



## ACARS OVER IP POWERED BY AIRBUS FLIGHT OPERATIONS AND MAINTENANCE EXCHANGER (FOMAX)

# COMPLEMENTARY SOLUTION TO TRADITIONAL ACARS

### Protecting mission-critical communication now and in the future

Since its inception, Aircraft Communications Addressing and Reporting System (ACARS) has been reliably delivering operational and safety critical information to airlines' aircraft globally. It is used by hundreds of airlines and over 27,000 aircraft globally to connect airline operation centers, air traffic control, and national aviation centers. Airlines have grown to depend on ACARS information to reliably operate and dispatch aircraft.



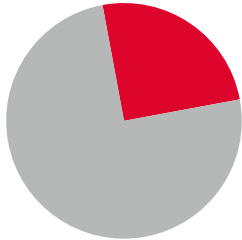
The significant growth of ACARS is attributed to the expansion of airline's fleets in response to increased global travel demand, the development of new ACARS applications and the addition of new generation aircraft. These aircraft are demanding increased ACARS capacity to support the growing volume of aircraft operations ACARS messages.

### KEY FEATURES & BENEFITS

- Preserves valuable VHF bandwidth so mission critical communications can continue
- Provides ACARS connectivity at airports without VHF coverage
- Helps manage cost efficiencies

## New generation aircraft – aircraft and engine information data is driving ACARS usage growth

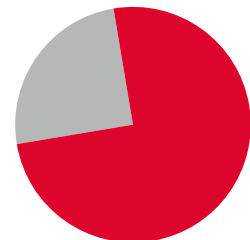
### OLDER GENERATION



Engine and aircraft ACARS data has grown **25%** to almost **75%** between new and older generation aircraft

New generation aircraft generate **four times** the amount of ACARS data than their predecessors

### NEWER GENERATION



■ AOC/ATS data  
■ OEM/engine data

Figure 1. Narrow body aircraft data usage example – A320

Source: Collins Aerospace, 2021

### A SCALABLE LONG-TERM SOLUTION

ACARS over IP (AoIP) is the newest option for ACARS communications. The Collins AoIP service is enabled by selecting the AoIP option on the Airbus Flight Operations & Maintenance Exchanger (FOMAX) - which was developed in partnership with Collins. Airbus aircraft come with the FOMAX Aircraft Interface Device (AID) hardware as basic linefit. The system also provides additional functionality above and beyond AoIP, including Electronic Flight Bag (EFB) access to IP connectivity and aircraft parameters, automated Flight Data download for Flight Operations Quality Assurance requirements, and avionics software loading.

AoIP leverages the advantages of ACARS while also utilizing the growing availability and decreasing cost of broadband cellular connectivity on the ground, and IP capable Satellite Communication (SatCom) connectivity when airborne.

AoIP supports the uplink and downlink of Airline Operations Communications (AOC) ACARS. Air Traffic Control (ATC) ACARS will continue to be sent over traditional Very High Frequency (VHF) radio, High Frequency (HF) radio, and narrow band safety service SatCom.

AoIP provides the ability to offload the growing volume of AOC ACARS information from VHF, HF, and narrow band safety services SATCOM to broadband connectivity. New generation aircraft have three to four times more ACARS data than older aircraft which can lead to network congestion (Figure 1). This increase in AOC ACARS traffic is driven by the growth in data generated by sensors in the engines as well as onboard the aircraft.

The specific mechanisms vary by aircraft and the type of system used, but in general, standard ARINC 618 ACARS messages are encapsulated in IP between the aircraft and ground-based ACARS message processors. On the ground the ACARS messages are sent to and from the ACARS message processors as standard ARINC 620 Type 'B' messages and thus no updates to the end user systems are required. When fully integrated with the ACARS avionics, AoIP looks like a new media type in addition to VHF, HF, and Safety Satcom options. Because AoIP uses Broadband IP communications, which have a much higher effective throughput than VHF and HF, it is a highly scalable long-term solution.

# ACARS over IP impact on VHF traffic growth projections

The graph below shows the impact of AoIP on VHF traffic growth over the next 15 years using the new generation aircraft growth estimate. AoIP has the capability to preserve VHF capacity for critical airline operations and air traffic services by migrating airline operations ACARS applications away from VHF. The forecast shows that strong market adoption of AoIP would result in nearly half the VHF ACARS traffic over the next 15 years.

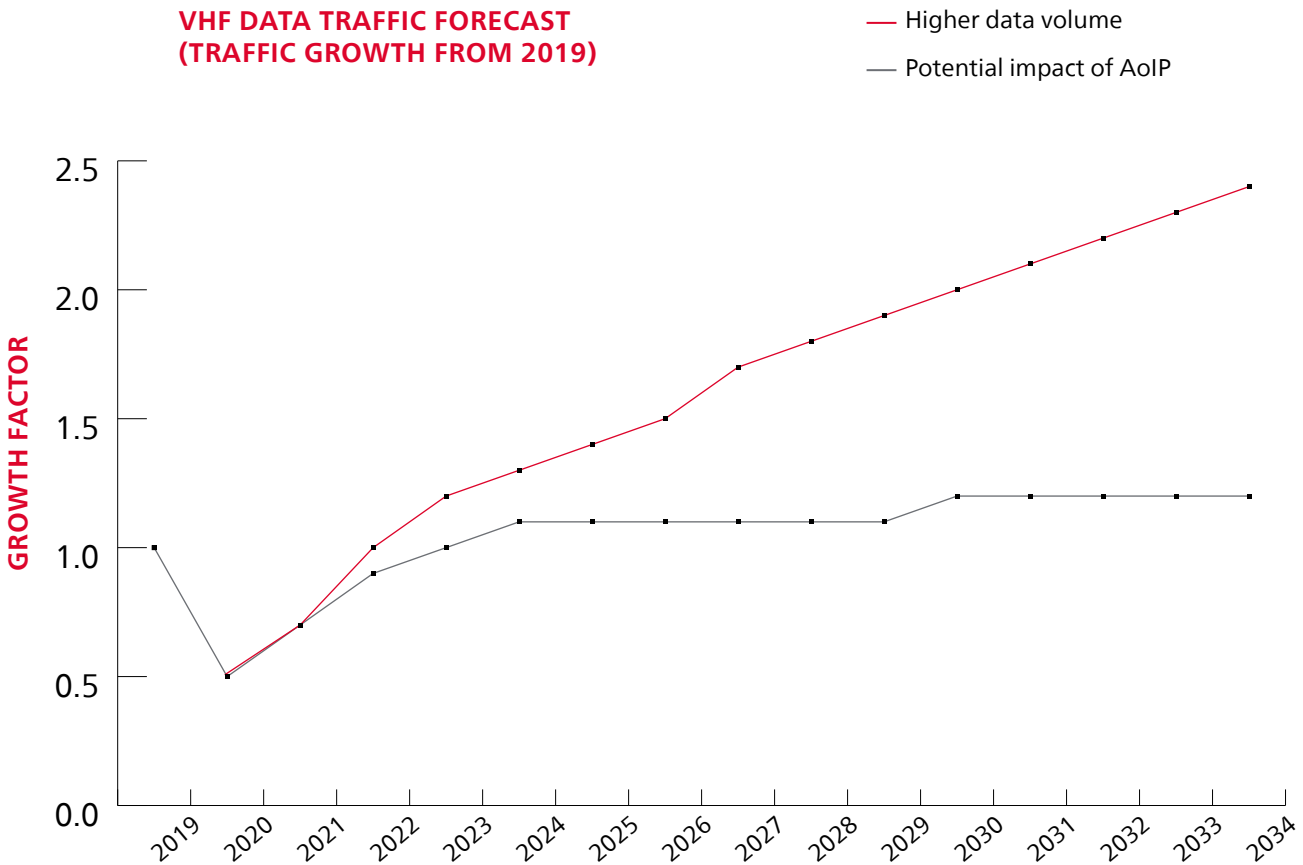


Figure 2. VHF data traffic forecast

Source: Collins Aerospace, 2021

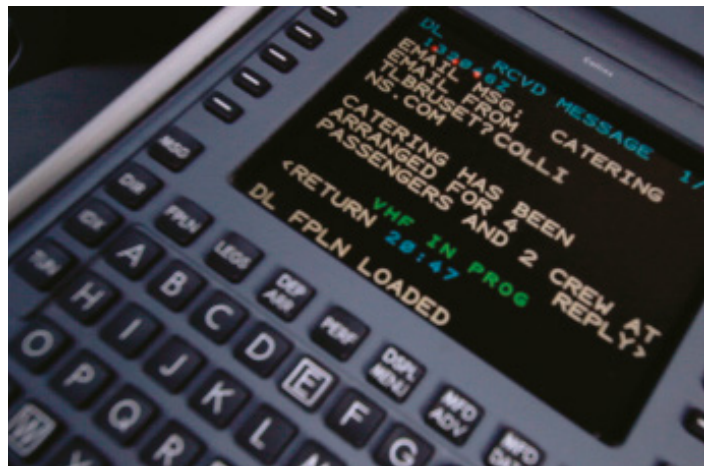


An aircraft needs at least the following to enable AoIP:

- Aircraft Interface Device (AID) connected to the aircraft's ACARS router
- Software on the AID that is capable of encapsulating ACARS 618 messages into an IP message
- Broadband IP connectivity with a high degree of security, such as an IP Virtual Private Network (VPN). Examples are either a ground cellular capability or IP capable Satcom. A ground ACARS message processor which can convert the IP encapsulated ACARS message into a Type B message to forward to the end user systems. This function is usually provided by a datalink service provider
- A service provider active contract

AoIP is an operationally proven technology that is capable of off-loading aircraft operations ACARS traffic from VHF/HF, allowing traditional systems to stay focused on ATC and other mission critical traffic.

As next generation aircraft are purchased, airlines should invest in both AoIP technology, and the broadband services that support its delivery to the ground. This will help ensure the capacity of VHF and HF networks will continue to be sufficient. Additionally, airlines can manage their ACARS messaging costs by leveraging broadband connectivity for additional operational improvements.



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