

ACARS

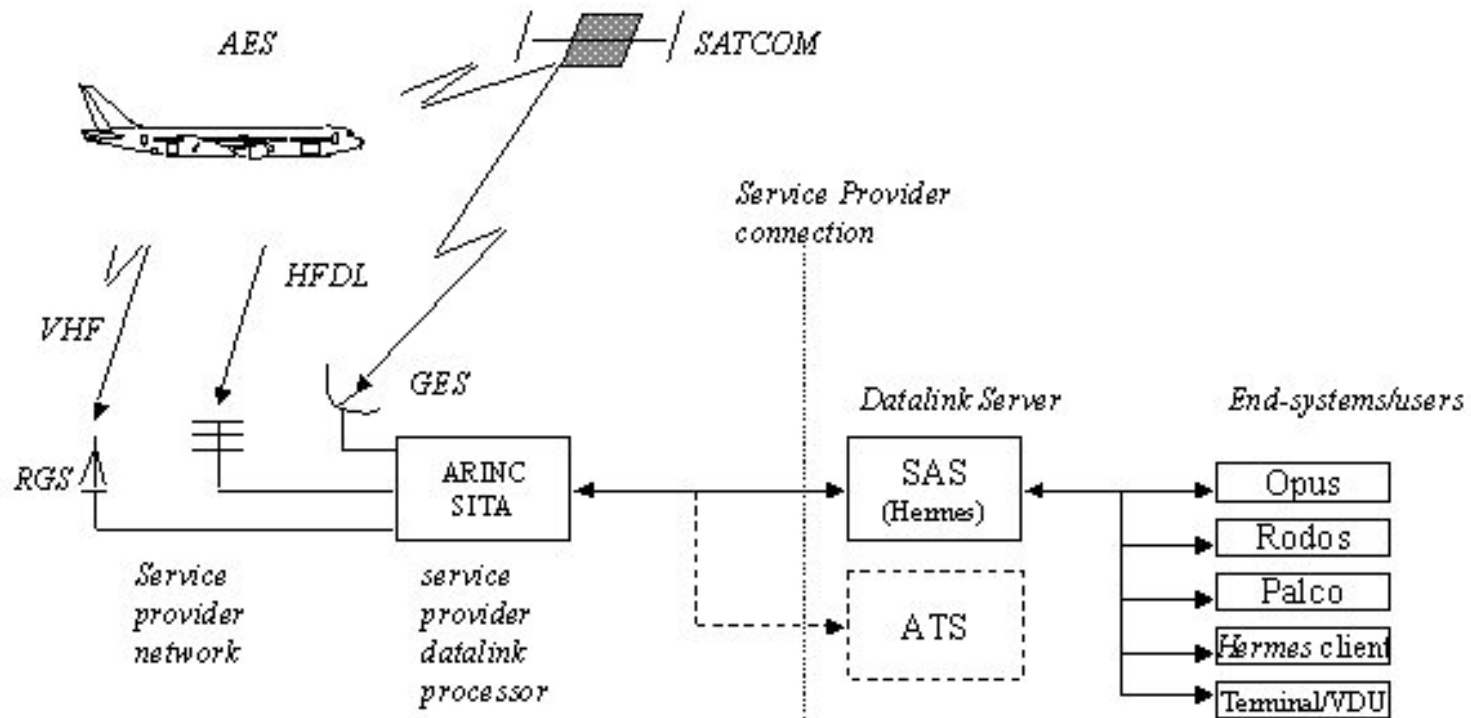
Aircraft **C**ommunication **A**ddressing and **R**eporting **S**ystem

OZ1LQO, 20/4-2006

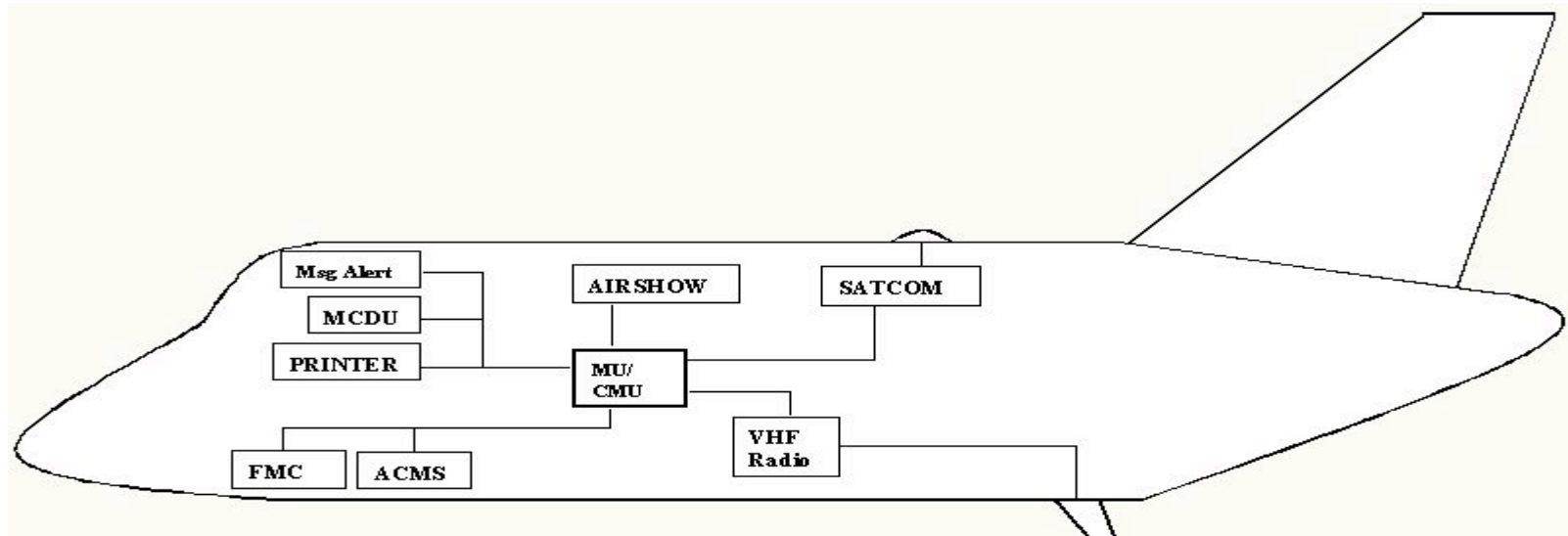


- Hvad er ACARS
- Opbygningen af ACARS
- Komponenter i flyet
- ACARS performance/begrænsninger
- Fra start til landing
- Eksempler på telegrammer
- Frekvenser
- 'Wacars', demo af et simpelt dekoderprogram
- Online Servere

Datakommunikation med civil luftfart, overblik



Komponenter på flyet



MU/CMU, ACARS Management Unit, Communication Management Unit.

SATCOM

HFDL, High Frequency Data Link

MCDU, Multi-Function Control and Display Unit

Cockpit printer

ACMS, Aircraft Condition Monitoring System

FMC, the Flight Management Computer

Airshow

Inde i cockpittet

(767-383ER)



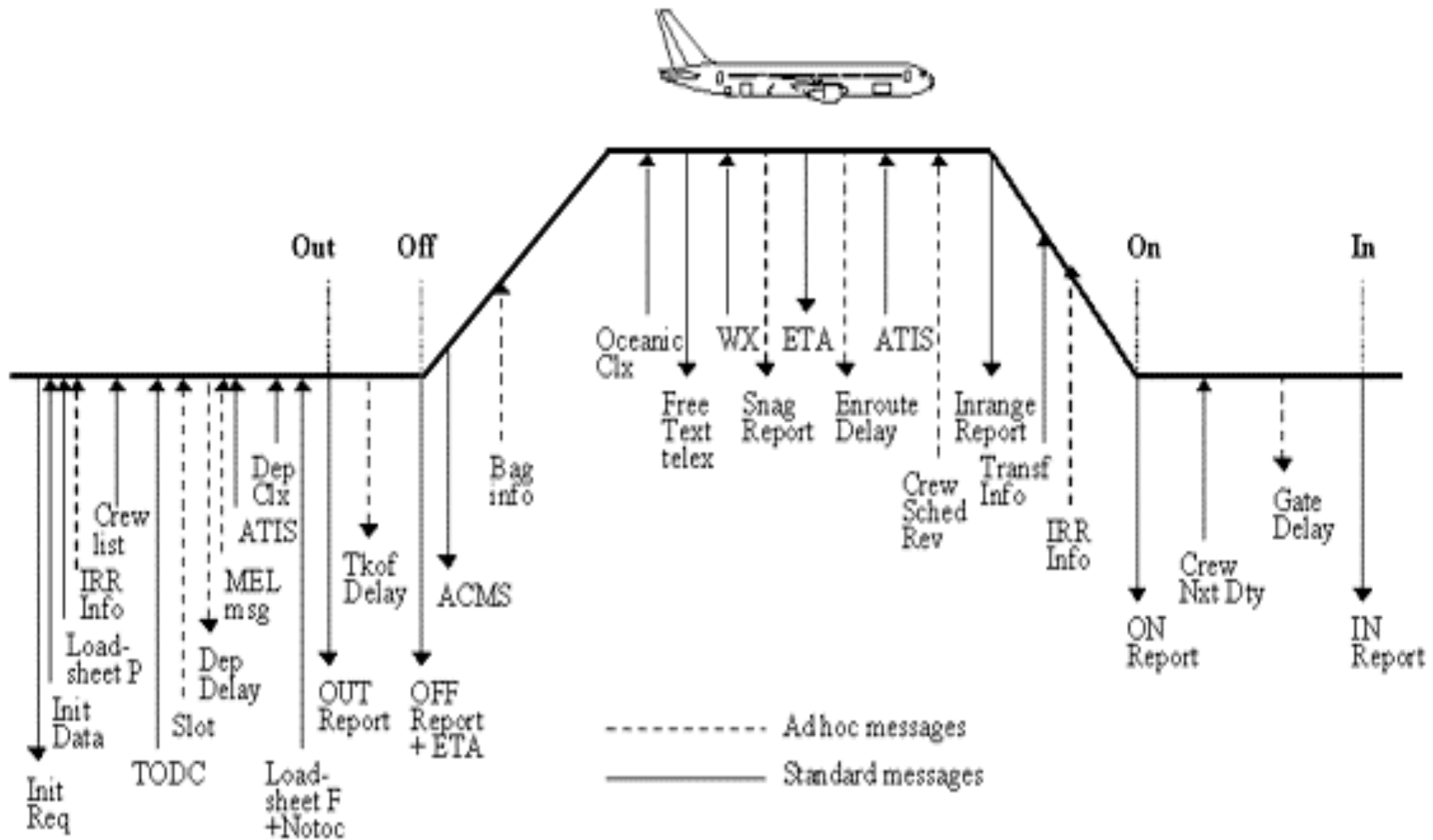
Cockpit MCDU

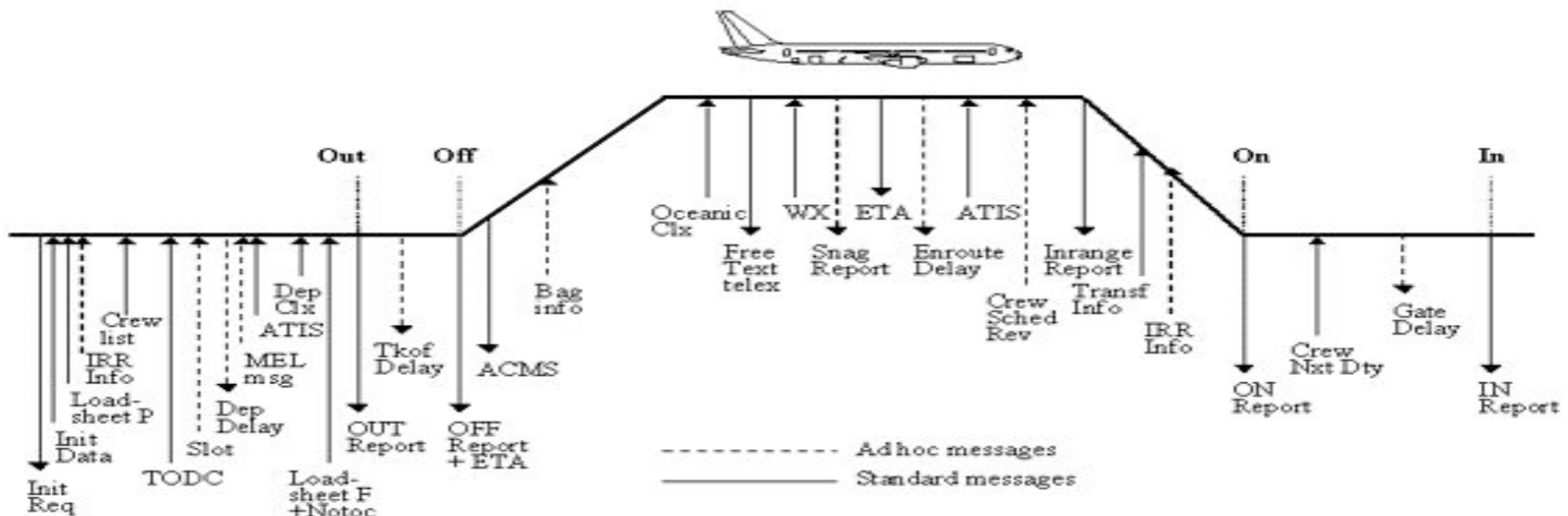


Performance og begrænsninger

- 2400bps VHF link
 - Kun blok bogstaver
 - Begrænset karaktersæt
 - Ingen grafik/farve
 - Maximum besked længde er 3520 tegn
 - Cockpit printer can skrive 64 bogstaver/linie
 - Cockpit display (MCDU) kan vise 24 bogstaver/linie.
 - Airshow monitor (B767) bør ikke vise mere end 40 bogstaver/linie
-
- End-to-end delivery time, uplink message: 10-20 sek
 - End-to-end delivery time, Downlink message: 5-10 sek
-
- Downlink success rate: >99%
 - Uplink success rate: >95%

Fra Start til Landing...





Før afgang:

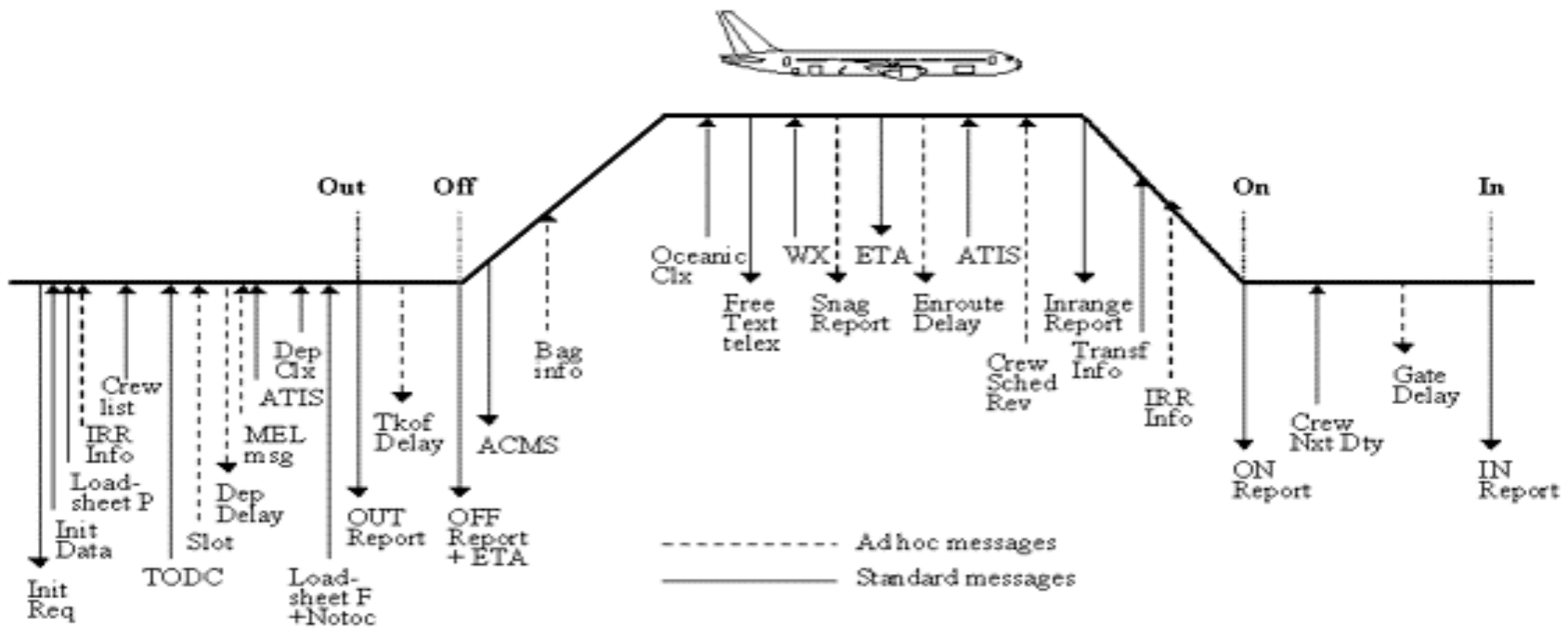
ACARS/MCDU, "Init Request"

• Upload af 'Flight number', dato, afg. lufthavn, mål lufthavn og afgangstid.

- Cabin configuration, company route, next+1 leg
- Departure slot og/eller sidste-minuts flight plan rute ændringer.
- Opdateret besætningsliste
- Loadsheets og Notoc (special handling) information
- Traffic Irregularity Info update (hvis nødvendigt)
- Lufthavns vejr-rapport
- Sigmet information (vejrinfo specielt for den pågældende flyvning)

Piloten får derefter en ATIS uplink:

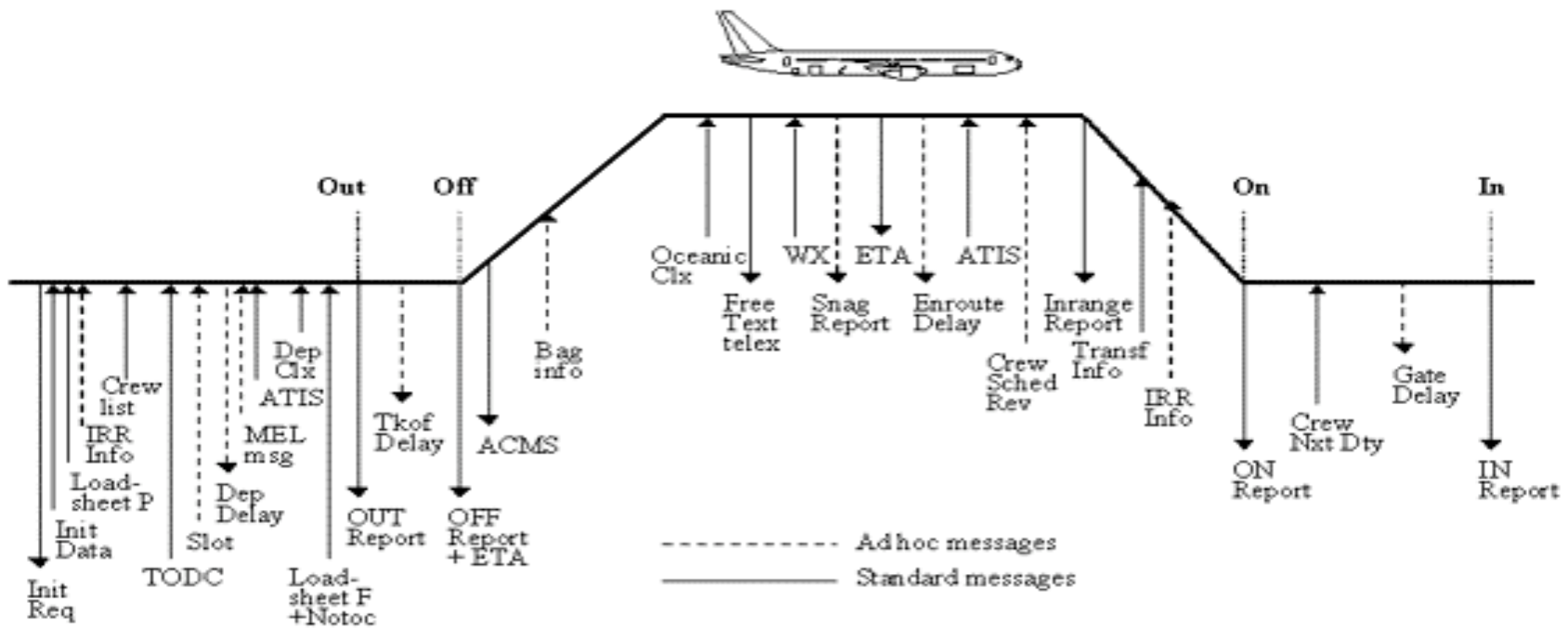
• Runway, MET + div. information/procedures



Pushback, Engine Start and Taxi out

Parking brake released -> ACARS 'Out Report'.

- Final Loadsheets modtages
- Taxi clearance uplink
- New takeoff data.

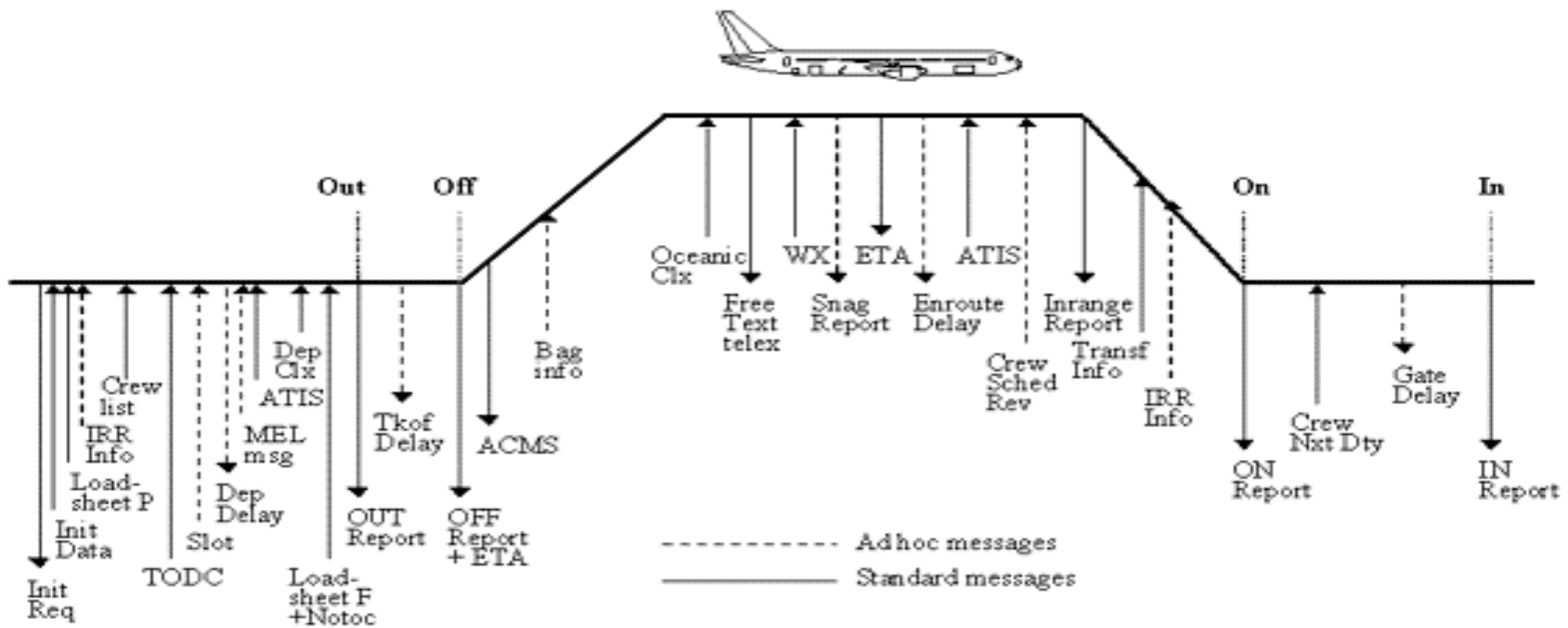


Takeoff and Ascent

Lift off -> ACARS 'Off Report' (indeholdende Out and Off time og estimeret ETA)

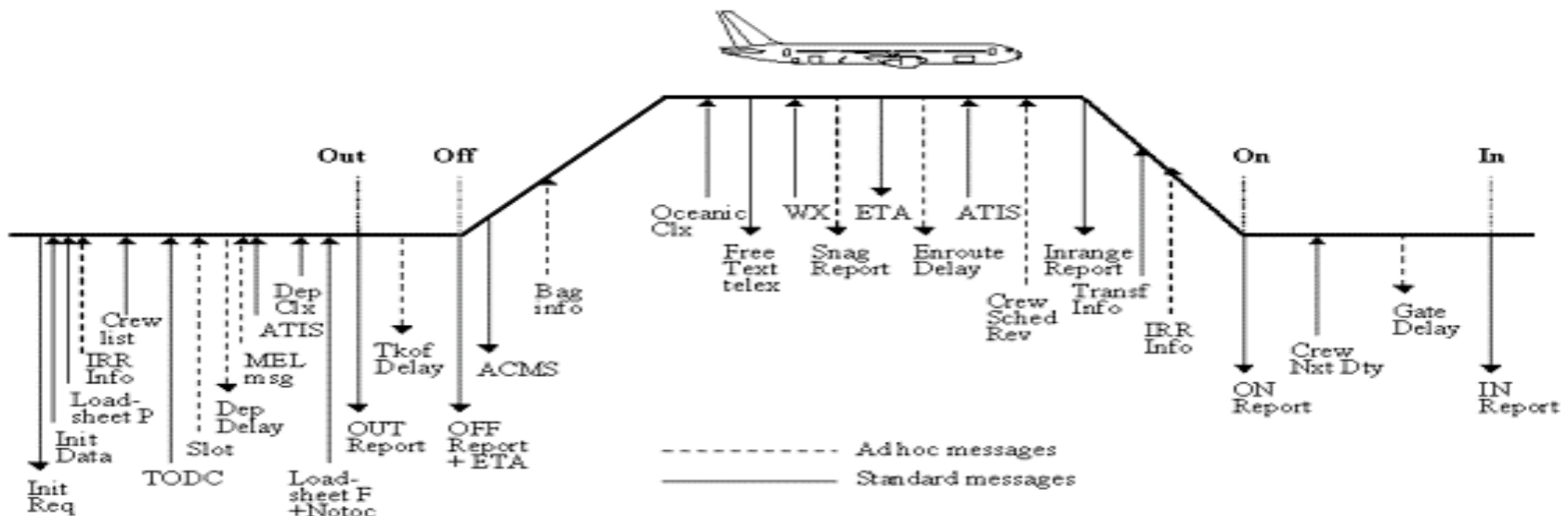
ACMS -> 'Engine Takeoff Report'

Information om manglende bagage (pga. kort transfer) og evt. ombooking af passagerer pga. delays



Cruise

- Vejrinfo,
- ATIS for destinationen og andre lufthavne.
- Oceanic Clearance
- Nye 'Sigmet' meldinger.
- ATS waypoint position reports sendes automatisk
- Freetext telexes
- Air-to-air telexes



Descent, Approach og Landing

20 minutter før ETA (afh. af flytype)

ACARS -> 'Inrange Report'

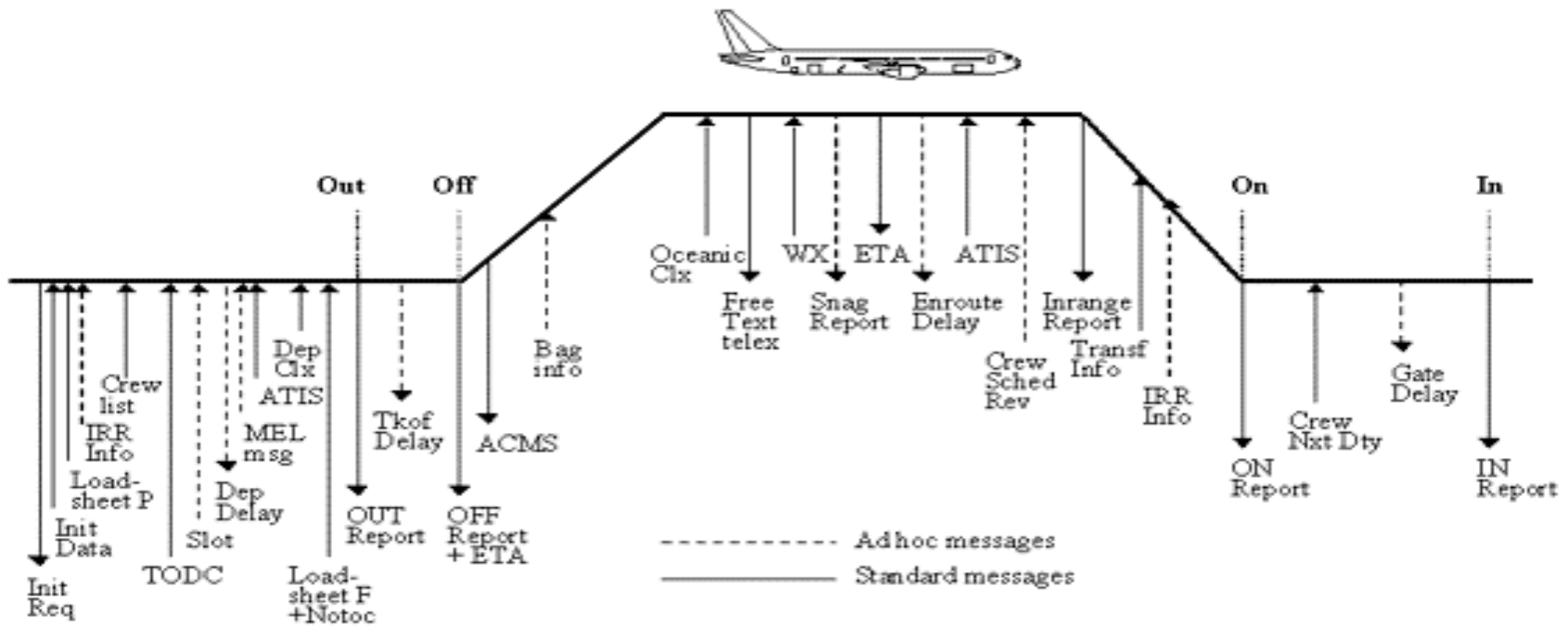
Herefter uplink af:

- Irregularity Information
- Ankomst information: terminal, gate, baggage handling, etc.
- Connecting flight information for the passengers from the stations system
- Passagerer re-booking

- Ankomst og forbindelser (forsinkelser) vises på 'Airshow' kabine monitorer.
- Idividuelle beskeder til passagerer printes og leveres.

- 'Airshow' viser lufthavns layout, parking gate og gates for connecting flights.

Touchdown -> ACARS 'On Report'



Taxi in and Parking

Uplink of 'Crew Next Duty' og 'Next Crew List'

ATC Taxi instruction uplink.

Parking -> ACARS 'In Report'.

Groundstop

- ACMS, Inflight sales, lagerbeholdning download.
- Navigation updates, Electronic manuals update.
- Inflight entertainment system upload.

Telegrammer #1

**N173UA BOEING 747-422
UNITED AIRLINES UA0900
Using Ground Station V .Message No. F38A
Message Type H1 GENERAL MESSAGE
#M1BCURRENT POSITIONN57383E005332,RIR03,062444,370,SOS04,
062904,MIT05,M53,27834,549,85,/TS062444,2004060B60**

**N173UA BOEING 747-422
UNITED AIRLINES UA0900
Using Ground Station X Birmingham.Message No. D50A
Message Type H1 GENERAL MESSAGE
DIGITAL FLIGHT RECORDERE24C041730900 SAN FRANCISCO,
OAKLAND FRANKFURT, MAIN 0420060615ER
277847036997-19305599-2400
123708580375087304831200110114000123655805031130608-200410
015040100850012008500010077100420056
A6B4038CB00008000150C0000000000000**

Telegrammer #2

N173UA BOEING 747-422

UNITED AIRLINES UA0900

Using Ground Station X Birmingham.Message No. M13A

Message Type 5Z /71 SAN FRANSICO FRANKFURT

**0\VIDEO MONITOR ZONE DNEEDS TO BE ADJUST OERLINGHAUSEN WER
TO FIT SCREEN/71**

SAN FRANSICO FRANKFURT 6110015\NO COLD H2O LAV 105

G-EUPS

BRITISH AIRWAYS BA0762

Using Ground Station X Birmingham.Message No. M08A

Message Type 10 GENERAL FTX01. LONDON HEATHROW NCBA

THANKS. HE IS OKAY NOW SO NO ASSISTANCE REQUIRED.

**IF THERE IS A SYSTEM TO RECORD HIM AS A RUDE INDIVIDUAL IT
WOULD BE GOOD TO RECORD HIM. TKS.**

ACARS Frekvenser

Frequencies in Mhz

131.55	Primary Channel worldwide
129.125	Additional Channel for USA & Canada
130.025	Secondary Channel for USA & Canada
130.425	Additional Channel for USA
130.450	Additional Channel for USA & Canada
131.125	Additional Channel for USA
131.450	Primary Channel for Japan
131.475	Air Canada company Channel
131.525	European secondary Channel
131.725	Primary Channel in Europe
136.700	Additional Channel for USA
136.750	Additional Channel for USA
136.800	Additional Channel for USA
136.900	European Secondary Channel
136.925	No longer in use
136.850	SITA North America Channel
136.750	New European Channel
131.850	New European Channel

HF ACARS

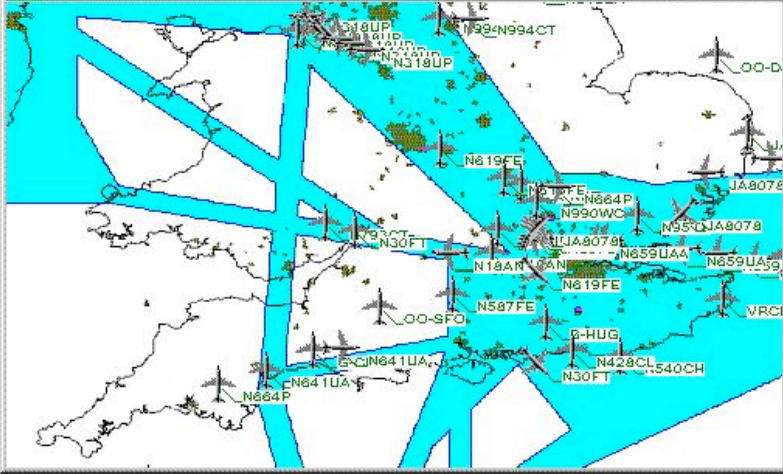
Auckland	5.583, 10.084, 13.352
Bahrain	8.885, 10.045, 11.312, 17.967, 21.982
Barrow	6.646, 8.936
Bolivia	11.318, 13.315, 21.997
California	4.672, 8.559, 10.081, 11.327, 13.276, 21.934
Guam	8.927, 11.306
Hat Yai	13.270, 17.928
Hawaii	8.912, 10.075, 11.312, 11.348, 17.936
Johannesburg	4.681, 8.834, 21.949
Krasnoyarsk	10.087, 13.321
New York	5.523, 8.912, 11.315, 13.275, 17.919, 21.934
Reykjavik	5.720, 6.712, 8.977, 11.184, 15.025
Shannon	5.547, 6.532, 8.843, 8.942, 11.384

Wacars decoder software #1

WACARS Version 0.5 Jan 24 1998

File Edit Search Options Window Help

Position Map



Aircraft Contacted

N785UA BOEING 777-222 Operating as UA0934 Last Contacted at
N789UA BOEING 777-222 Operating as UA0955 First Contacted at
N789UA BOEING 777-222 Operating as UA0955 Last Contacted at
N790UA BOEING 777-222 Operating as UA0907 First Contacted at
N790UA BOEING 777-222 Operating as UA0907 Last Contacted at
N790UA BOEING 777-222 Operating as UA0954 First Contacted at
N790UA BOEING 777-222 Operating as UA0954 Last Contacted at
N793CT Operating as GS0001 First Contacted at 07:05, on 29/
N793CT Operating as GS0001 Last Contacted at 07:06, on 29/
N795UA BOEING 777-222 Operating as UA0935 First Contacted at
N795UA BOEING 777-222 Operating as UA0935 Last Contacted at
N8067A AIRBUS A. 300B4-605R Operating as AA0109 First Contact
N8067A AIRBUS A. 300B4-605R Operating as AA0109 Last Contacte
N809DE DOUGLAS MD-11 Operating as DL0010 First Contacted at
N809DE DOUGLAS MD-11 Operating as DL0010 Last Contacted at

Flights Contacted

EL AL LY0008 in 4X-ELC First Contacted at 10:26, on 29/01/19
EL AL LY0008 in 4X-ELC Last Contacted at 10:45, on 29/01/199
EL AL LY0106 in 4X-ELB First Contacted at 10:13, on 29/01/199
EL AL LY0106 in 4X-ELB Last Contacted at 10:46, on 29/01/199
EMIRATES EK0001 in A6-EMJ First Contacted at 10:41, on 29/01
EMIRATES EK0001 in A6-EMJ Last Contacted at 11:08, on 29/01/
EMIRATES EK0002 in A6-EMJ First Contacted at 13:53, on 29/01
EMIRATES EK0002 in A6-EMJ Last Contacted at 14:05, on 29/01/
EMIRATES EK0008 in A6-EKH First Contacted at 11:04, on 29/01
EMIRATES EK0008 in A6-EKH Last Contacted at 11:13, on 29/01/
EVA AIRLINES BR EVA in N406EV First Contacted at 19:44, on 2
EVA AIRLINES BR0067 in N406EV First Contacted at 19:36, on 2
EVA AIRLINES BR0067 in N406EV Last Contacted at 19:38, on 29
EVA AIRLINES BREVA6 in N406EV First Contacted at 19:55, on 2
GENERAL EXPRESS EV0001 in N415EE First Contacted at 21:12

Raw Data Log

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D10AUA0976#DFB/PIREPUA.E22C256410976KJFKE'33_NMFFGMNKN</br>2)'-BXD0jNOY}N45IBF6INND6>3I<;'#MF2_MN4KBFLLO(10YLIVY_____  
i^U.[-"W%"<NAK>  
VHS<STX>  
1U5("12$$)B^]?6J*#R+*<DC3>+*)&X)$T<NAK>  
****<SUB>*<NAK>  
**J***VuU*ZiUUIM)*ZUUU<SYN><SYN><SOH>  
O.CS-TNE<NAK>  
Q08<STX>  
M96ATP0454<ETX>  
<NAK>  
<NAK>  
(~*)V[WUWjUW]}UU+^(TW[**Z
```

2901MESS.LOG

-----21:06:28-----
F-GFKG AIRBUS A.320-111
AIR FRANCE AF2271
Using Ground Station Q London Stansted
Message Type Q0 LINK TEST

-----21:06:39-----
N641UA BOEING 767-322ER
UNITED AIRLINES UA0976
Using Ground Station J Jersey
Message Type H1 GENERAL MESSAGE
#M1BCURRENT POSITIONN50442W002308,GIBSO,210712,273,BEWLI,211

-----21:06:47-----
G-CPER
BRITISH AIRWAYS BA2884
Using Ground Station W London Gatwick
Message Type 10 GENERAL
WEATHER REQUEST FOR PARIS-ONLY

Signal Strength CPU Load

Wacars decoder software #2

The screenshot displays the Wacars decoder software interface. The top window shows a list of aircraft with their call signs, frequencies, and operational status. The middle window shows a list of flight contacts with call signs, frequencies, and contact times. The bottom window shows an ATIS message log for flight JA8953.

Aircraft List:

- 6007 Operating as 2700FJ First Contacted at 16:00, on 17/04/2003
- 601G Operating as 5300OK First Contacted at 13:47, on 17/04/2003
- 98-MPD B747-400 26701/997 BJER [Gereban] Operating as 2700FJ First Contacted at 06:28, on 18/04/2003
- 98R2 Operating as 2700FJ First Contacted at 06:28, on 18/04/2003
- 98R2 Operating as MR001J First Contacted at 05:51, on 18/04/2003
- 99-SRB B777-212(ER) 28998/149 HSCJ Operating as S00982 First Contacted at 16:51, on 17/04/2003
- 99-SRB B777-212(ER) 28998/149 HSCJ Operating as S00982 Last Contacted at 17:08, on 17/04/2003
- 99-SRC B777-212(ER) 28999/150 JMLQ Operating as S00989 First Contacted at 12:17, on 17/04/2003
- 99-SRC B777-212(ER) 28999/150 JMLQ Operating as S00989 Last Contacted at 13:46, on 17/04/2003
- 99-SRE B777-212(ER) 28523/239 JPHN Operating as S00974 First Contacted at 16:51, on 17/04/2003
- 99-SRE B777-212(ER) 28523/239 JPHN Operating as S00974 Last Contacted at 17:08, on 17/04/2003
- 99-SRF B777-212(ER) 28521/330 FOEL Operating as S00985 First Contacted at 16:51, on 17/04/2003
- 99-SRI B777-212(ER) 30867/348 JQDH Operating as S00973 First Contacted at 16:51, on 17/04/2003
- 99-SRI B777-212(ER) 30867/348 JQDH Operating as S00973 Last Contacted at 17:08, on 17/04/2003
- 99-SRI B777-212(ER) 30867/348 JQDH Operating as S00986 First Contacted at 16:51, on 17/04/2003
- 99-SRI B777-212(ER) 30867/348 JQDH Operating as S00986 Last Contacted at 17:08, on 17/04/2003
- 99-SVE B777-312 28531/244 BERS Operating as S00998 First Contacted at 16:51, on 17/04/2003

Flights Contacted:

- 0619 in JA8953 First Contacted at 16:51, on 17/04/2003
- 0619 in JA8953 Last Contacted at 17:08, on 17/04/2003
- 0620 in JA8953 First Contacted at 18:26, on 17/04/2003
- 0620 in JA8953 Last Contacted at 18:40, on 17/04/2003
- 30000 in JA8985 First Contacted at 08:35, on 17/04/2003
- >IGGO in N3240P First Contacted at 13:26, on 17/04/2003
- >OGFH in N7860A First Contacted at 20:07, on 17/04/2003
- >OGFH in N7860A Last Contacted at 20:13, on 17/04/2003
- >OGQJ in Q1NHF First Contacted at 17:15, on 17/04/2003
- >OGON in N2090A First Contacted at 21:28, on 17/04/2003
- 3MNOK in JA609A First Contacted at 16:21, on 17/04/2003
- 3ONGH in JA8568 First Contacted at 13:12, on 17/04/2003
- 3ONGH in JA8568 Last Contacted at 13:46, on 17/04/2003
- 8OMGL in JA8264 First Contacted at 12:17, on 17/04/2003
- 8OIKN in HS-T First Contacted at 13:44, on 17/04/2003
- 8OIKN in HS-TRB First Contacted at 13:43, on 17/04/2003
- 8OIKN in HS-TRB Last Contacted at 13:43, on 17/04/2003

ATIS MESSAGE LOG:

-----07:43:12, 18/04/2003

JA8953 B737-400 24129/1763
HU001
Using Ground Station B North East Eng??? Message No 4311
Message Type H1 GENERAL MESSAGE TO/FROM TERMINAL
#DIGITAL FLIGHT RECORDER B PWTC630HD016A10
17224140
N25564E127349224110152 8287 7 124

Nyttige links

<http://www.sasflightops.com/>

Alt om ACARS i SAS og masser af info om systemet

<http://www.sasflightops.com/dlk/applicat.html>

'Interaktiv' takeoff-to-landing guide

<http://www.acarsd.org/>

Online decodere og PC-SW

<http://www.geocities.com/CapeCanaveral/Cockpit/9870/wacars/intro.html>

'Wacars', simpelt program til decodning fra lydkortet.

<http://www.acarsonline.co.uk/>

Google!!