

AERONAUTICAL TELECOMMUNICATION NETWORK PANEL
WORKING GROUP THREE

Alexandria, Virginia USA

7-18 October 1996

IATA RECOMMENDATION
ON BACKWARD COMPATIBILITY

PROPOSAL

Provided requirements can be stated by the ADS Panel, and SARPs written and validated by the ATN Panel before the proposed late February 1997 ATNP Working Group of the Whole meeting, IATA recommends that:

- A single application be created for ADS wherein version 0 is the exact equivalent of the currently operational FANS-1/A ADS, and version 1 is the proposed CNS/ATM-1 ADS (i.e FANS-1/A ADS is subsumed into CNS/ATM-1 ADS),
- A single application be created for CPDLC wherein version 0 is the exact equivalent of the currently operational FANS-1/A CPDLC, and the proposed CNS/ATM-1 CPDLC is version 1 (i.e.FANS-1/A CPDLC is subsumed into CNS/ATM-1 CPDLC),
- The ATN Panel, WG3 agree to work on the enhanced ADS and CPDLC “single application - dual version” SARPs subject to ADS Panel Working Group endorsement at their 13-31 January 1997 Atlanta meetings, and
- Either the DUAL STACK WITH STATE GATEWAY (2.a) or DUAL STACK WITH SERVICE PROVIDER GATEWAY (2.b) migration or transition scenario be adopted by ICAO.

If the late February 1997 date cannot be met, IATA recommends that the DUAL STACK (2) migration or transition scenario be adopted by ICAO.

BACKGROUND

The ATNP WG3 report from the Toulouse meeting in March 1995 included the following information:

3.2.3.1 ADS Contract Establishment and Position Reporting

1. Mr. Murphy presented status of the ADS SARPs. The SARPs are not ready for WG3 review. Mr. van Roosbroek presented WP 2-11, the ADS SARPs,
2. Operational requirements work is still required by ADSP. It was noted that North Atlantic Unified Trials (NUT) do not fully validate ADS, and
3. The meeting agreed that the basis of ADS SARPs development is the ADSP/3 work, not RTCA DO-212, change 1. The meeting was informed by Mr. Hennig that there is no International Air Transport Association (IATA) requirement for backwards compatibility in CNS/ATM-1 applications.

DISCUSSION

The second sentence in 3.2.3.1-3 above was based on the rationale that FANS-1/A states had committed to "dual stacks" whenever and wherever CNS/ATM-1 implementations occur. It was also based on the rationale that a CNS/ATM-1 state also had an option to use a service provider application/communication gateway to bridge the FANS-1/A airplane to the CNS/ATM-1 ground system. Since Toulouse, concerns about the latter option have been raised by state certification authorities, as well as by controllers and pilots. The concerns regarding a service provider application/communication gateway are in three areas:

- Feasibility,
- Certifiability, and
- Acceptance

FEASIBILITY

Can all the FANS-1/A ADS and CPDLC application functionalities and message constructs be adequately transformed into equivalent CNS/ATM-1 functionalities and message constructs, and vice versa? The answer is unknown, as no one has done a complete study, nor prepared a complete proposal.

CERTIFIABILITY

Will all states certify a system wherein a service provider application/communication gateway terminates the FANS-1/A application cyclic redundancy check (CRC) in favor of the ATN transport CHECKSUM, or is the origin of the application cyclic redundancy check (CRC) when the originating end system is an ATN application using the transport CHECKSUM? The answer is unknown.

ACCEPTANCE

Can states (and controllers) agree on and accept a single service provider application/communication gateway specification? The answer is unknown, but it is thought to be necessary for safety reasons. Can the ARINC Airlines Electronic Engineering Committee (AEEC) undertake to specify an AEEC characteristic covering a single service provider application/communication gateway for pilots? This question will be presented at the AEEC general session in Phoenix on 21-25 October 1996.

CONCLUSION

Attached is the draft IATA Datalink Task Force final report appendix (planned for recommendation to, and adoption by the IATA Flight Operations Committee at their meeting on 10-12 December 1996). The ATNP WG3 is invited to consider the material and offer suggestions on completeness and accuracy.

RECOMMENDATION

Provided requirements can be stated by the ADS Panel, and SARPs written and validated by the ATN Panel before the proposed late February 1997 ATNP Working Group of the Whole meeting, IATA recommends that:

- A single application be created for ADS wherein version 0 is the exact equivalent of the currently operational FANS-1/A ADS, and version 1 is the proposed CNS/ATM-1 ADS (i.e FANS-1/A ADS is subsumed into CNS/ATM-1 ADS),
- A single application be created for CPDLC wherein version 0 is the exact equivalent of the currently operational FANS-1/A CPDLC, and the proposed CNS/ATM-1 CPDLC is version 1 (i.e.FANS-1/A CPDLC is subsumed into CNS/ATM-1 CPDLC),
- The ATN Panel, WG3 agree to work on the enhanced ADS and CPDLC “single application - dual version” SARPs subject to ADS Panel Working Group endorsement at their 13-31 January 1997 Atlanta meetings, and
- Either the DUAL STACK WITH STATE GATEWAY (2.a) or DUAL STACK WITH SERVICE PROVIDER GATEWAY (2.b) migration or transition scenario be adopted by ICAO.

If the late February 1997 date cannot be met, IATA recommends that the DUAL STACK (2) migration or transition scenario be adopted by ICAO.

NOTE. If a service provider application/communication gateway is feasible (the various application anomalies can be reconciled and agreed to), and states are willing to certify such an application/communication gateway (FANS-1/A CRCs vs ATN transport CHECKSUMs), and the controller human-computer interfaces to/from such an application/communication gateway are acceptable, then any state has the option to use the service provider application/communication gateway instead of implementing the dual stack.

APPENDIX E: FANS-1/A MIGRATION or TRANSITION TO CNS/ATM-1
Version 0.2 dated 4 October 1996

Version 0.1 distributed as paul.zip on 20 SEP 96 to ATNSI/CAMCOM & IATA/FOC/DLTF
Version 0.2 distributed as paul1.zip on 4 OCT 96 to same addressees (no red line/strike out)

Material in this appendix explains the issue of migration or transition from the FANS-1/A aircraft and corresponding FANS-1/A state ground automation, to the CNS/ATM-1 airplanes and corresponding CNS/ATM-1 state ground automation. The migration or transition approach recommended by the IATA Flight Operations Committee, Datalink Task Force also appears in the main body of this report.

TERMINOLOGY

FANS-1/A When used by itself, or in combination with aircraft (i.e., FANS-1/A aircraft) or states (i.e., FANS-1/A state), it means the CURRENT (i.e., 1996) operational implementation of the Boeing FANS-1 ATS System Requirements and Objectives (SR&O) in the Asia/Pacific region.

CNS/ATM-1 When used by itself, or in combination with aircraft (i.e., CNS/ATM-1 aircraft) or states (i.e., CNS/ATM-1 state), it means the first operational implementation of the ATN Panel SARPs adopted at the ICAO ATNP/2 meeting 4-15 November 1996.

BACKGROUND

Beginning in 1995, Boeing offered a software upgrade to its 747-400 flight management system which implemented two ATC bit oriented applications over the existing ACARS character oriented datalink infrastructure. Specifically, the Boeing system requirements and objectives (SR&O) began with the AEEC 745 definition of automatic dependent surveillance (ADS) and the RTCA DO219 definition of controller pilot datalink communication (CPDLC), enhanced them due to operational requirements, added the AEEC 622 mechanism to allow bit oriented application data to be transmitted over a character oriented (i.e., ACARS) datalink infrastructure and the AEEC 623 applications for addressing and notification, and certified the package as FANS-1.

NOTE. FANS-A is the proposed Airbus version of the Boeing FANS-1 package, hence the FANS-1/A acronym to describe this total class of aircraft and ground automation. FANS-1 states, mostly in the South Pacific, and some 200 747-400 FANS-1 airplanes are operational in the Summer of 1996. The use of FANS-1/A is expected to expand over the next several years into other regions and different aircraft types.

In the Fall of 1996, the ICAO ATN Panel adopted standards and recommended practices (SARPs) for the CNS/ATM-1 package. These CNS/ATM-1 SARPs consist of four ATN air/ground applications (ADS, CPDLC, context management "CM" and flight information services/automatic terminal information service "FIS/ATIS"), two ATN ground/ground applications (ATS message handling services "ATSMHS" and inter-centre communication/ATS interfacility data communication "ICC/AIDC"), ATN upper layer communication services and ATN internet communication services. CNS/ATM-1 initial operating capability in the North Atlantic is expected in the 4Q99 timeframe with an operational evaluation scheduled during 2Q99.

The code and byte independent ATN upper layer and internet communication services replace the character oriented ACARS infrastructure. The CNS/ATM-1 ADS and CPDLC applications are significantly different from the FANS-1/A ADS and CPDLC applications.

ISSUE

“How will FANS-1/A airplanes be accommodated in CNS/ATM-1 airspace (i.e., airspace controlled by states using the ATN CNS/ATM-1 implementation), and how will airplanes implementing CNS/ATM-1 operate in FANS-1/A airspace (i.e., airspace controlled by states using the existing ACARS FANS-1/A implementation). Since the future air navigation system (FANS) is intended to be a global seamless system, a migration or transition strategy must be defined for both the aircraft and the states which have implemented FANS-1/A.”

NOTE. There is no issue about whether or not IATA airlines intend to implement the CNS/ATM-1 package. CNS/ATM-1 is superior to FANS-1/A in that it is standardized by ICAO, is based on internationally standardized ISO/OSI protocols, has significantly higher integrity and reliability capabilities, and is required for free flight.

MIGRATION/TRANSITION

The following is a set of migration or transition scenarios with discussion of the pros, cons and certification issues, followed by a summary matrix of the pros, cons and certification issues, and concluded with an IATA recommendation. Scenarios and sub-scenarios are not presented in any particular order. Migration or transition from FANS-1/A to CNS/ATM-1 involves both automation (computer applications & the underlying communications infrastructure), as well as crew and ATC controller interfaces. All must be considered when selecting a preferred migration or transition path. Migration or transition from one to the other is an issue for both aircraft systems and crews, as well as for ground based state systems and controllers.

ASSUMPTIONS

There are FANS-1/A geographical regions (e.g., South Pacific, Asia Pacific, etc.) where some number of FANS-1/A aircraft and some number of states equipped with the FANS-1/A air traffic control environment are operational with the FANS-1/A ADS and CPDLC applications over the ARINC 622 ACARS infrastructure.

There is at least one new region (e.g., North Atlantic) where some number of states intend to implement the CNS/ATM-1 ADS and CPDLC applications over the ATN infrastructure, and some number of aircraft plan to equip with CNS/ATM-1 compliant avionics. The ICAO North Atlantic Unified Trials (e.g., ADS Europe, AVPAC/DUTCH Initiative, etc.) are conducting ongoing pre-operational trials using data-3 SATCOM equipped aircraft and a partial CNS/ATM-1 compliant application set.

International network service providers (e.g., Air Canada, ARINC, AVICOM, SITA, etc.) will deploy CNS/ATM-1 ATN subnetwork infrastructure capabilities (satellite data-3, VHF data radios, etc.) as needed or desired by airlines. International network service providers will develop and deploy application/communication gateway products as needed or desired by airlines.

An instantaneous cutover from the current FANS-1/A environment to CNS/ATM-1 is not considered possible. It is felt that a significant time overlap will be required to completely phase out older systems. Sunset clauses may be considered in the future and enacted because system upgrades will occur, and it is not always possible to be backwards compatible to all old versions of automation. Any migration or transition must assume there is always some mixture of both old and new in all regions of the world.

The issue is how will FANS-1/A airplanes be accommodated in CNS/ATM-1 airspace, and how will CNS/ATM-1 airplanes operate in FANS-1/A airspace, (or) how can industry agree on a common implementation.

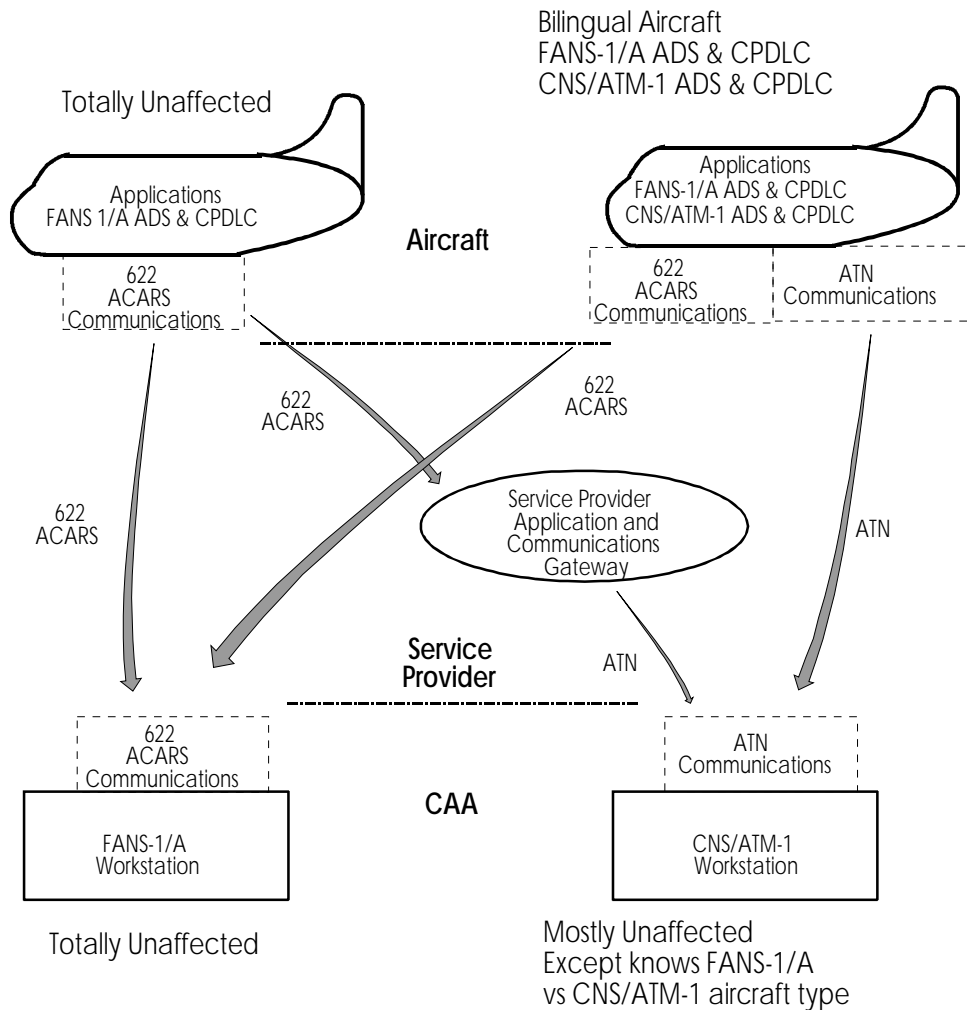
There are three basic high-level migration/transition scenarios with three sub-scenarios as follows:

1. **BILINGUAL SCENARIO (prime)**
 - 1.a *BILINGUAL "SINGLE APPLICATION" SUB-SCENARIO (second)*

2. **DUAL STACK SCENARIO**
 - 2.a *DUAL STACK "CAA SINGLE APPLICATION GATEWAY" SUB-SCENARIO*
 - 2.b *DUAL STACK "SERVICE PROVIDER SINGLE APPLICATION GATEWAY"*

3. **ONE SPECIFICATION SCENARIO**

1. BILINGUAL SCENARIO (prime)



Bilingual Prime Scenario

- All FANS-1/A aircraft and crews are unaffected,
- All FANS-1/A states are unaffected,
- A service provider application/communication gateway is used to bridge the FANS-1/A aircraft and CNS/ATM-1 states,
- All CNS/ATM-1 aircraft are bilingual (i.e., they either speak FANS-1/A ADS & CPDLC over ACARS, or CNS/ATM-1 ADS & CPDLC over ATN depending on the airspace provider's capability), however the CNS/ATM-1 crews are mostly unaware of the differences, and
- All CNS/ATM-1 states are mostly unaffected (except for FANS-1/A application gateway differences, and controllers know that airplanes under their control are either FANS-1/A or CNS/ATM-1).

All CNS/ATM-1 aircraft expected to operate outside of CNS/ATM-1 airspace are equipped with both the FANS-1/A and the CNS/ATM-1 application versions of ADS and CPDLC, and the corresponding ARINC 622 ACARS and ATN datalink infrastructures.

The CNS/ATM-1 aircraft crew interface has the same general look and feel regardless of which application/infrastructure (FANS-1/A or CNS/ATM-1) is in use, however some differences will exist.

When operating in CNS/ATM-1 airspace, FANS-1/A crews are unaware of differences.

FANS-1/A aircraft, operating in CNS/ATM-1 airspace, interface to CNS/ATM-1 ground based systems through international network service provider application/communication gateways. These gateways convert the ACARS infrastructure to ATN, and the FANS-1/A ADS & CPDLC application data to CNS/ATM-1 ADS & CPDLC application data, and vice versa.

PROS

- Airlines (with their service providers) are in control,
- FANS-1/A (aircraft & states) investments are protected,
- CNS/ATM-1 states are unaffected (except for gateway certification and acceptance).

CONS

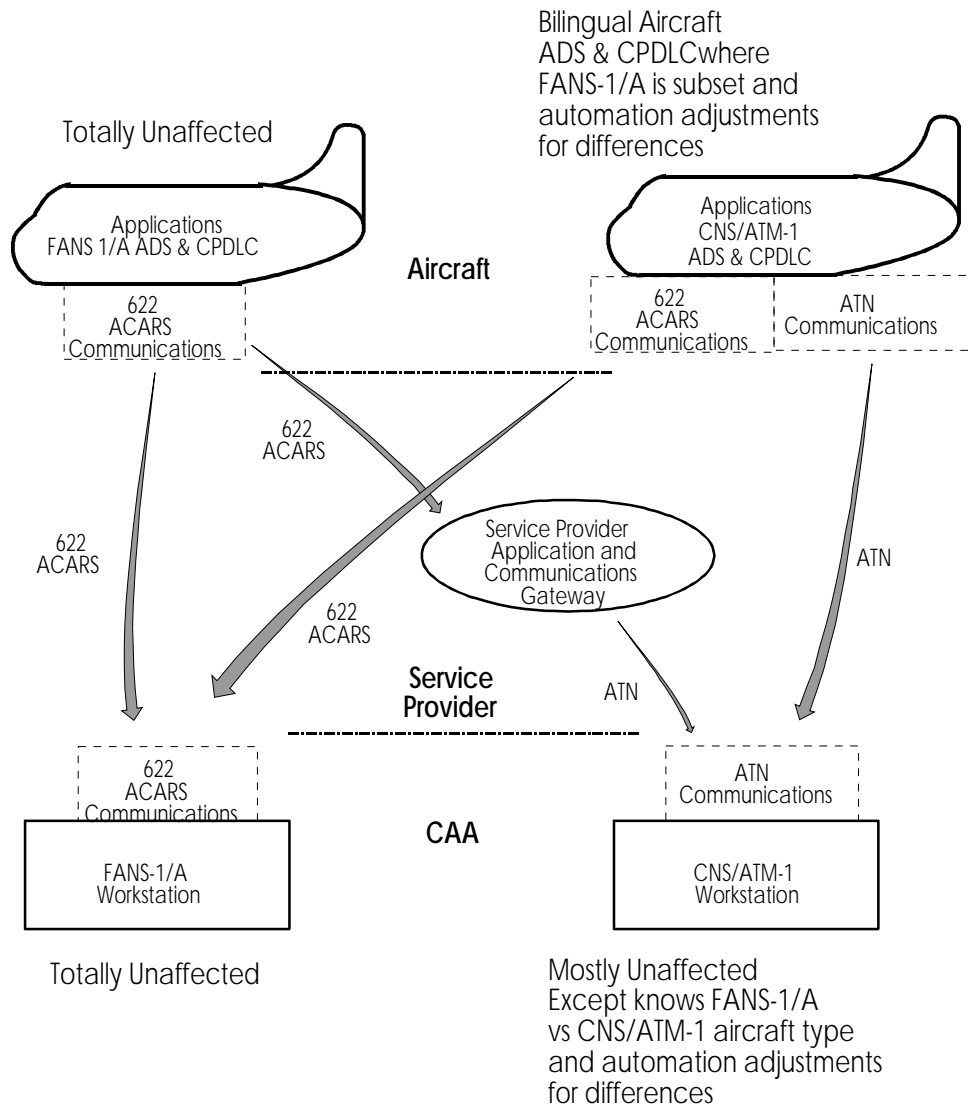
- Costs to implement and maintain dual CNS/ATM-1 avionics systems are significant,
- Burden of transition is wholly on CNS/ATM-1 aircraft,
- Crew training on bilingual systems is onerous, and
- Certification of the gateway is in question.

CERTIFICATION

- Certification of such a system using this gateway is thought to be an issue as the FANS-1/A application cyclic redundancy check (CRC) is replaced by the ATN transport CHECKSUM at the service provider (e.g., Air Canada, ARINC, AVICOM, SITA, etc.) interface, and the FANS-1/A ADS & CPDLC application data is transformed.

1.a **BILINGUAL “SINGLE APPLICATION” SUB-SCENARIO (second)**

Same as Bilingual Prime Scenario except for CNS/ATM-1 airplane, Service Provider Gateway and CNS/ATM-1 state; also message sets harmonized



Bilingual Second Scenario

A subset of the BILINGUAL SCENARIO (prime), except the bilingual CNS/ATM-1 airplane uses “single application - dual version” applications for ADS and CPDLC:

- FANS-1/A aircraft (same as bilingual prime),
- FANS-1/A states (same as bilingual prime),
- The service provider communication gateway does not have to worry about application bridging,
- CNS/ATM-1 aircraft do not have to worry about architecting the same general look and feel because it is accomplished in the single ADS and CPDLC applications, and
- CNS/ATM-1 states are less affected because the FANS-1/A application gateway differences are rolled into the state single ADS and CPDLC applications.

PROS (same as bilingual prime, except)

- *Gateway is simplified, and*
- *Less aircraft, crew training and certification costs.*

CONS (same as bilingual prime, except)

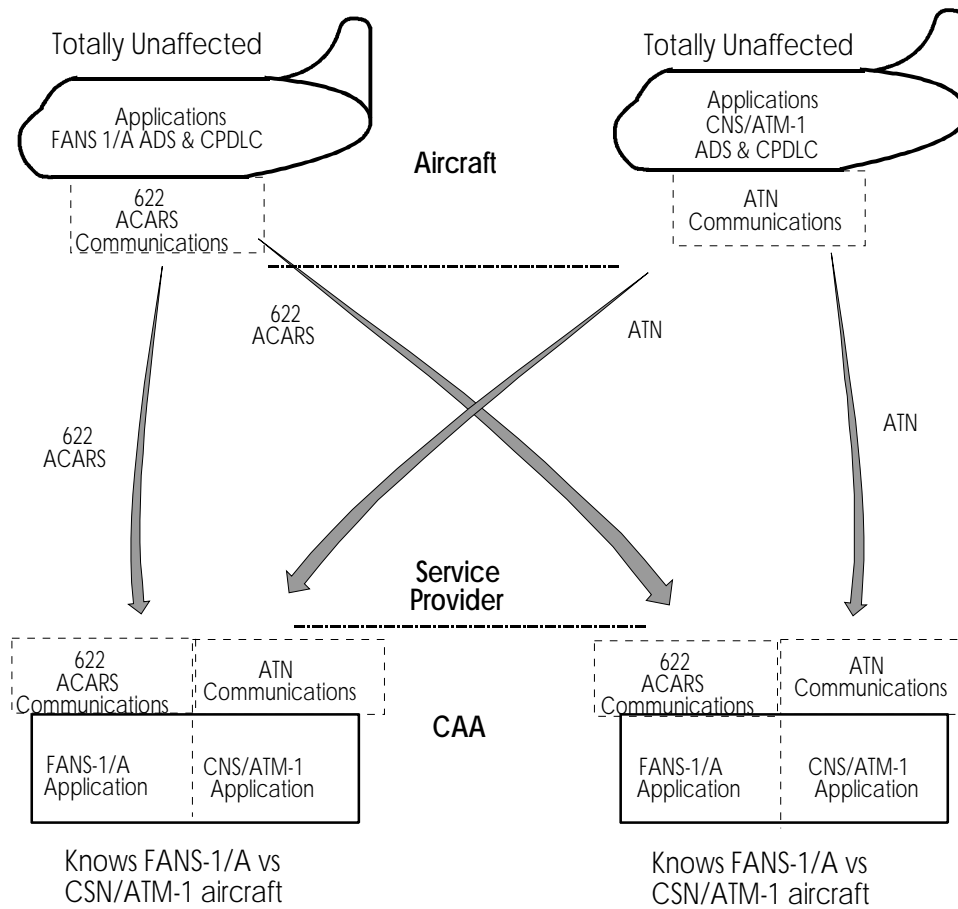
- *Requires the ICAO ADS Panel to endorse the “backwards compatibility” requirement, and the ATN Panel to change ADS & CPDLC SARPs accordingly.*

CERTIFICATION

- *Certification of such a system using this gateway is less of an issue as the FANS-1/A application cyclic redundancy check (CRC) is part of the ADS and CPDLC “single application - dual version” SARPs, and FANS-1/A ADS & CPDLC application data is not transformed.*

NOTE. Another spin on this sub-scenario is that the single, common application version of ADS and CPDLC be the existing FANS-1/A version (i.e., ADS and ATN panels revert SARPs back to the Boeing SR&O specification). This is thought to be infeasible due to political realities, operational safety issues, etc., and is not explored further.

2. DUAL STACK SCENARIO



Dual Stack Scenario

- All FANS-1/A aircraft and crews are unaffected,
- All FANS-1/A states must implement the CNS/ATM-1 second stack (applications and infrastructure),
- There is no service provider gateway,
- All CNS/ATM-1 aircraft and crews are unaffected, and
- All CNS/ATM-1 states must implement the FANS-1/A second stack (applications and infrastructure).

All airspace provider ground systems support both the FANS-1/A and CNS/ATM-1 application versions of ADS and CPDLC, and the corresponding ACARS and ATN infrastructures. This is known as the "dual stack" approach.

All controller interfaces have the same general look and feel regardless of which application/infrastructure (FANS-1/A or CNS/ATM-1) is in use, however, some differences will exist, and controllers know that airplanes under their control are either FANS-1/A or CNS/ATM-1.

PROS

- FANS-1/A aircraft investments are protected,

- CNS/ATM-1 aircraft investments are minimized, and
- Burden of transition is not on CNS/ATM-1 aircraft.

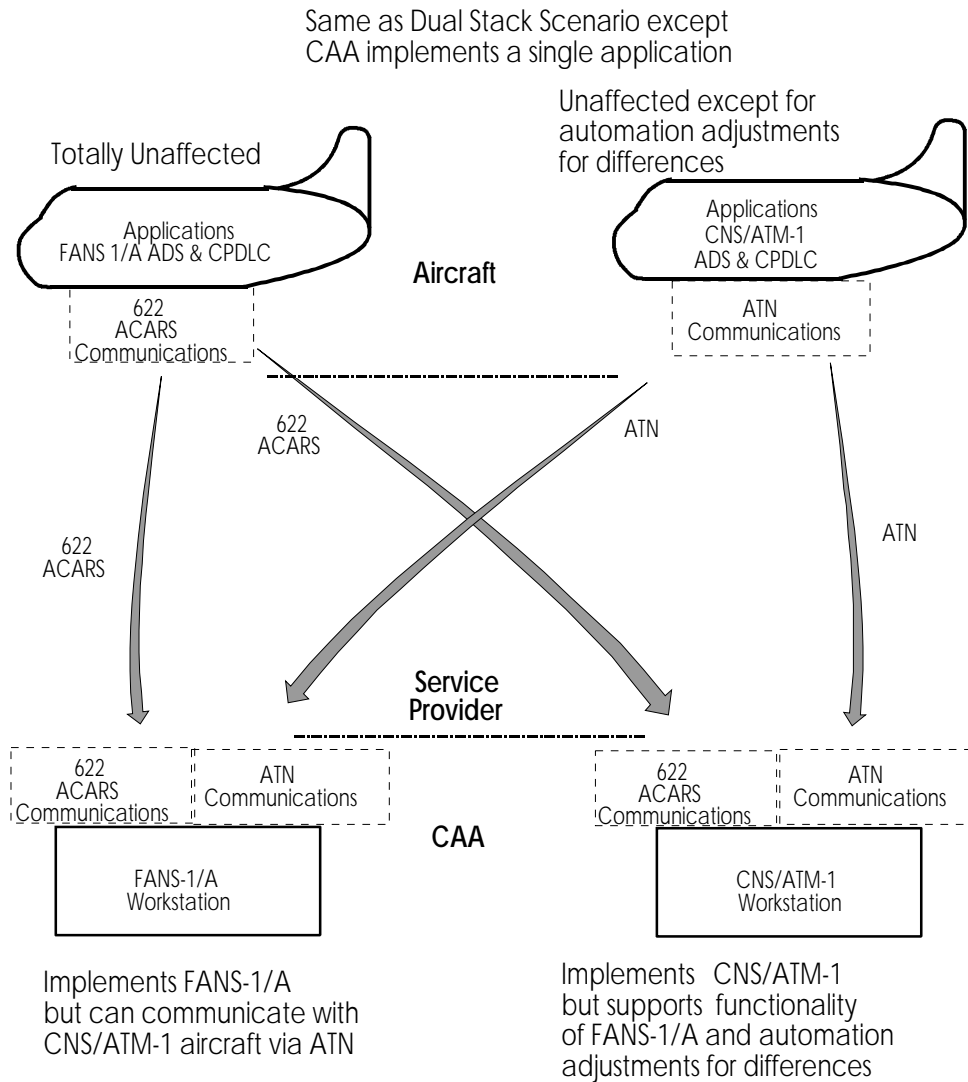
CONS

- Airlines (with their service providers) are not in control,
- FANS-1/A states must implement the CNS/ATM-1 second stack,
- International agreement among states for “dual stack” implementations is necessary,
- State costs to implement and maintain dual stack systems are significant, and
- Complex controller training on bilingual systems is onerous.

CERTIFICATION

- There are no special certification issues.

2.a DUAL STACK “CAA SINGLE APPLICATION GATEWAY” SUB-SCENARIO



Dual Stack CAA Gateway Scenario

A subset of the DUAL STACK SCENARIO, except both the FANS-1/A and CNS/ATM-1 states implement “single application - dual version” applications for ADS and CPDLC (dual communication stacks are still required):

- *FANS-1/A aircraft (same as dual stack),*
- *All FANS-1/A states implement the CNS/ATM-1 second communication stack and the “single application - dual version” applications for ADS and CPDLC,*
- *Service provider (same as dual stack),*
- *CNS/ATM-1 aircraft crews in implementing the “single application - dual version” applications for ADS and CPDLC will notice differences, and*
- *All CNS/ATM-1 states implement the FANS-1/A second communication stack and the “single application - dual version” applications for ADS and CPDLC.*

PROS

- *FANS-1/A aircraft investments are protected,*
- *CNS/ATM-1 aircraft investments are minimized,*
- *Burden of transition is not on CNS/ATM-1 aircraft, and*
- *Simplified controller training on “single application - dual version” applications for ADS and CPDLC.*

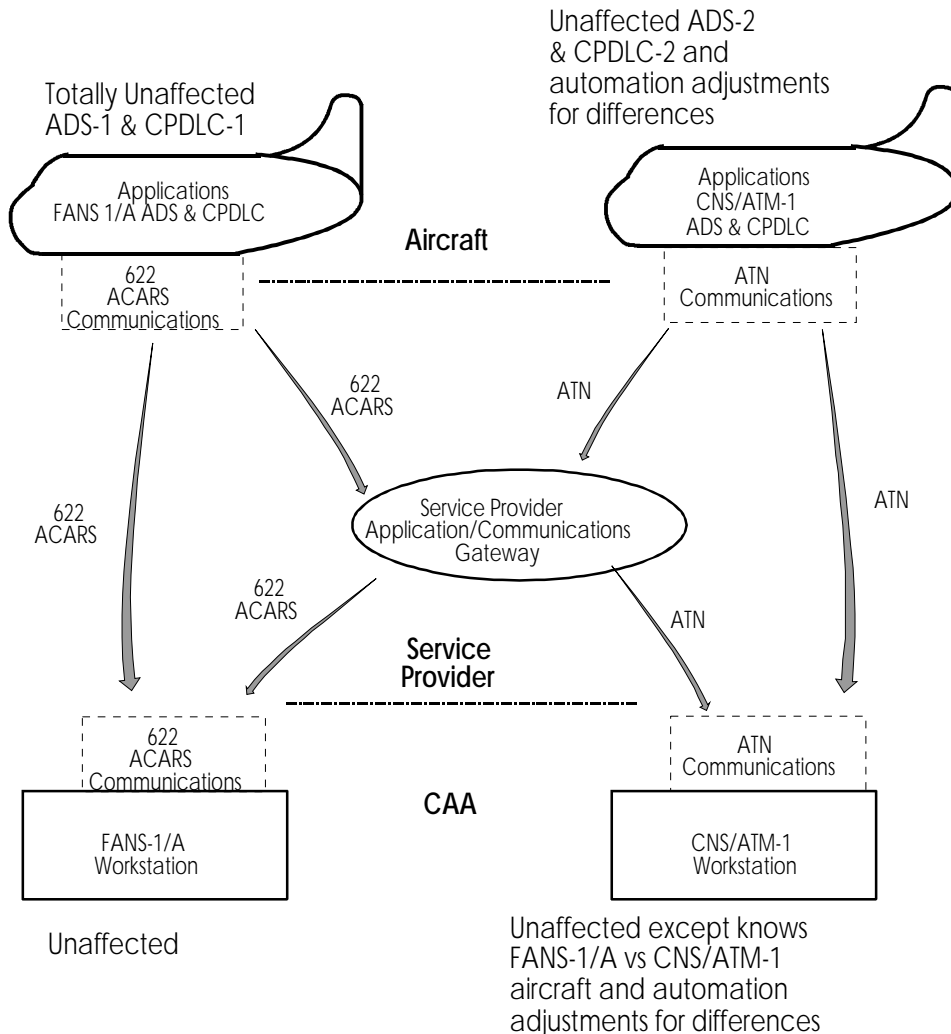
CONS

- *Airlines (with their service providers) are not in control,*
- *CNS/ATM-1 crews are affected by the “single application - dual version” applications for ADS and CPDLC differences,*
- *FANS-1/A states must implement the CNS/ATM-1 second communications stack,*
- *Requires the ICAO ADS Panel to endorse the “backwards compatibility” requirement, and the ATN Panel to change ADS & CPDLC SARPs accordingly.*

CERTIFICATION

- *There are no special certification issues.*

2.b DUAL STACK “SERVICE PROVIDER SINGLE APPLICATION GATEWAY”



Dual Stack Service Provider Gateway Scenario

Another subset of the DUAL STACK SCENARIO, except that the “single application - dual version” applications for ADS and CPDLC and the communications bridge is done by an international service provider communications gateway.

- All FANS-1/A aircraft are unaffected,
- All FANS-1/A states are unaffected,
- A service provider communication gateway is used to bridge both the FANS-1/A aircraft and CNS/ATM-1 states, as well as the CNS/ATM-1 aircraft and the FANS-1/A states. The gateway uses the “single application - dual version” applications for ADS and CPDLC,
- CNS/ATM-1 aircraft crews in implementing the “single application - dual version” applications for ADS and CPDLC will notice differences, and
- CNS/ATM-1 states are less affected because application differences are rolled into the single ADS and CPDLC gateway applications.

International network service provider communication gateways convert the ACARS infrastructure to ATN, but use the “single application - dual version” applications for ADS and CPDLC

PROS

- *FANS-1/A aircraft investments are protected,*
- *CNS/ATM-1 aircraft investments are minimized,*
- *Burden of transition is not on CNS/ATM-1 aircraft, and*
- *Simplified controller training on “single application - dual version” applications for ADS and CPDLC.*

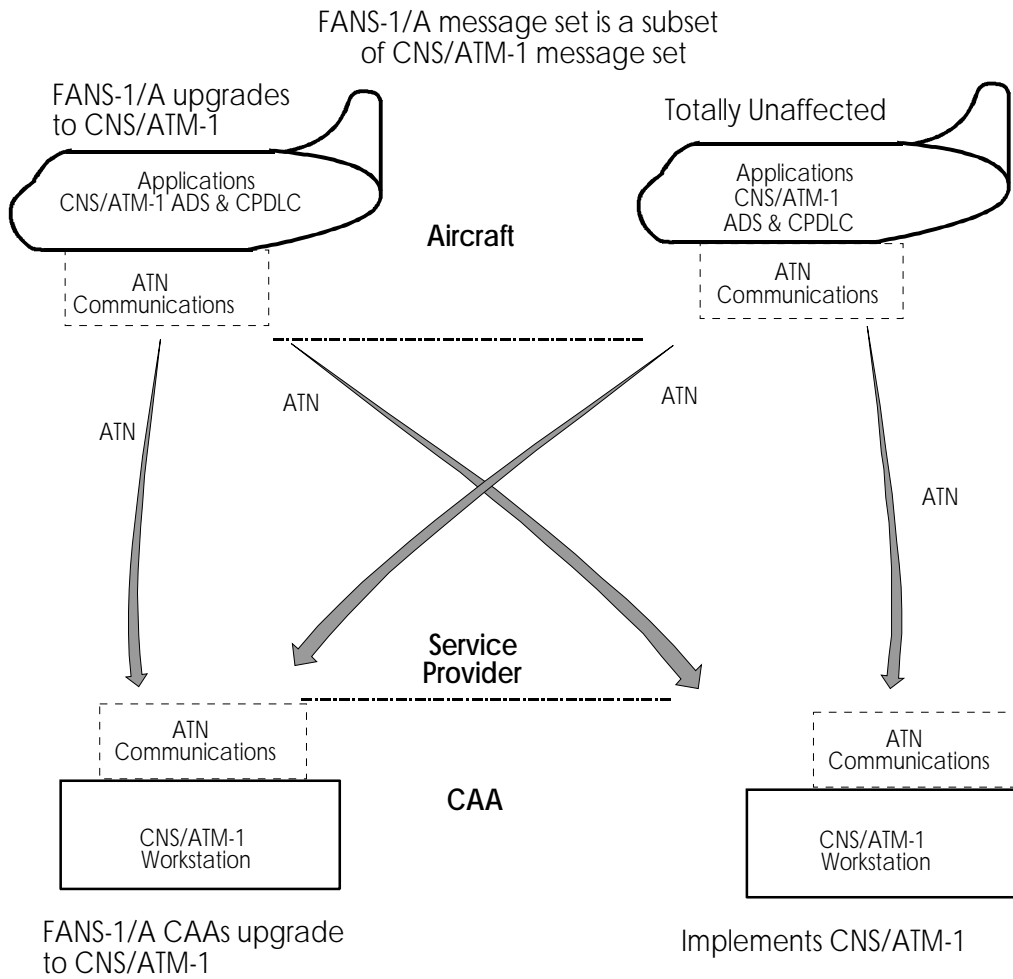
CONS

- *Airlines (with their service providers) are not in control,*
- *CNS/ATM-1 crews are affected by the “single application - dual version” applications for ADS and CPDLC differences,*
- *FANS-1/A states must implement the CNS/ATM-1 second communications stack,*
- *Requires the ICAO ADS Panel to endorse the “backwards compatibility” requirement, and the ATN Panel to change ADS & CPDLC SARPs accordingly.*

CERTIFICATION

- *Certification of such a system using this gateway is less of an issue as the FANS-1/A application cyclic redundancy check (CRC) is part of the ADS and CPDLC “single application - dual version” SARPs, and FANS-1/A ADS & CPDLC application data is not transformed.*

3. ONE SPECIFICATION SCENARIO



One Specification Scenario

- All FANS-1/A aircraft upgrade to the CNS/ATM-1 application versions of ADS and CPDLC, and the corresponding ATN infrastructure,
- All FANS-1/A states upgrade to the CNS/ATM-1 application versions of ADS and CPDLC, and the corresponding ATN infrastructure
- There is no service provider gateway,
- All CNS/ATM-1 aircraft and crews are unaffected, and
- All CNS/ATM-1 states are unaffected.

Both FANS-1/A aircraft and states would adopt the CNS/ATM-1 SARPs as the only operational specification allowed. Ideally, this means that any new FANS-1/A airplane and/or new state implementation uses the ICAO standards, and that existing FANS-1/A systems (both air and ground) upgrade to the new ICAO standards.

The upgrade is accomplished between now and 1999 when the North Atlantic is expected to offer initial operating capability for CNS/ATM-1. Upgrade is expected to start with all FANS-1/A states adding the “dual stack” CNS/ATM-1 capability, followed by an airplane-by-airplane FANS-1/A retrofit upgrade to use the new state CNS/ATM-1 applications and infrastructure, and concluding with phase out of the FANS-1/A state systems when no more FANS-1/A airplanes exist.

PROS

- Affects the least amount of states and airplanes,
- Offers the cleanest, seamless Future Air Navigation System, and
- Is thought to be the only solution acceptable to the ICAO standards bodies

CONS

- FANS-1/A environment is deemed adequate for low density airspace (little added justification to migrate to CNS/ATM-1),
- Airlines/states must decide to migrate as 1999 is sunset for FANS-1/A

CERTIFICATION

- There are no special certification issues.

MATRIX OF SCENARIO PROS, CONS AND CERTIFICATION ISSUES

| | PROS | CONS | CERTIFICATION |
|---|--|---|--|
| 1. BI LINGUAL SCENARIO (prime) | <ul style="list-style-type: none"> • Airlines (with their service providers) are in control, • FANS-1/A (aircraft & states) investments are protected, • CNS/ATM-1 states are unaffected (except for gateway certification and acceptance). | <ul style="list-style-type: none"> • Costs to implement and maintain dual CNS/ATM-1 avionics systems are significant, • Burden of transition is wholly on CNS/ATM-1 aircraft, • Crew training on bilingual systems is onerous, and • Certification of the gateway is in question. | <ul style="list-style-type: none"> • Certification of such a system using this gateway is thought to be an issue as the FANS-1/A application cyclic redundancy check (CRC) is replaced by the ATN transport CHECKSUM at the service provider (e.g., Air Canada, ARINC, AVICOM, SITA, etc.) interface, and the FANS-1/A ADS & CPDLC application data is transformed. |
| 1.a BI LINGUAL “SINGLE APPLICATION” SUB-SCENARIO (second) | <ul style="list-style-type: none"> • Gateway is simplified, and • Less aircraft, crew training and certification costs. | <ul style="list-style-type: none"> • Requires the ICAO ADS Panel to endorse the “backwards compatibility” requirement, and the ATN Panel to change ADS & CPDLC SARPs accordingly. | <ul style="list-style-type: none"> • Certification of such a system using this gateway is less of an issue as the FANS-1/A application cyclic redundancy check (CRC) is part of the ADS and CPDLC “single application - dual version” SARPs, and FANS-1/A ADS & CPDLC application data is not transformed. |
| 2. DUAL STACK SCENARIO | <ul style="list-style-type: none"> • FANS-1/A aircraft investments are protected, • CNS/ATM-1 aircraft investments are minimized, and | <ul style="list-style-type: none"> • Airlines (with their service providers) are not in control, • FANS-1/A states must implement the CNS/ATM-1 second | <ul style="list-style-type: none"> • There are no special certification issues. |

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| | <ul style="list-style-type: none"> • Burden of transition is not on CNS/ATM-1 aircraft. | <ul style="list-style-type: none"> • International agreement among states for “dual stack” implementations is necessary, • State costs to implement and maintain dual stack systems are significant, and • Complex controller training on bilingual systems is onerous. | |
| 2.a DUAL STACK “CAA SINGLE APPLICATION GATEWAY” SUB-SCENARIO | <ul style="list-style-type: none"> • FANS-1/A aircraft investments are protected, • CNS/ATM-1 aircraft investments are minimized, • Burden of transition is not on CNS/ATM-1 aircraft, and • Simplified controller training on “single application - dual version” applications for ADS and CPDLC. | <ul style="list-style-type: none"> • Airlines (with their service providers) are not in control, • CNS/ATM-1 crews are affected by the “single application - dual version” applications for ADS and CPDLC differences, • FANS-1/A states must implement the CNS/ATM-1 second communications stack, • Requires the ICAO ADS Panel to endorse the “backwards compatibility” requirement, and the ATN Panel to change ADS & CPDLC SARPs accordingly. | <ul style="list-style-type: none"> • There are no special certification issues. |
| 2.b DUAL STACK “SERVICE PROVIDER SINGLE APPLICATION GATEWAY” | <ul style="list-style-type: none"> • FANS-1/A aircraft investments are protected, • CNS/ATM-1 aircraft investments are minimized, • Burden of transition is not on CNS/ATM-1 aircraft, and • Simplified controller | <ul style="list-style-type: none"> • Airlines (with their service providers) are not in control, • CNS/ATM-1 crews are affected by the “single application - dual version” applications for ADS and CPDLC differences, | <ul style="list-style-type: none"> • Certification of such a system using this gateway is less of an issue as the FANS-1/A application cyclic redundancy check (CRC) is part of the ADS and |

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|---------------------------------------|--|---|---|
| | <p>training on “single application - dual version” applications for ADS and CPDLC.</p> | <ul style="list-style-type: none"> • FANS-1/A states must implement the CNS/ATM-1 second communications stack, • Requires the ICAO ADS Panel to endorse the “backwards compatibility” requirement, and the ATN Panel to change ADS & CPDLC SARPs accordingly. | <p>CPDLC “single application - dual version” SARPs, and FANS-1/A ADS & CPDLC application data is not transformed.</p> |
| <p>3. ONE SPECIFIC-ATION SCENARIO</p> | <ul style="list-style-type: none"> • Affects the least amount of states and airplanes, • Offers the cleanest, seamless Future Air Navigation System, and • Is thought to be the only solution acceptable to the ICAO standards bodies | <ul style="list-style-type: none"> • FANS-1/A environment is deemed adequate for low density airspace (little added justification to migrate to CNS/ATM-1), • Airlines/states must decide to migrate as 1999 is sunset for FANS-1/A | <ul style="list-style-type: none"> • There are no special certification issues. |

RECOMMENDATION

Provided requirements can be stated by the ADS Panel, and SARPs written and validated by the ATN Panel before the proposed late February 1997 ATNP Working Group of the Whole meeting, IATA recommends that:

- A single application be created for ADS wherein version 0 is the exact equivalent of the currently operational FANS-1/A ADS, and version 1 is the proposed CNS/ATM-1 ADS (i.e FANS-1/A ADS is subsumed into CNS/ATM-1 ADS),
- A single application be created for CPDLC wherein version 0 is the exact equivalent of the currently operational FANS-1/A CPDLC, and the proposed CNS/ATM-1 CPDLC is version 1 (i.e.FANS-1/A CPDLC is subsumed into CNS/ATM-1 CPDLC),
- The ATN Panel, WG3 agree to work on the enhanced ADS and CPDLC SARPs subject to ADS Panel Working Group endorsement of this “single ADS & CPDLC application” concept out of their 13-31 January 1997 Atlanta meetings, and
- Either the DUAL STACK WITH STATE GATEWAY (2.a) or DUAL STACK WITH SERVICE PROVIDER GATEWAY (2.b) migration or transition scenario be adopted by ICAO.

If the late February 1997 date cannot be met, IATA recommends that the DUAL STACK (2) migration or transition scenario be adopted by ICAO.

NOTE. If a service provider application/communication gateway is feasible (the various application anomalies can be reconciled and agreed to), and a state is willing to certify such an application/communication gateway (the FANS-1/A CRCs are broken at the gateway), and the controller human-computer interfaces to/from such an application/communication gateway are acceptable, then any state has the option to use the service provider application/communication gateway instead of implementing the dual stack.