



The Enterprise Data Bus

Part 1 - Strategy

A mid-level view of data flow in the
Aviation Industry

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Introduction

This document is a companion to the Advanteks Presentation of the same name. The information presented here is intended to present an overview of the strategic planning our consultants have put together. These ideas are based on work Advanteks consultants have performed for several clients and are intended to encapsulate theories built during those projects.

During the years Advanteks consultants have spent in the aviation industry, it became obvious that there was a wide spectrum of data sources required to feed the airline systems. These data sources ranged from new lightweight, web-based services that were driven by SOAP (Simple Object Access Protocol) and other modern technologies using XML or other new data formats that are efficient and transportable. The other end of that spectrum was the need to support early mainframe-based technology such as Teletype messaging and other types of text-only data.

Of course, the extreme requirement for an airline IT person involved in interfaces is to receive inbound data in the form of a teletype message and deliver it to a system that ingests XML. Many companies have developed a talent for managing these interfaces that requires developers on both sides to build “point-to-point” interfaces to meet those requirements. We'll see the results of that philosophy later in our presentation.

Components and Systems

There are three major components that data moves through on its course through the Enterprise Data Bus. They are the Messaging (or Routing) Layer, the Data Transformation Layer and the Interface Layer. The “Data Repositories” are outside the scope of this presentation but deserve a part in any discussion around data in the corporate environment.

At one time, the role of “gateway” or messaging systems was simply to deliver incoming data to a defined destination. The only reason to maintain a record of that data movement was to confirm delivery. In today's environment there are 2 major reasons for a change in that philosophy:

- 1 Accountability -With the advent of Sarbanes-Oxley regulations, public companies are required to be more vigilant at logging data transfer and data transformation.
- 2 Historical reporting – As industries become more competitive (the rise of the Low-Cost Carrier for example) companies are using historical data more and more to track trends and to better understand what drives their business. This perspective is valid both from the Operations view and also from the Marketing/Customer Service view.



The design of our Data Bus must reflect these needs with a more flexible, efficient and secure architecture than was required when the company's Corporate network was just built to “move” data.

In the airline environment, an area Advanteks has worked for years, the internal systems are not that different than you would see in most businesses that have an Operational and a Back Office component. Some of these systems require a real-time data feed and others are users of historical or stored data.



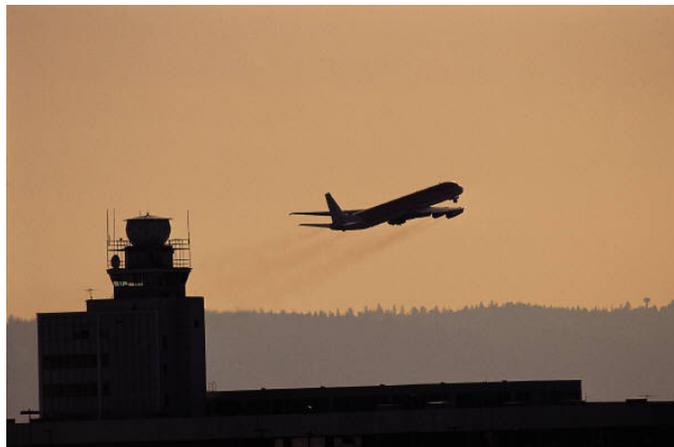
Again, in the airline world, there are a number of sources (and destinations) for data that are owned (and possibly controlled) by the airline but are not within what is considered their Corporate WAN (Wide-Area-Network).

One of these remote locations, the aircraft, although critical to the airline operation, has for some time been considered a standalone entity – not part of the Enterprise system. There are 2 areas of movement (1 relatively new and 1 that has been around for over 30 years) that have caused the aircraft to become a more linked-in element to the company.

One is ACARS (**Aircraft Communications and Reporting System**) – by which data is exchanged either between ground systems and either the aircraft systems or the flight crew. In addition to the near-real time communications, this technology has allowed airline maintenance departments to ingest data from airframe and engine systems in flight. This gives them the opportunity to be very proactive in troubleshooting or fixing problems and monitoring the fleet on a constant basis. Although this technology has been around for many years, only lately have airlines (even Low Cost carriers and Regional carriers) begun to understand the value it can have in automation and data flow.

The other is a movement by both Airbus and Boeing to make their next generation aircraft a part of the airlines IP network. This would allow the aircraft to truly become just another node on the Enterprise Architecture.

In the aviation world, there is another “partner” in all travel scenarios that manages a component that plays a large part in the movement of data – the airport. The Common Use model, in place at many major airports around the world, allows the airport to be a true Service Provider to the airline – supplying network and hardware to the airline’s airport activities (and the associated IT support) allowing the airline to concentrate on its Passenger Processing activities. An interesting concept that must be considered when developing your Data Bus is that airports actually are a consumer and a generator of data.



Many airlines have incorporated a Self Service Strategy as a part of their Master Business model. This encompasses connectivity with their customers using main technologies (Web, PDA, Cell phone, Kiosk etc) and can be used for Flight and Baggage Notification, Check-In, Marketing and many other forms of connection to their customers.

Although some of these systems require real-time connectivity (terminal sessions or Web Services) there is a value to linking them in your Enterprise Data Bus for reporting, trending, troubleshooting and many other reasons)

The External Systems are the ones that will give the best return on your investment if you manage them via a Enterprise Data Bus. There are requirements around these interfaces that will be more stringent than any of your internal systems. The issues that will surround these systems are:

- 1 Security – Both from the perspective of having a secure interface (data is only “readable” at its source and destination – nowhere in-between) and security of the data.



Responsibility for making sure that data comes from the correct source and is only distributed to the proper end user is an aspect of interface security that needs to be addressed.

- 2 Data format – While you will have some influence on the data format when moving data between internal systems, external vendors will have a specific format they support and are reluctant to create new ones for another interface.

Using the Enterprise Data Bus concept to manage these interfaces means you can manage them all through a single configuration template. Upgrades, enhancements, changes to Business rules, new interfaces – all these things will impact your business less if managed through this methodology. Expect change – it's a part of the new paradigm of "how business works". The successful business in this millennium will be the one that best adapts to change and can re-invent itself on a dime.

The Data Bus – Managing your traffic

There are some inherent dangers to building interfaces between systems rather than using a managed, centralized interfacing and routing model. The downstream impact of any change is difficult to envision and format changes to a single data stream may result in re-engineering 3 or more interfaces. The more you can build generic solutions that fit multiple templates the less maintenance and enhancements will be needed later.

When designing complex, multi-faceted solutions that cross departmental and technological boundaries, it is always helpful to have a simple, easily communicated vision of what you are trying to accomplish. In the case of the Enterprise Data Bus it would be:

"To build a reliable, efficient and secure mechanism for delivering data between your internal systems and also connect to external systems as needed. The end result will be designed around the fact that there will be two standards for routing this data :

PUSH – this is driven by a list of information sources and a schedule of delivery. Systems will describe their data requirements and our Enterprise Data Bus will deliver the product to them.

PULL – when a described data set is ingested, systems will be able to poll or query for their needs.

Included in the services the true Enterprise Data Bus provides will be the ability to manipulate or transform data as needed and the ability to learn about new data types as they appear."

An overview of the proposed solution, such as the one above, allows all interested parties, even disparate departments to get a view of the expected results. The complexity begins as we drill down to the details of how the pieces fit and where they overlap.

In the final slides of the accompanying PowerPoint presentation, we follow the flow of data through a real-world example of how the Enterprise Data Bus can provide the foundation to build, flexibility to change and security to encompass all your Enterprise Data needs. In Part 2 of this series, focusing on the "Layers" of the enterprise Data Bus we walk through this example for a more thorough understanding of how these layers work to accomplish their chores.



Summary

This document is intended as an over view in order to stimulate your organization to start thinking and planning with an eye to enterprise strategy. We have focused on the Data Bus – how information moves through the organization. With respect to the three components that make up the internal layers of the Data Bus more investigation needs to be done on how they can be successfully designed to integrate full with your internal system. Also critical is to build an open system that is re-usable and extensible by your in-house developers.

These topics are the core of the work product developed by Advanteks and their associates to help businesses design enterprise solutions. To further investigate the layers in the Enterprise Data Bus and to understand how they can be implemented in your organization see the next series of Advanteks White Papers on the Enterprise Data Bus - Pt 2 - Layers.

Strategy – Innovation - Integration

Advanteks, Inc. is a Canadian consulting firm specializing in aviation technology and the strategy involved in implementing emerging technology solutions.

Advanteks consultants have over 20 years experience working with airlines and airports at solving technology problems and using innovation to implement a wide range of solutions.

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