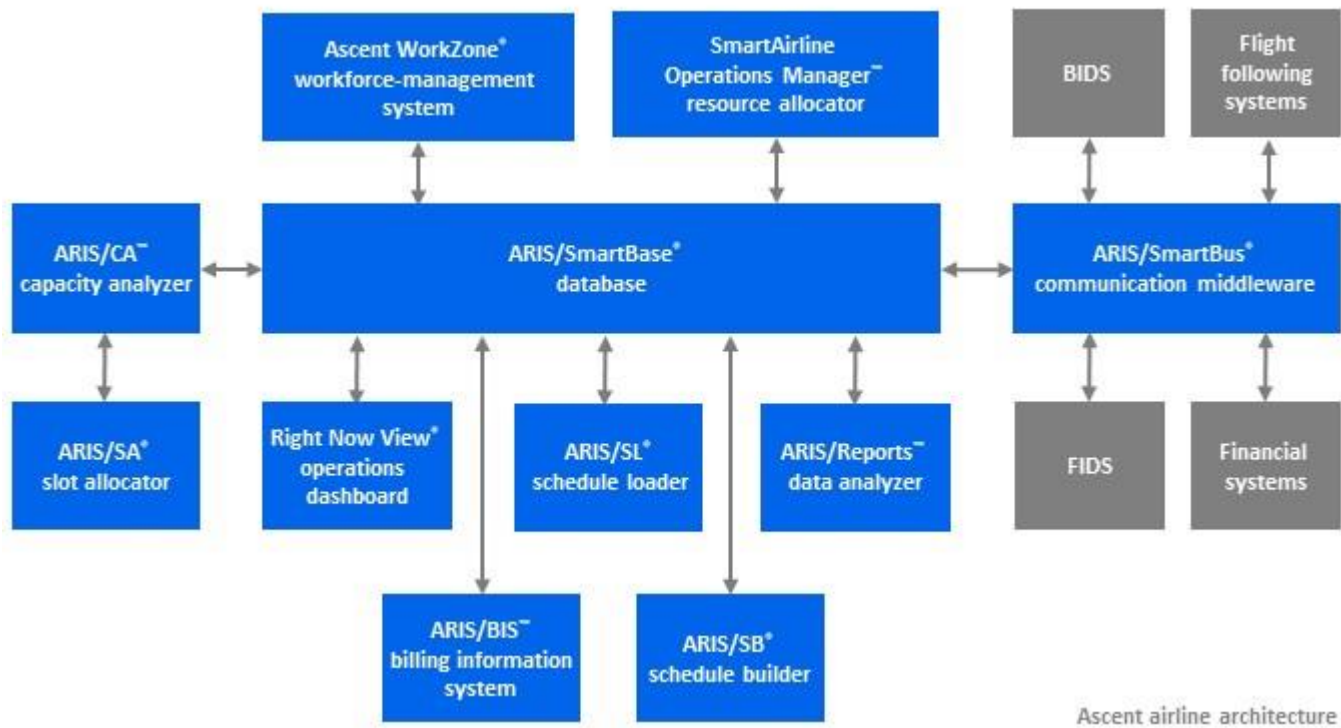
**Time-range control.** Rather than scrolling through a large matrix, you can use time-range control functions to select a specific time range for arrivals or for departures. You can view connections within each bank of flights. Because connections within the same bank of flights usually represent 95% of all connections, the bank-selection system provides a convenient way to partition the matrix.

**Report generation.** The ARIS/CX crew-connection analyzer produces hardcopy output of sections of the connection matrix. The printout, which can cover any time period, is generated by a separate program that accesses the ARIS/SmartBase database directly. Crew information is also printed on the ARIS/GM gate manager Tower Sheet report.

**Generalized database access.** All information processed by the ARIS/CX crew-connection analyzer is stored in the ARIS/SmartBase database, where it can be used by other ARIS® products or by external systems. You can create reports that show, for example, the average delay due to crew connection problems.

**Worldwide capability.** The ARIS/CX crew-connection analyzer can store crew connection information on a worldwide basis. You can monitor crew connections system-wide and locate any connection problems.

**Integration with the ARIS/PX® passenger-connection analyzer.** When the ARIS/PX passenger-connection analyzer is also running, passenger-connection information is integrated with the crew-connection matrix. By sharing the matrix with the ARIS/PX passenger-connection analyzer, a single display can monitor both passenger and crew connections.



## Reports

You can print hardcopies of portions of the ARIS/CX crew-connection analyzer matrix.

The ARIS/CX crew-connection analyzer stores 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 and SmartAirport Operations Center products, services, and solutions.

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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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**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 and SmartAirport 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 or SmartAirport 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 solutions 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 or SmartAirport Operations Center solutions in production.

**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<br>Database: Oracle 12C SE2<br>Desktop: Windows 7, 8 or 10 with 4GB of RAM<br>Browser: Latest Microsoft Edge, Google Chrome or Mozilla Firefox<br>Minimum internet access for remote support: 512 kbps |                |             | Browser: Latest Microsoft Edge, Google Chrome or Mozilla Firefox;<br>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          | ✓   |                | ✓*          | ✓*  |

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|--|---|----|---|
| 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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