FANS 1 OPERATIONAL OVERVIEW

Worldwide Integrated Flight Support Corp.

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Acronyms

- **ACARS** – Aircraft communications addressing and reporting system (Character-based)
- **ADS** – Automatic dependent surveillance
- **ATC** – Air Traffic Control
- **ATN** – Aeronautical telecommunications network (Digital-based)
- **CDS/MCDU** – Common Display System or Multi-function Control & Display Unit
- **CMU** – Communications management unit
- **CPDLC** – Controller pilot data link communications
- **FANS-1/A** – Future air navigation system
- **FMC/S** – Flight management computer/system
- **ICAO** – International Civil Aviation Organization
- **SATCOM** – Satellite communication
- **VDL** – VHF data link
- **WIFS** – Worldwide Integrated Flight Support, Inc.
What is FANS-1/A?

FANS - 1/A stands for Future Air Navigation System

- FANS-1/A utilizes specialized FMC software to automatically or manually exchange flight information between ATC and the flight crew over ACARS
- In 1983, ICAO selected FANS as a strategy to counter global increases in air traffic and subsequent frequency congestion, & an aging worldwide infrastructure
- FANS applications are primarily used in Oceanic regions of the world and in some high density traffic areas (Maastricht Airspace in Europe)

FANS - 1 in use by Boeing aircraft since 1995
FANS - A in use by Airbus aircraft since 2000

Types of FANS Data Link

**ADS (Automatic Dependent Surveillance)** operates independent of the flight crew and allows ATC to query the FMC for specific information (i.e., flight plan, aircraft position, WX info, ETAs., etc.) The FMC may be required to downlink the data once, at periodic rates (15 minutes), or at specific events (waypoints, altitudes).

**CPCLC (Controller Pilot Data Link Communications)** is a data application that allows for the direct exchange of text-based messages between a controller and a pilot.

Who’s equipped with FANS-1?
- Several thousand aircraft worldwide
  - USAF aircraft (KC-135, C-17, C-5, VC-25, C-32, *C-40C)
<table>
<thead>
<tr>
<th>Category</th>
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| **C** Communication | • 8.33 Radios  
• SATCOM/HF/VHF  
• CPDLC | Air Traffic Management  
Transition from ATC to ATM With the Ultimate Goal of Free Flight |
| **N** Navigation | • RNP – 30 vs. 100 nm  
• RVSM – 1000 vs. 2000 ft  
• FM Immunity | |
| **S** Surveillance | • ADS  
• Mode S  
• TCAS | |
Typical Aircraft FMS/ACARS System

- **FMS Hardware**
- **CMU Hardware**
- **SATCOM Hardware**
- **VHF Radio Hardware**
- **HFDL Radio Hardware**

- **FANS Software**

- **FMS**
- **MCDU or CDU**
- **CMU**
- **VHF/VDLM2**
- **SATCOM**
- **Inmarsat**
- **HFDL**
- **Iridium**

- **Flight Deck**
  - MCDU w/ FMS & ACARS
Benefits of FANS

1. Reduced Separation Between Airplanes
2. More Efficient & Direct Routes
3. No Altitude Loss When Crossing Tracks
4. Better Communications Quality (Data vs. Voice)
5. Automatic downlink of AOC Position Reports
6. Potential to utilize “Tailored-Arrivals”
7. Reduces communication errors between pilot and controller
8. Frees up voice communication channels
9. Allows the flight crew to print ATC messages
10. “Pilots and ATC Controllers prefer FANS vs. Voice”
Where is FANS-1?
Where is FANS-1?

U.S. / CANADA/ South Atlantic/ South America

Most of the world’s surface now has some FANS-1/ capability.

• The Continental U. S. is the obvious exception. Domestic FANS-1 capability will most likely await the FAA NGATS implementation beginning in the 2010 - 2015 timeframe.

• New York Oceanic and Oakland have full FANS-1/A capability now.

• Canada, Edmonton:
  • Implementing ADS and CPDLC in the northern airspace

• The South Atlantic Oceanic airspace assigned to Brazil (Europe – South America. traffic) now has FANS-1/A capability.

• Brazil is developing initial functionality for non-oceanic areas.
Where is FANS-1?

ASIA/PACIFIC

- All of the Pacific Ocean Regions have FANS-1/A capability and has realized significant benefits Reduced separation
  - (RNP-4 or 30x30)
  - User Preferred Routes
  - Continue to develop (Dynamic Aircraft Routing Procedures), DARP.

- Tokyo, Anchorage, Oakland, Tahiti, Fiji, New Zealand, and Australia all using full FANS-1/A

- Singapore is operational with CPDLC and ADS.
- China does have a route to Europe north of the Himalayas across the Tibetan plain (L-888) that requires FANS 1/A.
- The Polar Routes are fully covered by ADS and CPDLC through NavCanada and Russia (Magadan), though you lose satellite coverage above 82N.

- Russia polar 3 and 4 in Magadan Oceanic using CPDLC and ADS, also B-218 route in Russia Far East is a FANS-1/A only route.

- India, Thailand, Myanmar are all working on FANS-1/A systems.
Where is FANS-1?

**North Atlantic / Europe / Africa / Middle East**

**The NAT**
- Has CPDLC/ADS operational with “potential mandate” of 2015 for FANS equipage.

- **Iceland and Santa Maria** are a little bit behind the NAT in development.

**Masstricht in Europe**
- Has limited CPDLC/ADS operations, but their focus is on full CNS/ATM using **ATN protocols over ACARS VDL Mode 2** networks
- Assumption is that Eurocontrol will continue to accommodate FANS traffic for the near future.

**Middle East (MID):**
- Iran is running trials
- IATA/ICAO have had their first Arabian Sea/Indian Ocean Coordinating Group Meeting last year in Dubai. Emirates is the lead airline working with Air Services Australia in this region. Work is on-going
Flight Deck Controls for FANS
Operational FANS Testing for the C-40C
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FANS Operations – Couple Tips

Sources: ATC Center NOTAMS and Regional FANS Operational Manuals

• NEW YORK OCEANIC FIR DATA LINK PROCEDURES
New York ARTCC offers full CPDLC capability within the entire New York Oceanic FIR for FANS-1/A capable aircraft. The New York Oceanic FIR log-on address is “KZWY”.

• Position Reports
When logged on to “KZWY”, normal waypoint position reports will be received via ADS (if so equipped). Operators should not use CPDLC for position reports when using ADS, unless requested to by ATC. Use CPDLC for clearance requests, and for communications not associated with position reports. “KZWY” CANNOT accept CPDLC position reports containing latitude/longitude in ARINC 424 format (e.g. 4050N).

• LOGON WITH TOKYO ACC.
The logon address for Tokyo ACC is “RJTG”. An attempt to logon while on the ground in Japan before departure will not be accepted. Inform Tokyo Control on VHF or through Tokyo Radio (VHF or HF) of the completion of the CPDLC connection using the following phraseology:
“C-P-D-L-C CONNECTION COMPLETED.”

• Tokyo ACC cannot uplink route changes: Make requests for route changes, other than weather deviation, on HF.

• Leaving the Tokyo FIR:
When leaving the Tokyo FIR, the flight will be informed that data link services are terminated with the following CPDLC uplink message:
“CONTACT TOKYO CENTER [ frequency ]. DATA LINK SERVICE TERMINATED.” (In this instance, TOKYO CENTER means Tokyo Radio).
FANS Operations – ATC Flight Plan

Call sign on flight plan must match planned login call sign and tail number (e.g. SPAR55)

**Equipment:**  
- B737/M-SXHJRYW/SD  
  - J - CPDLC  
  - D - ADS

**Remarks:**  
- DAT/SV  
  - V- VHF Datalink  
  - H – HF Datalink  
  - S – Satcom Datalink
Suggested References

- *FANS 1/A Operations Manual (FOM)*
- South Pacific Operations Manual
- Pacific Operations Manual
- Indian Ocean Operations Manual
- NAT ATS Data Link Guidance Manual
- FLIP AP Regional Information
- FIR NOTAMS
- WIFS User Manual and Pilot Guide
Future FANS Considerations

- FANS Accommodation in Europe (Eurocontrol) with ATN/CPDLC? (VDLM2)
- FANS Over Iridium?
- Tailored Arrivals?
- FANS Mandates?
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