

# ADS-B In-Trail Procedure

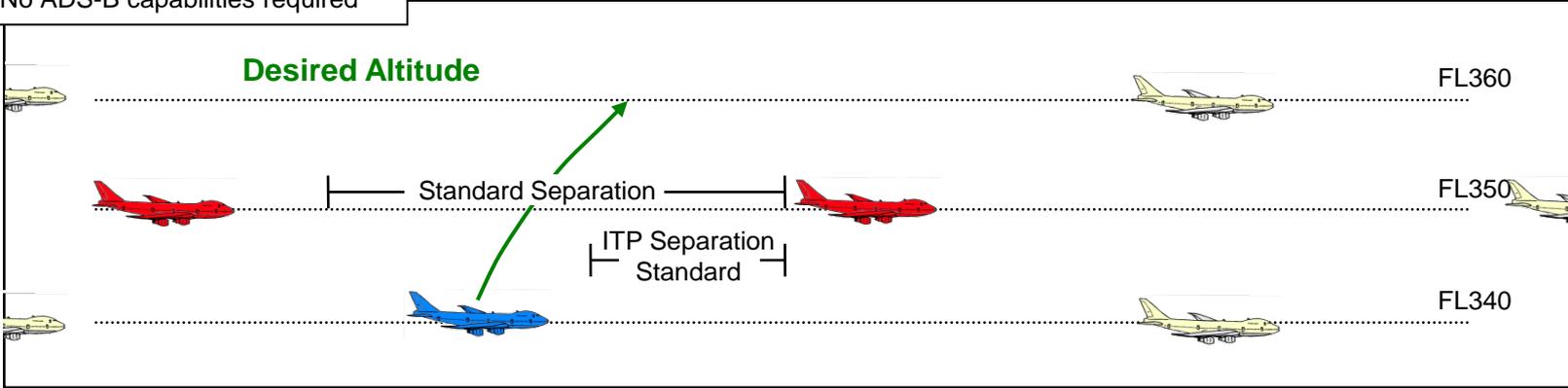
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Federal Aviation  
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# Motivation for ADS-B In-Trail Procedures

 ADS-B Transceiver and Onboard Decision Support System  
 ADS-B Out (required)  
 No ADS-B capabilities required



**NEED** → **CHALLENGE** = **OPPORTUNITIES**

→ Altitude Changes required for better fuel economy, winds, and ride quality

→ The combination of locally dense traffic and large separation minima can limit altitude changes

→ Use ADS-B ITP to enable altitude changes potentially blocked by current operations



# ADS-B ITP

- **Concept Summary**

- Maximum of two reference aircraft,  $\pm$  2000 feet altitude of ownship
- Aircraft can be any combination of ahead of or behind
- Can climb or descend; no less than 300 fpm in maneuver
- Initiate no closer than 15 NM with no more than 20 knots of closure or 20 NM with no more than 30 knots of closure
  - Note: initial operational trial limited to no closer than 18 nm
- Must maintain Mach number in climb
- Increased traffic situation awareness (can see traffic ~180 NM away)

- **ITP Aircraft High Level Requirements**

- ADS-B In with on board ITP decision support system + CPDLC

- **Reference or Target Aircraft High Level Requirements**

- Valid ADS-B-Out signal (generally met with any GPS-equipped ADS-B out aircraft)

# ADS-B ITP

## Side Mounted Display Flight Crew Interface

- ADS-B-In requires hardware, software and crew interface
- FAA partnered with United Airlines on a trial
- Electronic Flight Bag (EFB) solution chosen as a retrofit option



# ADS-B ITP - Flight Crew Interface "ITP Data" View



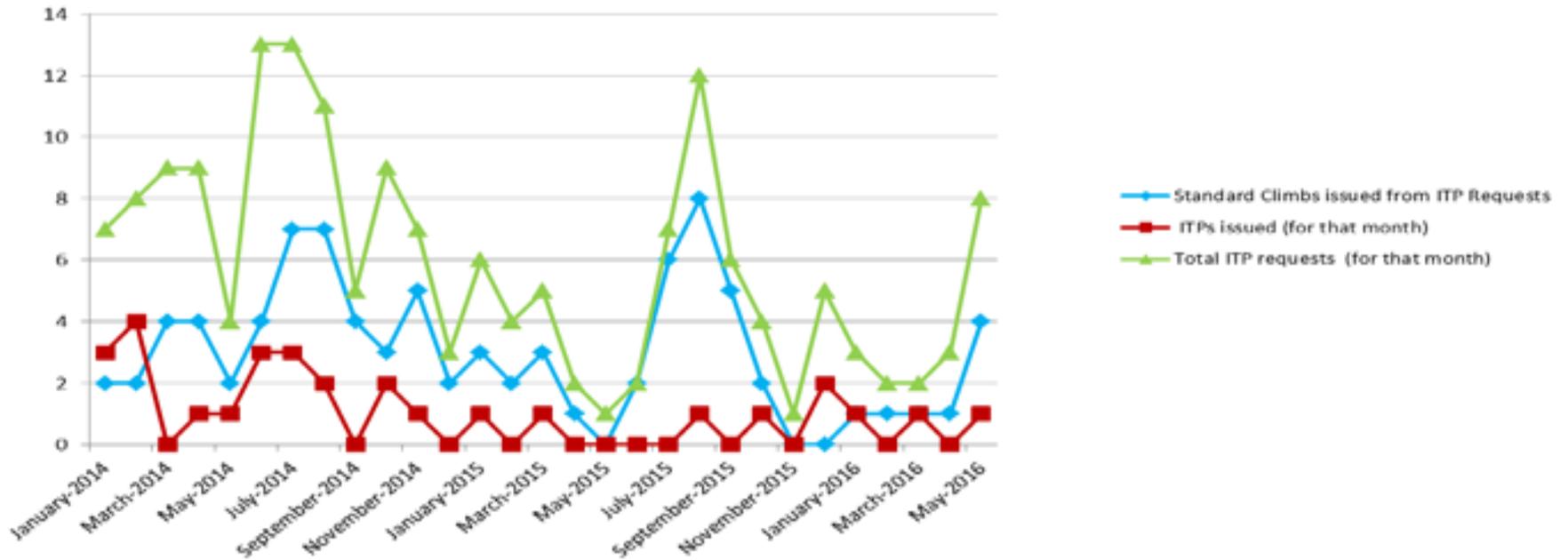
# ADS-B ITP Operational Evaluation

- **Operational Evaluation began on August 15, 2011**
  - Demonstration flight conducted using two United 747s operating in revenue service (UAL 863 and UAL 869)



- **Op Eval has been conducted for five years**
  - Data has been collected and analyzed during the operational evaluation
  - Data has been used to validate safety assumptions and gather data on operational performance and economic benefits

# Oakland Manual ITP Trial Activity



# FAA ADS-B ITP Automation Implementation

- Oakland began using the CDP procedure on June 6, 2016.
- Anchorage and New York are planning to begin use of the ITP before the end of the year after controller training is completed

# ATOP ITP request

**CLEARANCE**  
UAL838 44N160E 1052/ 47N170E 1143/ 49N180E 1228/ 50N170W 1308/ 49N160W 1348/ 47N150W 1432/ 44N140W 1525/ 41

Urgent	Rpt	Negot	Rspn	Misc	Vert	Route	Speed	X-ing	Conn	Pre-Fnt					
Free Text	CLIMB	Time	UNA	DSCND	Time	TFC	WX DEV	ARR	DEP	RBOR	WHEN	ETA	NDA	OTA	HOLD

20 CLIMB TO AND MAINTAIN (alt) F360 EOS

26 CLIMB TO REACH (alt) F360 BY (time) EOS

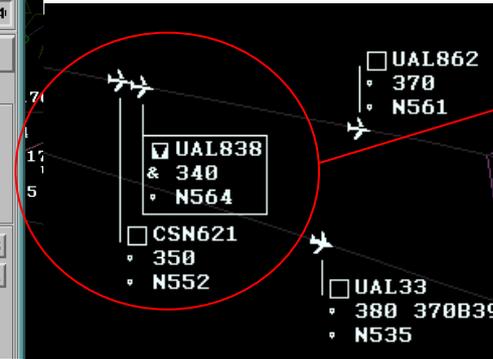
27 CLIMB TO REACH (alt) F360 BY (pos) EOS

(169) (free text) ITP AHEAD OF CSN621

(20) CLIMB TO AND MAINTAIN (alt) F360

DL : REQUEST CLIMB TO F360  
ITP 16NM AHEAD OF CSN621

ITP CAN TPRB SND UNBL VHF SAVE EALT DVRD COORD ACPT REJ HLP CLS



UAL 838 requesting ITP ahead of CSN621

**CLEARANCE**  
UAL838 44N160E 1052/ 47N170E 1143/ 49N180E 1228/ 50N170W 1308/ 49N160W 1348/ 47N150W 1432/ 44N140W 1525/ 41

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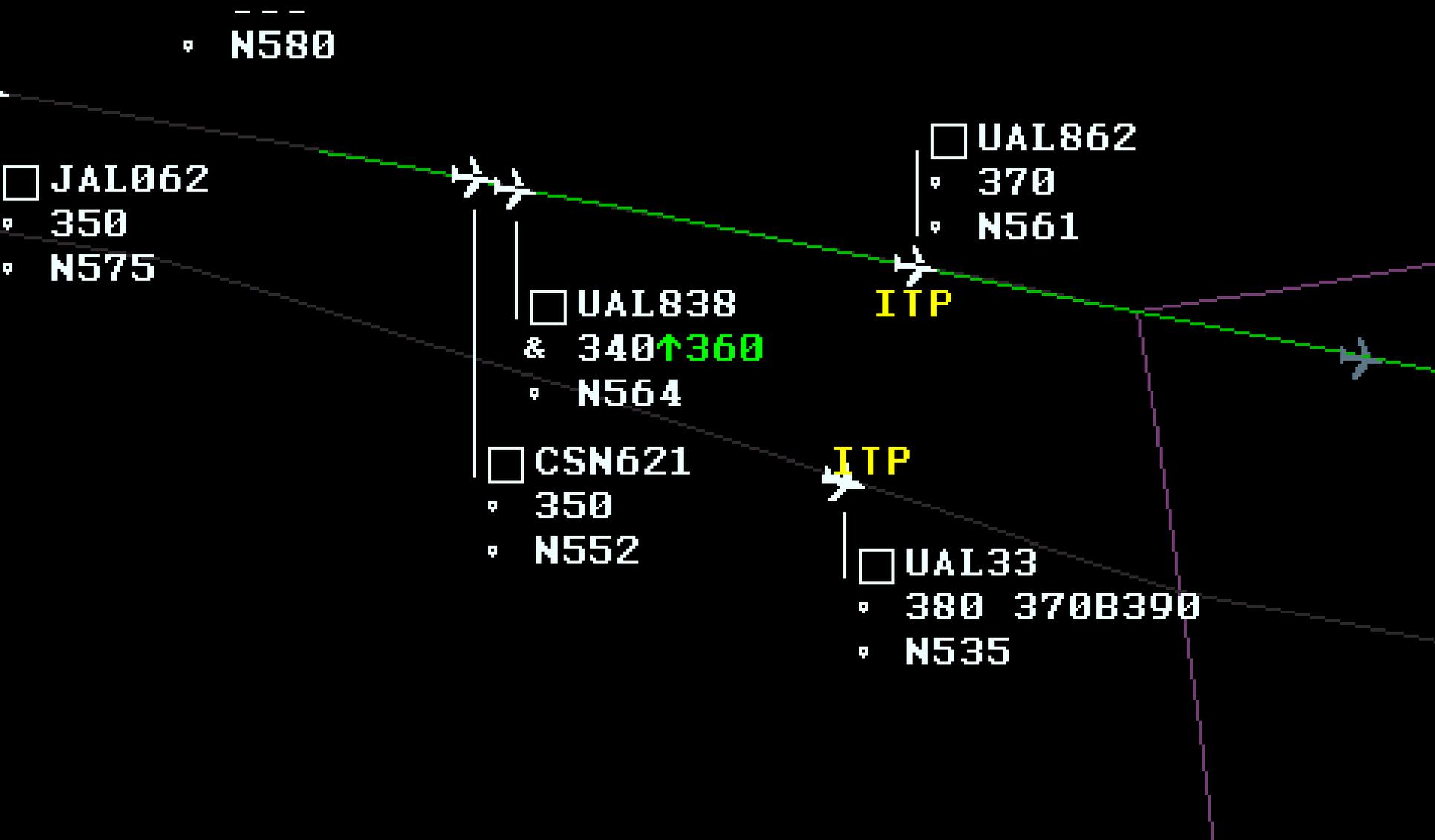
(169) (free text) ITP AHEAD OF CSN621

(20) CLIMB TO AND MAINTAIN (alt) F360

Probing : ITP AHEAD OF CSN621, CLIMB TO AND MAINTAIN F360  
[UAL838]: No procedural conflict found for flight plan

ITP CAN TPRB SND UNBL VHF SAVE EALT DVRD COORD ACPT REJ HLP CLS

# ATOP ITP Clearance



# Oakland Automated ITP Activity

- **Since the ADS-B ITP capability has been enabled in the ATOP system at Oakland, there have been a total of 10 ITP requests received. Two of the requests resulted in ITP clearances.**
- **Two of the 10 ITP requests were fulfilled using standard ATC separation.**
- **Four of the 9 requests received at Oakland were incorrectly formatted and were not able to be processed as ITP procedures.**
  - Now that the FAA has transitioned to using ATOP software to apply the procedure, it is critical that the ITP downlink request be correctly formatted.
- **One of the 10 ITP requests was overcame by events, before the ITP was processed, the reference aircraft changed altitude. The ITP aircraft was cleared to a lower altitude than the requested ITP climb.**
- **One of the 9 ITP requests was denied because the reference aircraft was assigned a block altitude and the reference aircraft was traffic at the target altitude.**



**Thank you**

**Comments?**

**Questions?**



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