

Session 3: Preparation for data link implementation (Operator)

GOLD / PBCS – Operational Approval (Compliance)

Presented to: Operational Data Link
Familiarization Seminar
(Nairobi, Kenya)

By: Tom Kraft
tom.kraft@faa.gov

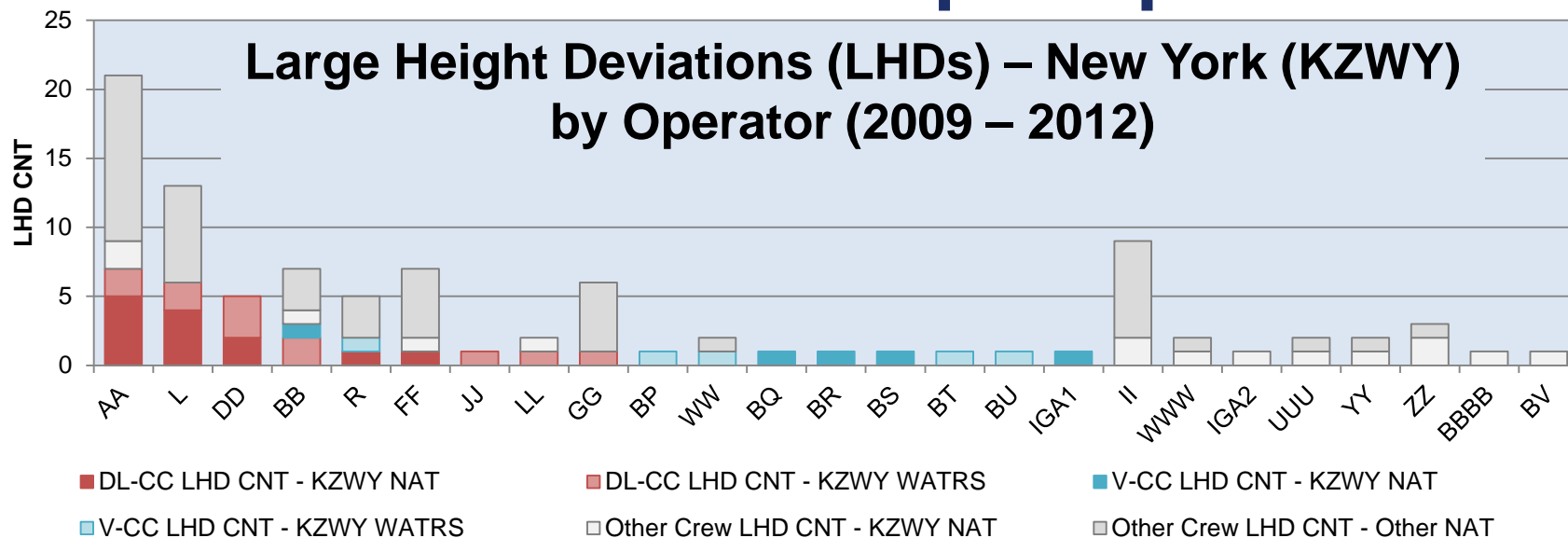
Date: 2-6 November 2015



**Federal Aviation
Administration**



Individual operator performance contributes to overall airspace performance



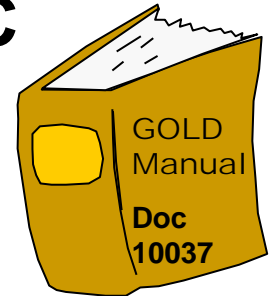
Operator	Count	%	Operator	Count	%	Operator	Count	%
AA	7,756	3.8%	BP	589	0.3%	WWW	772	0.4%
L	13,968	6.8%	WW	949	0.5%	IGA2	0	0.0%
DD	4,085	2.0%	BQ	799	0.4%	UUU	2,027	1.0%
BB	9,042	4.4%	BR	581	0.3%	YY	421	0.2%
R	16,220	7.8%	BS	0	0.0%	ZZ	2,064	1.0%
FF	6,924	3.3%	BT	4,238	2.0%	BBBB	243	0.1%
JJ	1,975	1.0%	BU	20	0.0%	BV	1,300	0.6%
LL	1,560	0.8%	IGA1	3	0.0%			
GG	3,028	1.5%	II	3,992	1.9%			

% of total flights
est. 2012 data

Overview

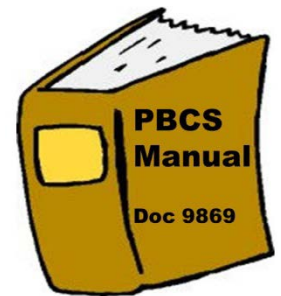
- **GOLD Manual (Doc 10037), CPDLC / ADS-C**

- Preparation and readiness
- Procedures – Controller and flight crew



- **PBCS Manual (Doc 9869), performance-based concept that provides global framework**

- For ANSP to prescribe criteria for communication and surveillance capabilities that are applicable to the air traffic operations in relevant airspace
- For appropriate parties (e.g. operator) to show that the different components of the system comply with prescribed criteria



Doc 9869, Appendix A, PBCS Implementation Plan – Checklist

- **Group A Tasks – State/Region preparation**
 - A-3 – Operator and Aircraft System – PBCS policies, objectives supporting safety oversight
- **Group D Tasks – Aircraft operator, aircraft type/system (airworthiness) eligibility**
 - D-1 – Aircraft operator readiness
 - D-2 – Confirm initial operator and/or aircraft type/system compliance with RCP/RSP specifications

Operator eligibility (Initial Compliance)

- **Operational approval with the State of Registry or State of the Operator**
 - Procedures (GOLD Manual, Chapter 4)
 - Flight crew training and qualification,
 - Aircraft maintenance,
 - Minimum Equipment List (MEL)
 - User modifiable software (e.g. ORT)
 - Service agreements with the CSP
 - Aircraft equipment approved for intended use

Operator eligibility

(Continued operational compliance)

- **Regional/State Data Link Monitoring Agencies**
 - Establish procedures for flight crew and operations staff to report problems
 - Provide contact information and participate in problem investigations



Flight plan

- **The ANSP needs to publish its policies, procedures or any special circumstances applicable in individual State and/or FIRs**
 - (e.g. Regional SUPPs, AIP and/or equivalent publication)
- **The operator needs to**
 - Ensure that the planned use of data link for the flight will be in accordance with appropriate aeronautical information publications
 - File the flight plan in accordance with ICAO Doc 4444, Appendix 2, and appropriate aeronautical information publications

PBCS Concept Overview

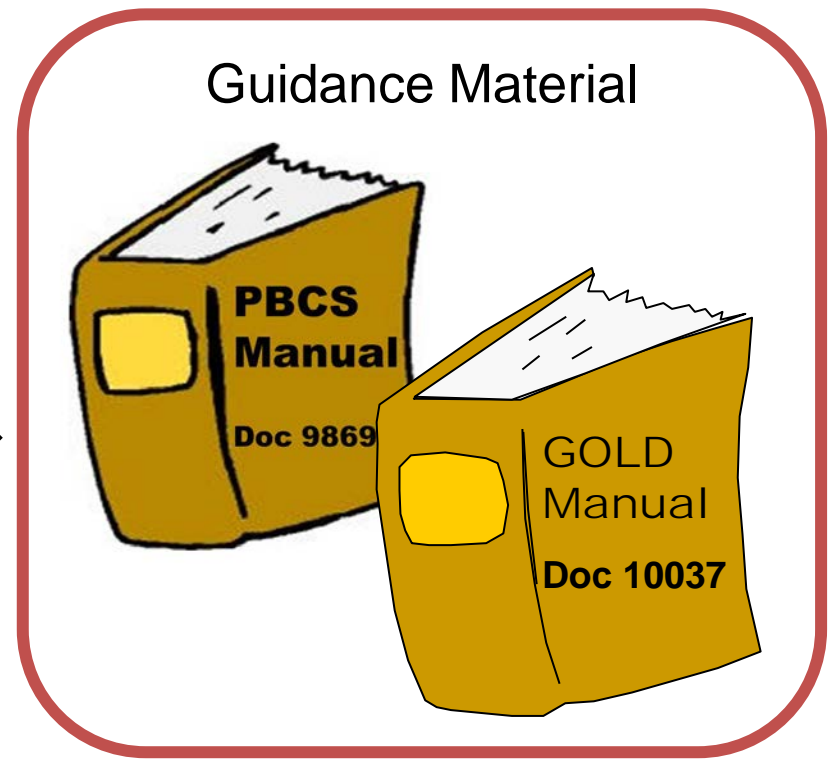
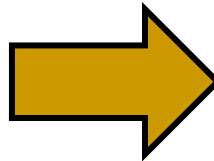
PBCS is a global concept for prescribing criteria for communication and surveillance systems and showing compliance

- **Annex provisions**

- Annex 6 – Aircraft Operations
- Annex 11 – Air Traffic Services
- Annex 15 – Aeronautical Information Service

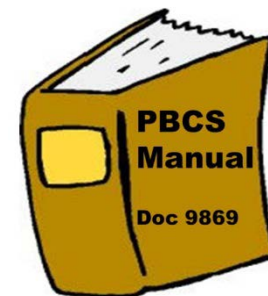
- **PANS provisions**

- PANS-ATM (Doc 4444)
- PANS-ABC (Doc 8400)



State Safety Oversight Framework

Means of compliance guidance → Doc 9869

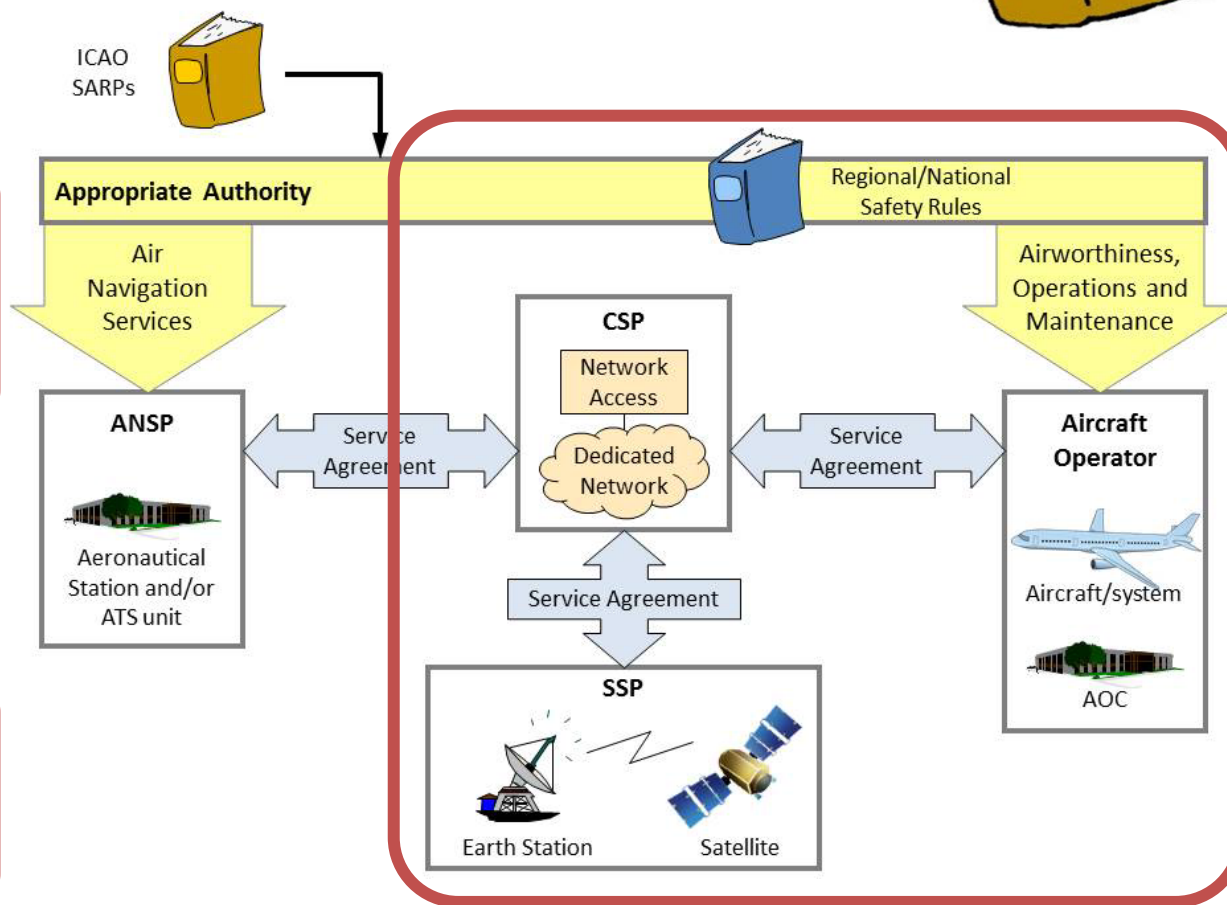


Initial approvals

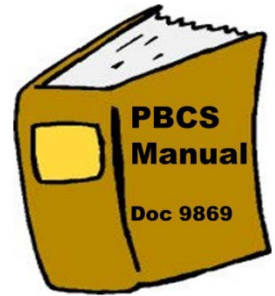
- ANSP
- Operator and aircraft system
- ANSP and Operator oversee CSP/SSP via service agreements

Post-implementation monitoring

- Component and sub-component analysis
- Change management
- Continuous improvement – corrective action

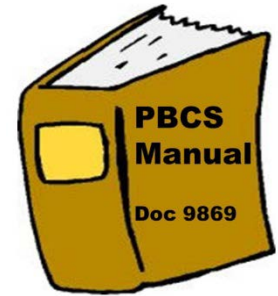


RCP-RSP Specifications

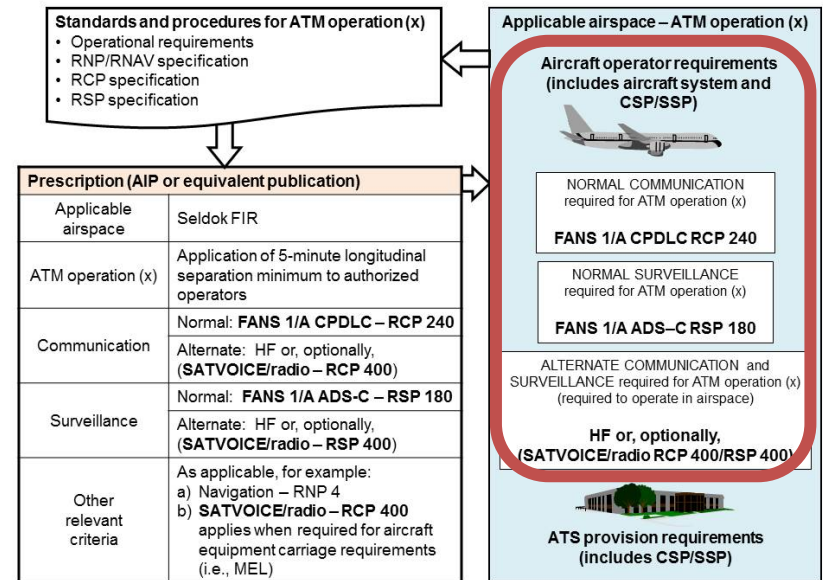


- **RCP-RSP specifications are applied to capability and provide functional, safety and performance criteria that are allocated to system components**
 - ANSP system
 - Aircraft system
 - CSP/SSP
 - Operator

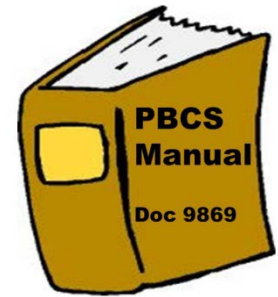
Prescribing RCP/RSP Specifications



- When prescribing the RCP/RSP specification in the AIP (or equivalent publication), the State should specify the following
 - Applicable airspace or specific routes
 - Specific ATM operations (e.g., 5-minute longitudinal separation minimum)
 - Associated with designator that defines the interoperability standards for the communication and surveillance capabilities
- Interoperability standards are identified in
 - GOLD Manual (Doc 10037) for CPDLC and ADS-C.
 - SVOM (Doc 10038) for SATVOICE. ...



Complying with RCP/RSP Specifications



- **Initial Compliance**

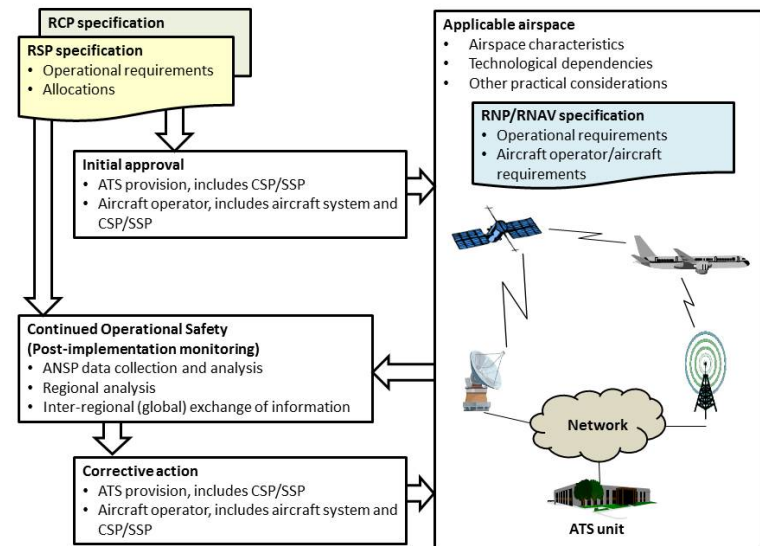
- ANSP, includes CSP/SSP
- Aircraft type/system
- Operator, includes CSP/SSP

- **Continued operational safety**

- ANSP data collection and analysis
- Regional analysis
- Inter-regional exchange of information

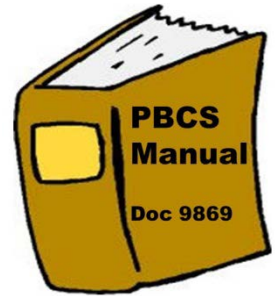
- **Corrective action**

- ANSP, includes CSP/SSP
- Operator, includes aircraft system and CSP/SSP



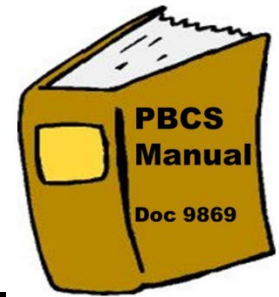
Associated with complying with interoperability standards

Initial Compliance – ANSP

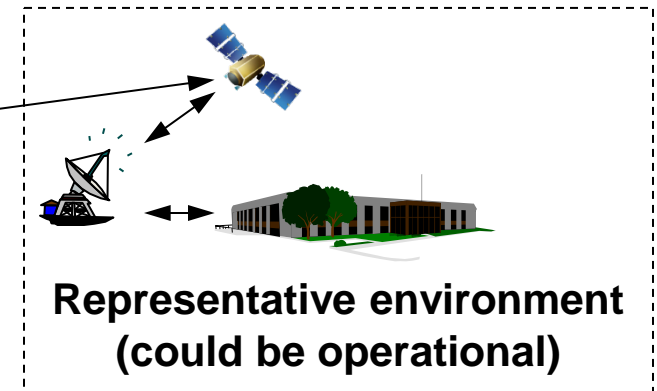


- **Consistent with State Safety Program,**
ANSP provides air navigation services in accordance with National regulations → ensures ATS system meets allocated criteria in interoperability standards and RCP – RSP specifications → specifies operator requirements in AIP
 - ATC system design and procedures
 - Controller and other ATS staff training/qualification
 - Service agreements with CSP(s)/SSP(s)
 - Operational trials
 - Notification of data link services, operator requirements, including aircraft equipage and flight plan requirements (e.g. P[n] codes)
 - Contingency and restoration of service procedures

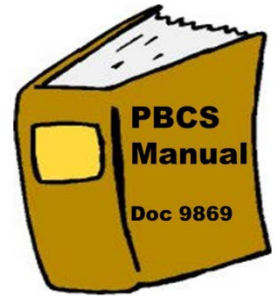
Initial Compliance – Aircraft/Avionics



- **Aircraft/avionics manufacturer obtains design approval in accordance with National regulations (State of Design and State of Manufacture); ensures avionics meet allocated criteria in interoperability standards and RCP – RSP specifications**
 - Aircraft/avionics manufacturer shows operational performance with a representative ATS system
 - Flight manual and master minimum equipment list (MMEL)
 - Compliance cannot be practically exhaustive

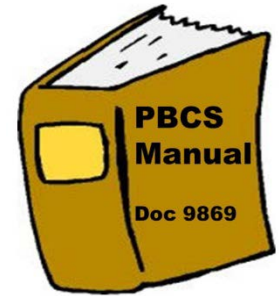


Initial Compliance – Operator (1 of 3)



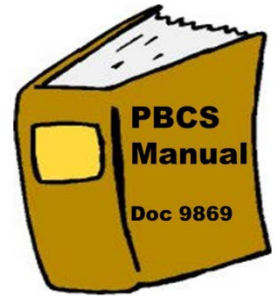
- **Operator obtains approval in accordance with National regulations (State of the Operator or State of Registry); ensures operations and maintenance programs ensure procedures, system and services meet allocated criteria in interoperability standards and RCP – RSP specifications**
 - Aircraft system approval for the intended use
 - Flight crew training and qualification
 - Minimum equipment list (MEL)
 - Maintenance, such as user modifiable software used to establish operator's policies for the management of communication media
 - Service agreements with the CSP(s)/SSP(s)
 - Procedures for submitting problem reports and data to the PBCS monitoring programme

Initial Compliance – Operator (2 of 3)



- **Operator demonstrates to State of the Operator or State of Registry acceptable RCP/RSP performance for the aircraft types/systems in its fleet in accordance with maintenance and operations specifications (e.g. configured avionics, CSP/SSP, area(s) of operation)**
 - Nominal continuity – ACP meets RCP 95% and ASP meets RSP 95%
 - Operational continuity – RCP ET (99.9%) and RSP OT (99.9%)
 - ACP – ASP affect how often ATC system/controller receives indication of no operational response to ATC instruction or overdue surveillance data reports, respectively
 - If ACP – ASP do not meet criteria, determine acceptability taking into account local environmental conditions and controller workload
 - Rule of thumb (operational judgment) — 99% or better – no action necessary; otherwise – contact regional PBCS monitoring programme, operator and/or CSP to determine any action to improve performance

Initial Compliance – Operator (3 of 3)



- **Corrective action notice**
 - If actual performance measurement indicates non-compliance, the **State of the Operator or State of Registry** provides operator notice of action to correct within a predetermined timeframe based on severity of the deficiency and magnitude of the solution
- **State of the Operator or State of Registry would remove the RCP [X] and/or RSP [Y] approval if non-compliance remains after the date indicated in the corrective action notice.**
 - The operator may still use CPDLC and ADS-C, but specified aircraft types within its fleet or individual airframe would not be eligible for any ATS service predicated on RCP [X] and/or RSP [Y], such as the application of a performance-based separation minimum

Benefits of Initial Compliance

- **Establishes confidence that ATM operations predicated on communication and surveillance capability and performance are provided only to eligible aircraft— BEFOREHAND**
 - Applicable to new or changed components introduced by ANSP, aircraft/avionics manufacturer, or Operator
 - New or changed CSP/SSP services are shared by ANSPs and operators via service agreements
- **Provides early detection of problems and resolution**
 - More cost-effective than waiting later using post-implementation PBCS monitoring, to find problems and fix them
- **Provides means to communicate among different States—Design, Manufacture, Registry and the Operator—“global” criteria for aircraft system approvals and operational approvals associated with airspace requirements in AIPs**

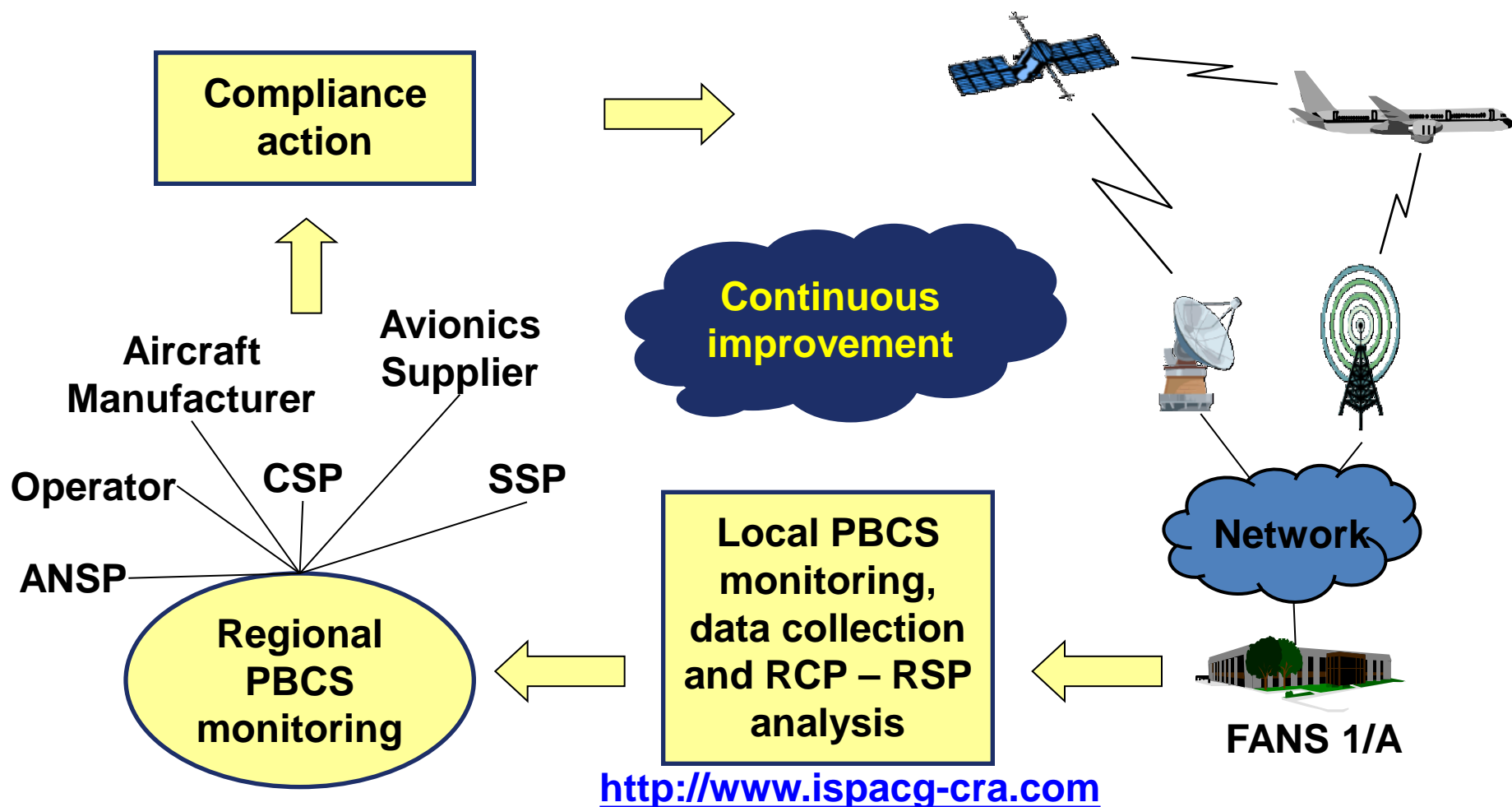


RCP/RSP is Filed With Interoperability

FPL Item 10 – Equipment and Capability	
Ltr	Equipment and capability
	Item 10A
J1	CPDLC ATN VDL Mode 2 (See Note 3)
J2	CPDLC FANS 1/A HFDL
J3	CPDLC FANS 1/A VDL Mode A
J4	CPDLC FANS 1/A VDL Mode 2
J5	CPDLC FANS 1/A SATCOM (INMARSAT)
J6	CPDLC FANS 1/A SATCOM (MTSAT)
J7	CPDLC FANS 1/A SATCOM (Iridium)
M1	SATVOICE-ATC-RTF SATCOM (INMARSAT)
M2	SATVOICE-ATC-RTF (MTSAT)
M3	SATVOICE-ATC-RTF (Iridium)
P1–P9	Reserved for RCP CPDLC RCP 400 (See Note 7)
P2	CPDLC RCP 240 (See Note 7)
P3	SATVOICE RCP 400 (See Note 7)
P4–P9	Reserved for RCP
	Item 10B
D1	ADS-C with FANS 1/A capabilities
...	
<i>Note 1.— The RSP specification(s), if applicable, will be listed in Item 18 following the indicator SUR/. ...</i>	

- **Eligible operator files RCP/RSP capabilities in accordance with regulations, policies and procedures in control areas for the flight**
 - as published by the appropriate States in AIPs (or equivalent publications)
- **RCP/RSP capabilities are inserted only when the descriptors J2 through J7 for CPDLC, M1 through M3 for SATVOICE, and/or D1 for ADS-C, are also inserted**
 - RCP/RSP capabilities denote performance
 - J2 through J7, M1 through M3 and D1 in item 10 denote the interoperability
- **Interoperability standards defined in**
 - GOLD Manual (Doc 10037) for CPDLC and ADS-C
 - SVOM (Doc 10038) for SATVOICE

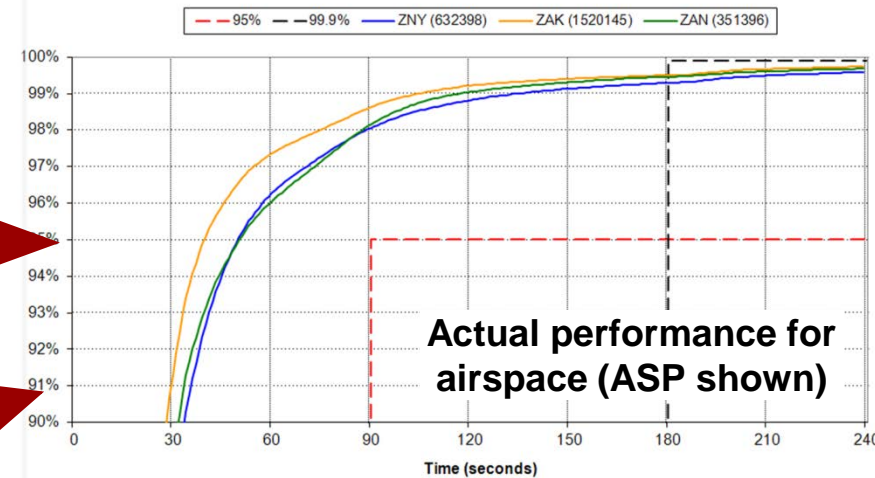
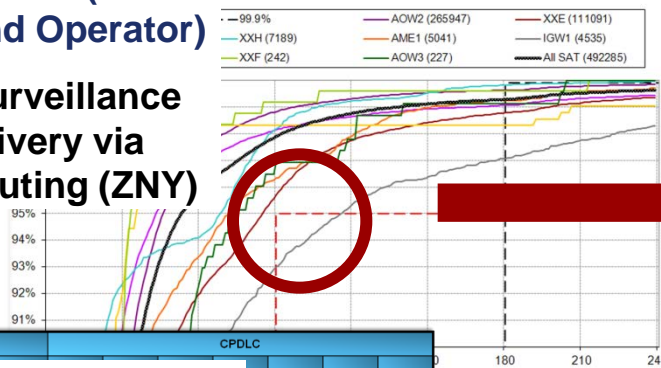
Continued Compliance – ANSPs and All



Managing Performance and Change

CSP agreements (shared by ANSP and Operator)

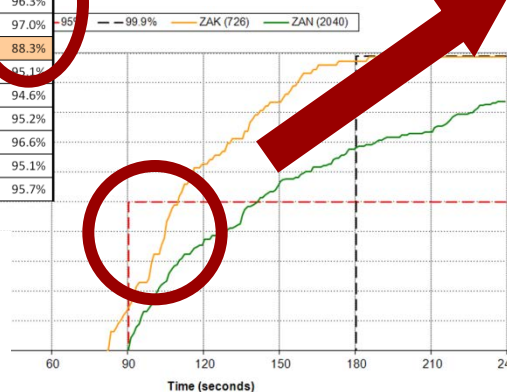
ASP for surveillance data delivery via different routing (ZNY)



Ope Cod	ADS-C				CPDLC			
	P	ACP	ACP	PORT	P	ACP	ACP	PORT
L	3%	97.5%	98.3%	91.8%	3%	97.5%	98.3%	91.8%
AA	3%	99.4%	99.5%	96.6%	3%	99.4%	99.5%	96.6%
BB	4%	99.0%	99.5%	96.3%	4%	99.0%	99.5%	96.3%
FF	3%	98.6%	99.5%	97.0%	3%	98.6%	99.5%	97.0%
DD	5%	97.0%	97.2%	88.3%	5%	97.0%	97.2%	88.3%
A	7%	98.0%	98.7%	95.1%	7%	98.0%	98.7%	95.1%
EE	28,884	4.6%	98.1%	98.5%	1,379	4.9%	99.4%	99.4%
GG	27,607	4.4%	98.8%	99.7%	1,860	4.6%	99.3%	99.5%
R	24,279	3.8%	96.9%	99.7%	1,148	2.9%	99.6%	99.8%
JJ	24,022	3.8%	99.6%	99.9%	862	2.1%	100%	99.4%
HH	23,153	3.7%	99.0%	99.1%	1,136	2.8%	99.9%	99.2%

Operator or aircraft system approval

ASP for an aircraft type (ZAK and ZAN)



These problems do not help aggregate performance for airspace

Benefits of Continued Compliance

PBCS Monitoring

- **Ensures actual system performance is maintained in accordance with RCP – RSP specifications**
 - Actual communication performance is measured against RCP specifications
 - Actual surveillance performance is measured against RSP specifications
- **Provides effective way to improve system performance**
 - Analysis tools can be and are shared (e.g. G-PAT)
 - Local results can be exchanged regionally and globally

