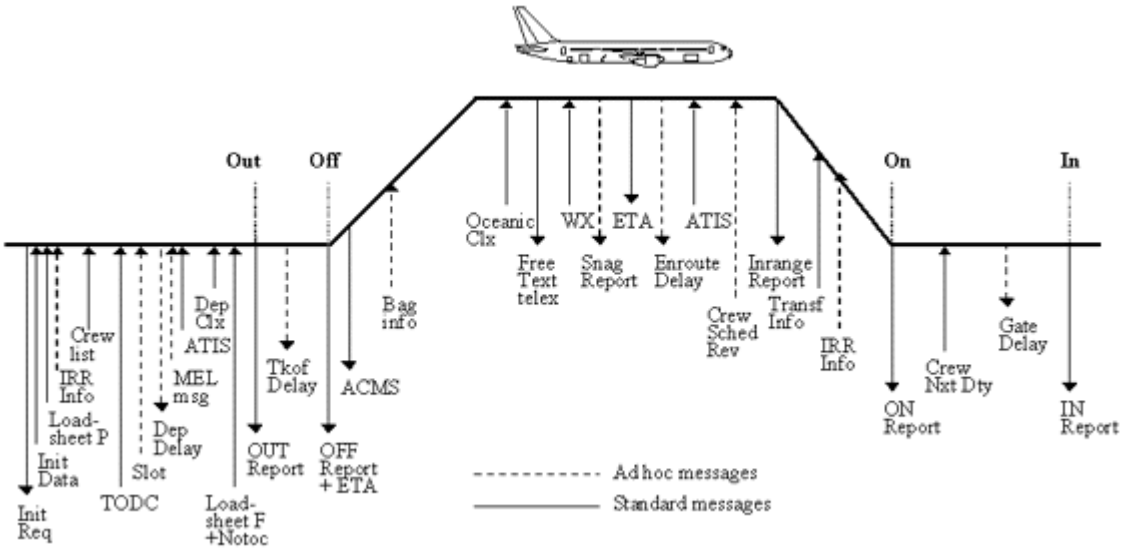
Advanteks Inc.

ACARS

(**A**ircraft **C**ommunications **a**nd **R**eporting **S**ystem)

Your Eye in the Sky



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ACARS – Not as sexy as IFE

Much is being made these days of advances in technology to enhance the abilities of passengers in commercial aircraft to use electronic devices. There is much work underway to allow the use of cell phones, PDA's, wireless-equipped notebooks and other devices while the aircraft is in flight. The development of innovation in these areas seems to get a large amount of publicity – possibly because of its link with the airline marketing and branding philosophy. At the other end of the aircraft (the flight deck) there are some interesting opportunities that airlines can be innovative with. However because they are not part of any marketing campaign the only places you'll read about them are in trade magazines.

Voice and data communications between the aircraft flight deck and airline ground systems has been around for some time. The opportunities range from simple text messaging and the transmission of OOOI (**O**ff, **O**n, **O**ut, **I**n) messages to full automation of some pilot or dispatch actuated tasks. The beauty of these opportunities is that once you have connectivity between the flight deck and the ground systems you can implement as little or as much as you want.

We'll focus here on ACARS and some of the things you'll want to investigate if your airline has it and wants to enhance or investigate usage or is thinking about implementing it. Although prices for data transmission from the aircraft can be more costly than your Internet access at home, prices for the hardware and the costs for network traffic have been decreasing over the last decade. One of the things that will allow you to mitigate some of the cost is an alternative transport mechanism (ie wireless) which is the topic of a future Advanteks document and the combination of the two (ACARS and Wireless) with the application of some Use-Case logic and lowest-cost data routing will lead you to a system that can decide to use Real-Time Delivery (with its higher cost) for time-sensitive data or to use a Store-and-Forward mechanism for data that can be delivered via a lower-cost infrastructure (WiFi) when the aircraft reaches the gate.

On the Deck

Although there have been many advances in the avionics many ACARS users are still using POA (**P**lain **O**ld **A**CARS). Even with the advent of VDL Mode 2 and other attempts to deliver more secure and more binary data the old tried and true text messages via VHF radio are still the most effective way to connect your aircraft systems to the ground. And, yes, the next generation of aircraft will have servers and IP networks and "will be an extension of your ground-based network" but the truth of the matter is that there will still be a lot of aircraft flying without that technology for years to come. And the decision that airlines that are flying planes with the current technology will have to make is whether retrofitting their aircraft makes sense and will have the Return-on-Investment they need.

In the past, airlines have had few choices when it came to implementing ACARS. There were the OEM manufacturers of ACARS devices (Honeywell, Universal etc) and really only 2 delivery methods using VHF radio for the air-to-ground portion – SITA and ARINC. The last few years has seen the emergence of some innovative solution providers that will provide ACARS-like capabilities that may or may not fulfill your requirements – but the choices are there and they are yours to make. These choices are especially valuable if you are retro-fitting your aircraft and make sense to investigate if you fly RJ's or turbo-props that were not ACARS-equipped from the factory.

On the Ground

The factor that will drive your ACARS plan the furthest (or maybe the least) will be your data requirements. And your data requirements are driven by what data your ground systems need. A full Business Requirements gathering is essential in that area so that you understand fully what you can and can't do.

Those requirements will also determine how robust your Message Distribution needs to be. From the perspective of downlink messages if you are planning on importing your Block Times into your Payroll system and your Fuel uplifts into your accounting system for account reconciliation, be prepared to invest in some good data migration and transfer tools. APM (**A**ircraft **P**erformance **M**onitoring) and Engine Trend reports sent down from the aircraft can be rolled into your Maintenance system (or emailed to Maintenance Control) for a real-time monitor of your aircraft in flight. As an example of a full end-to-end automation project, take the ETA message generated by the aircrafts FMC (**F**light **M**anagement **C**omputer) send it to your ground systems and then have it forwarded to the destination airport's FIDS (Flight Information Display System). Your passenger (or their meeters and greeters) at the airport know the status of that inbound flight at the same time as your dispatchers do.

With respect to uplink messages, there are many features of the daily business of flying airplanes that could be automated. However, caution needs to be the keyword as you move forward with these. Regulatory requirements and company **S**tandard **O**perating **P**rocedures may in fact make automating some of these practices impossible or inefficient. In a recent project with a Low Fare Carrier, we had the good experience of forming a team made up of members from IT, Flight Operations, Dispatch and Maintenance. This team evaluated items on the "ACARS Wish List" and could look into the implications and impacts before the airline even went down the road of finding and costing a solution.

In between the two

How you connect your aircraft to your ground systems is critical to keeping costs in line especially if your fleet is growing. For the SITA/ARINC users, these networks are pervasive at least across North America and will provide a high level of coverage. In that case, having VHF as the lowest-cost, first choice transmission method with perhaps Satellite from that provider as a backup method (or HF radio from ARINC) might give you a communications system that works everywhere. Other DataLink providers use Irridium or other satellite arrays to try to keep traffic costs down and may provide cost-effective solutions as well.

The major factor in how robust a communications network with your aircraft you need is how critical the timeliness of the data is. A question that needs to be asked for every downlink and uplink you implement is:

Does it need to get to the destination immediately → Send via Satellite
Could it wait until it can be sent via VHF ground station → Store and Forward
Could it be delivered by WiFi when the aircraft reaches the gate → Store and Forward

As you can see, a combination of delivery methods allows you to create the logic to deliver by the cheapest method based on the data's criticality.

Whatever end solution you choose, investigating the choices and understanding the requirements will help you provide an innovative design and an efficient plan to light up the Eye in the Sky for your airline.

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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