GUIDANCE MATERIAL

FOR NON-AOC OPERATORS

ON ACHIEVING CONNECTIVITY OVER ATN/VDL MODE 2 TO SUPPORT ATC DATALINK SERVICES

Edition 3.0

30th Jun 2023

EDITION HISTORY

Edition No.	Date	Author(s)	Reason
0.1	11/05/20	N. Witt	Document creation
0.2	12/05/20	N. Witt	Editorial corrections 1st Draft for external review
0.3	04/09/20	N. Witt	Reflect initial comments from ACSPs
0.4	18/12/20	N.Witt	Reflect input from Non-AOC Task Force
0.5	25/03/21	N.Witt	Reflect further input from Non-AOC Task Force
1.0	06/05/21	N.Witt	First issue
2.0	29/06/21	N.Witt	Addition of Section 4.4 on Flight Plan Filing
3.0	30/06/23	N.Witt	Update to reflect lessons learnt

TABLE OF CONTENT

1. INTRODUCTION

The European Datalink Services Implementing Rule (DLS IR) [1] requires General Air Traffic (GAT) flights in accordance with Instrument Flight Rules (IFR) above FL285 in designated European airspace to be capable of operating Datalink Services (DLS), including Controller Pilot Datalink Communication (CPDLC), unless exempted.

The rule embraces both Air Transport operations and General Aviation. Most Air Transport operators will typically perform Aeronautical Operational Control (AOC) datalink communication by means of a commercial (contractual) arrangement with an Air-ground Communication Service Provider (ACSP), and access to DLS will be made available alongside their AOC service by their commercial ACSP.

However, some Air Transport Operators as well as most General Aviation operators do not perform AOC, so do not have an existing contractual relationship with an ACSP, and thus do not enjoy the same level of support and guidance in establishing connectivity to support DLS.

Today there are two ACSPs offering AOC services to Airlines (ARINC/Collins and SITA), also supporting ATN/ATC services to equipped aircraft, including those without an AOC contract. In addition, one ANSP (ENAV) operates its own ATN/VDL network, directly offering ATN/ATC services, as well as relaying AOC messages on behalf of ARINC and SITA.

The accommodation of such Non-AOC aircraft was foreseen at the outset of the technical and administrative design of the ATN/VDL network, under the principle that the transfer of any ATC datalink messages shall be covered by the ATC route charges (which fund ANSPs) and as such would not require additional charges from operators. Nevertheless, the absence of an existing relationship with an ACSP means that some additional steps (both technical and administrative) may be needed by Non-AOC operators to achieve the necessary connectivity to support DLS.

Following the first meeting of the Datalink Support Group (DSG1), a problem report was raised by EBAA (CRO-802, Connection to the DL networks & frequency tuning of users doing only ATS traffic) requesting support to clarify and resolve issues in relation to the connectivity of non AOC aircraft to the ATN/VDL network. These issues were further discussed in the DSG2 meeting. Some key concerns which have been expressed include:

- lack of clear documentation on how to connect a non AOC aircraft to the ANSPs
- difficulties for non AOC aircraft operators to configure their aircraft.

Furthermore, ACSPs have reported problems in managing non-AOC aircraft on the ATN network, primarily related to the ability to perform effective frequency management. The absence or incorrect configuration of basic information about a non-AOC flight, that is normally available from an AOC operator, may impair the ACSP's ability to effectively manage the flight. Examples of such information might include: origin and destination, position, ICAO to tail number match, or incorrect ICAO aircraft address. While the absence of such information from the ATN traffic itself may be mitigated through other means *e.g.* access to complementary data feeds, some scenarios remain where individual non-AOC flights cannot be frequency managed effectively. In addition to the operational impact above, the resolution of problems or correction of configuration might be delayed due to absence of a known point of contact for non-AOC aircraft operators.

Against this background, the present document is aimed primarily at operators of Non-AOC aircraft, but may also be used as general guidance to achieve connectivity, to provide:

- answers to frequently asked questions (FAQs) (Section 2)
- technical guidance on steps needed to achieve connectivity (including frequency management) and access DLS (Section 3).

In addition, this document identifies potential issues that are the subject of ongoing consideration amongst stakeholders, including representatives of Non-AOC operators, ACSPs and ANSPs:

- non-technical issues requiring measures to streamline connection to ATN/VDL networks and operation of DLS services by Non-AOC operators (Section 4)
- further steps being taken to address such outstanding issues (Section 5).

The scope of the document is limited to the use of the VDL subnetwork within the ATN infrastructure, since this is believed to be of greatest relevance to Non-AOC Operators, and the use of SATCOM is not addressed. Annex A of this Guidance Material provides further explanation of the Principles and Architecture of the ATN.

This version of the document reflects input and review by the relevant/interested stakeholders as well as lessons learnt from the operation of the Fast Track Initiative (FTI) (Section 5.2 refers) and will continue to be used as the basis for exchanges on potential issues that remain to be addressed. Updated versions of this document will be developed as needed in response to feedback from stakeholders and further lessons learnt from operational experience with Non-AOC operators, as well as analysis and evaluation of the options to address the identified issues.

2. FREQUENTLY ASKED QUESTIONS (FAQs)

Q1 - Is a subscription with a CSP required in order to perform CPDLC without AOC?

Funding arrangements between ANSPs and ACSPs provide for ACSPs to carry ATN ATC messages without additional charge to both AOC and Non-AOC operators.

ACSPs currently provide ATN/VDL service to Non-AOC operators without constraints. Specific technical requirements (listed in Section 3.1) apply in order for the aircraft to be managed effectively by the ACSP, including VDL multi-frequency operation, and to achieve the best datalink performance.

Q2 - Is it necessary to switch between CSPs to gain connectivity to particular ATC Units?

No need should arise for aircrew to switch from one ACSP to another purely to achieve connectivity with any particular ATC Unit or ANSP. The ACSPs offering coverage within an ANSP's airspace are interconnected via ground interconnections among them allowing any aircraft to reach the desired ANSP either directly (though the Primary Provider), or indirectly (though the Alternate Provider).

In airspace controlled by ENAV, ATN/VDL connectivity is provided by ENAV itself, but avionics will connect to the appropriate service automatically without intervention from aircrew.

Q3 - How should avionics be configured to connect to ATN/VDL and operate DLS?

Section 3.2 of this Guidance Material provides advice on the information that should be configured into avionics to achieve ATN/VDL connectivity and interoperate DLS services. Non-AOC operators are also expected to configure their avionics to disable or minimise AOC transmissions, and Section 3.3 provides information on how to achieve this.

Q4 - What is the purpose of the Logon List?

The Logon List is employed by certain ANSPs (currently MUAC, Germany and Switzerland) to protect the ATC system from disruption by datalink avionics that are known to suffer from technical issues. It will be necessary to register an aircraft and details of its avionics onto the Logon List in order to operate DLS with ANSPs enforcing it. Section 3.4 of this Guidance Material provides further information on the Logon List and the registration procedures.

In some cases, it may be necessary to install a software update to the datalink avionics in order to be eligible for inclusion on the Logon List. Section 3.5 of this Guidance Material gives advice on the recommended software versions for datalink avionics from different vendors.

Q5 - What information must be entered into the Flight Plan to operate DLS?

Operators of a datalink equipped aircraft capable of performing CPDLC need to enter the appropriate code(s) reflecting their capability into Item 10 of the ICAO Flight Plan form, and additionally (for ATN equipped aircraft) their 24-bit address into Item 18. Section 4.5 of this Guidance Material provides further information on entry of datalink information into the Flight Plan form.

3. TECHNICAL GUIDANCE

3.1 REQUIREMENTS FROM AIR-GROUND COMMUNICATION SERVICE PROVIDERS (ACSPs)

Both ARINC and SITA confirm that Non-AOC aircraft can currently connect to the ATN via their VDL Mode 2 networks, as is the case for the service provided by ENAV.

As highlighted earlier, certain technical requirements must be satisfied by Non-AOC installations and operators in order for ACSPs to manage such connectivity effectively, including frequency transitions to/from the CSC. Specifically, ACSPs have advised that they will require

- the avionics to provide correct downlink XIDs in accordance with published standards

together with provision of the following information relating to each aircraft

- aircraft tail number
- aircraft ICAO address
- avionics configuration (VDR and CMU part numbers, and core software versions)
- preferred/default ACSP (further discussed in section 4.3)
- point of contact to alert operator in the event that ACSP detects an issue.

Note 1: This information is normally provided to the ACSP by AOC operators when establishing their contract for AOC service.

Note 2: Non-AOC aircraft often do not meet these requirements at present and in such cases ACSPs are unable to autotune them from the CSC, contributing to an increased load on the channel and potentially compromising the quality of service of the ATN connection.

Note 3: When the technical requirements above are satisfied, ACSPs are expected to manage frequency transitions for Non-AOC operators in the same way as they do for AOC operators so as to maintain the quality of service at the required level.

Note 4: ENAV do not intend to impose any restrictive policies, not require any agreements for Non-AOC operators to connect to its ATN/VDL service.

3.2 CONFIGURATION OF AVIONICS

Configuration of avionics to support DLS by Non-AOC operators inevitably depends on the features of individual avionics, and so the guidance provided in this document is of a general nature.

In line with the ACSPs requirements covered in section 3.1, the avionics, and taking into account the ICAO EUR NSAP Address Registry [3] describing the structure and content of ATN NSAP addresses, avionic configuration is expected to embrace the following points, although individual avionics may not offer all options:

- **Aircraft's ICAO 24 bit technical address.** This is sometimes referred to as the ARS field of the ATN NSAP address.
- **Aircraft's Registration.**
- **The VER and ADM fields of the ATN NSAP address.** In the absence of more specific instructions from the preferred ACSP, these fields should be set as follows.
    - Airlines and operators which have been allocated a three character ICAO designator should set
      VER = "41" (hex) and
      ADM = the three character ICAO designator.
    - General Aviation aircraft which have not been allocated a three character ICAO designator should set
      VER = "C1" (hex) and
      ADM = the ICAO Region and Country code of the aircraft's registration, as described by [4]. The first octet of the ADM field is set to the ICAO Region Identifier as specified by [3], followed by the two character alphanumeric ISO 3166 (ALPHA-2) Country Code, represented as upper case characters. The ICAO Region Identifier for Europe is "83" (hex).

    Note: The above recommendations have been proposed to ICAO EUR for inclusion in Doc028 [3].

- **Remaining fields of the ATN NSAP address.** These are either defined by ATN standards to take fixed values or else specified by the vendor. Most avionics pre-configure these fields, but if they are required to be entered, they must be set to the following values, as specified in [3]:
    - AFI = “47” (hex)
    - IDI = “0027” (hex)
    - RDF = “00” (hex)
    - LOC = value specified by vendor
    - SYS = value specified by vendor.
- **The preferred provider.** Determination of the preferred ACSP is discussed in section 4.3. Certain avionics may nominate the preferred provider randomly at start-up for a Non-AOC flight.
- **Enable multiple providers.** AOC operators may elect to restrict connection only to the preferred ACSP to preserve AOC connectivity at all times, but it is more appropriate for Non-AOC operators to allow connectivity with other providers if the preferred provider is not available. Some avionics may require selection of specific ‘Less Preferred’ providers to enable this.
- **Establish initial VHF contact in VDL Mode 2 on the CSC (136.975 MHz).** AOC operators may elect to establish contact initially on the ACARS frequency of their preferred ACSP, and switch to VDL only if service is available. This is not appropriate for Non-AOC operators.

Additional configuration options relating to application level options may be offered by individual vendors.

The current version of this guidance covers only generic aspects as identified above. If specific information will be provided by vendors, operators or ACSPS, for avionics of interest for Non-AOC aircraft, it will be added in future versions.

3.3 DISABLING GENERATION OF AOC MESSAGES

By default, some datalink avionics prepare and transmit AOC messages irrespective of whether the operator has an AOC contract. In the case of a Non-AOC operator, such messages will be discarded by the CSPs, but they nevertheless occupy bandwidth unnecessarily on the VDL channel, which is a limited resource, and also load the CSPs’ processors. Accordingly, Non-AOC operators are expected to take steps in the configuration of their avionics to disable, or minimise as far as possible the transmission of AOC messages.

The steps needed to achieve this vary significantly between different avionics. Some avionics provide an ‘ATN only’ mode, which can be easily selected by the operator, disabling transmission of all AOC messages. In other cases, it may be necessary to install a custom configuration or database into the avionics. The following table summarises the necessary steps in avionics commonly used by Non-AOC operators.

Avionic Vendor	Disabling or Minimising AOC Messages
Collins	No ATN only mode available AOC Init & OOOI messages are sent by default These can be disabled by installation of a custom AOC configuration, but at the time of writing the vendor is not yet in a position to provide such a configuration off-the-shelf for Non-AOC operators
Garmin	Legacy G1000 flight deck is ATN only – no support for AOC G3000 and G5000 flight decks can be configured to ATN only, ACARS only or ATN+ACARS **Non-AOC operators should select ATN only mode**
Honeywell	CMU Mk2+ -523 supports ATN only configuration Otherwise, no specific mechanism to prevent AOC transmissions AOC database and/or other end systems can be configured to minimise traffic Vendor intends to offer a 'minimalist' AOC database for Non-AOC operators through HW Airline Services Organization upon request either from OEM or operator
DLink+ (SDA, previously a Spectralux product)	Can be configured in ATN only mode – prevents crew access to AOC menus and auto messages disabled **Non-AOC operators should select ATN only mode**
Universal	No ATN only mode available Operator can disable FANS and automatic AOC downlinks (e.g. position reports) To remove all AOC downlinks a custom database would be required from vendor, but at time of writing the vendor is not yet in a position to provide such a database off-the-shelf for Non-AOC operators **Non-AOC operators should disable FANS and automatic AOC downlinks**

3.4 THE LOGON LIST

The Logon List is a mechanism employed by some ANSPs to protect their air traffic controllers from the disruptive effects of avionics that are known to suffer from technical issues. In order to perform CPDLC with such ANSPs, it is necessary for operators to register their aircraft in advance on the Logon List, and provide details of the installed datalink avionics. To register an aircraft on the list, an operator needs to gain access to the EUROCONTROL Datalink Performance Monitoring Function (DPMF) One Sky Team (OST).

Further information on the Logon List, including the ANSPs currently employing it, and the procedures to register an aircraft can be found on the EUROCONTROL datalink wiki page at: https://ext.eurocontrol.int/WikiLink/index.php/Logon_List .

3.5 AVIONIC SOFTWARE UPDATES

In some cases, operators may need to install a software upgrade to their datalink avionics in order to be eligible for registration on the Logon List. In other cases, a software update may be recommended where this is known to give rise to a noteworthy improvement in datalink performance. The following

table lists the recommended software versions for avionics commonly used by Non-AOC operators, together with the rationale for the recommendation and the aircraft types which are potentially affected.

Note: The following table reflects information available to EUROCONTROL at release of this document. More detail on availability of software updates for specific aircraft types is being sought, and will be incorporated into future versions of this document as available.

Avionic Vendor	**Potential Applicability to Aircraft Types**	**Recommended Version**	**Comment**
Collins	> 20 a/c types	CMU-4000 RIU-4000 RIU-4010 VHF-4000 VDR with deafness update	No current information on CMU/RIU VHF-4000 deafness update provides eligibility for Logon List (see ECTL wiki page)
Garmin	C25M, C525, C680, C68A, C700 E50P, E55P HDJT LJ75 TBM9	GIA63W CMF ≥ Ver 8.10 GIA64E CMF ≥ Ver 2.00 GDR66 VDR ≥ Ver 2.11	GIA63W/64E versions provide complete information required by CSPs to manage VDL frequency transitions (CRO-927) GDR66 version provides eligibility for Logon List
Honeywell	A306 F900, FA6X, FA7X, FA8X E170, E190, E195 E290, E295 GA5C, GA6C, GA7C, GLF6, GLF7 PC12, PC24	EPIC CMF ≥ BP3.4 EPIC VDR ≥ Mod U EPIC NAVCOM ≥ Mod D	CMF BP3.4 provides complete information required by CSPs to manage VDL frequency transitions (CRO-1173) VDR Mod U provides eligibility for Logon List
DLink+ (SDA, previously a Spectralux product)	B733, B737, B738, B752 A320, A321	DLink+ ≥ Mod 6	Mod 6 provides eligibility for Logon List
Universal	> 18 a/c types	UL800 UL801	No current information

3.6 THE CPDLC GROUND AUTOMATED TOOL (GAT)

EUROCONTROL has developed the CPDLC GAT to assist operators in verifying the correct functionality of installed datalink avionics both following installation and also after software updates. It may also assist aircrew in gaining familiarity with CM/CPDLC.

Aircraft may connect to the GAT while on the ground, by performing a CM-Logon, and then exchange CPDLC messages that are representative of operational datalink use.

Use of the tool is not obligatory, but Non-AOC operators may find it beneficial to gain confidence in the functionality of their datalink avionics and the improve familiarity of aircrew with datalink operation.

Further information on the GAT tool and procedures for accessing it can be found at: https://www.eurocontrol.int/tool/controller-pilot-datalink-communications-ground-automated-tool .

4. NON-TECHNICAL ISSUES

Based on past discussions and information provided by the involved stakeholders, a number of non-technical issues have been identified which may impact the use of the ATC datalink by Non-AOC aircraft. Therefore this section discusses issues for which solutions are desirable to streamline the connection of Non-AOC aircraft to the ATN/VDL network, and interact with DLS.

4.1 CONTRACTUAL UNDERTAKINGS POTENTIALLY REQUIRED BY ACSPs

ACSPs may require certain contractual undertakings from Non-AOC operators in order to provide connectivity to support DLS. It is anticipated that such undertakings will embrace the following:

- Provision of information required by the ACSP, including details of the operator's airframes and avionics, as specified in section 3.1.
- Qualification of avionics to operate on ACSP networks. ACSPs place great emphasis on validating interoperability of avionics with their air-ground networks to protect the integrity and performance of the network for the benefit of all users. Generally, such qualification tests will be performed on avionics prior to certification, but where specific installation and/or configuration issues are perceived to impact interoperability, additional testing may be necessary. Operators will be required to confirm the AQP/VAQ qualification status of their avionics, as advised by the avionic vendor or integrator.
- Procedures to address any unexpected negative impact of an operator's avionics on the air-ground network.
- Legal liability for carriage of ATN messages.

ACSPs emphasize the desirability of centralized management of such agreements with Non-AOC Operators, so as to minimise the overhead on all stakeholders, as discussed further in section 4.2 below.

Note 1: At the time of writing, any such required contractual undertakings remain to be specified fully.

Note 2: ENAV have advised that they do not foresee any contractual undertakings being required from Non-AOC Operators to connect to their network.

4.2 PROVISION OF REQUIRED INFORMATION TO ACSPs

Section 3.1 highlights that Non-AOC operators will be expected to provide information to one or more ACSPs on their aircraft and the corresponding datalink avionics. Accordingly it is desirable to streamline the provision of this information, and avoid duplication of contact with multiple ACSPs, in order to ease the burden on Non-AOC operators and ACSPs alike.

One approach might be to establish a web based registration service by which individual operators register their aircraft and provide information on the corresponding avionic configurations, as well as confirming their agreement to any undertakings required by ACSPs. This might be combined with an algorithmic allocation of the default preferred ACSP (as discussed in section 4.3) for the operator or aircraft. Information gathered by such a process could be shared automatically with all relevant ACSPs.

These issues are discussed further in the context of longer term support to Non-AOC operators addressed in Section 5.3.

4.3 DETERMINATION OF DEFAULT SERVICE PROVIDER

It has been considered desirable for a Non-AOC aircraft to operate on the basis of a default or preferred ACSP to which it will normally attempt to connect whenever possible. Avionics generally are designed to operate in this way, since this is universally required in the AOC world.

Allocation of Non-AOC aircraft to a default provider allows for management of the distribution of the load on the network, with the aim of avoiding a disproportionate number of such aircraft being connected to a single provider, potentially leading to local network congestion.

Furthermore, the preferred provider of an aircraft/operator is taken into account in multi-frequency management, as well as in ATN routing at certain ANSPs (with direct connections to dual providers). Hence, absence of such an allocation in Non-AOC aircraft may compromise existing functionality.

This raises the question of how determination of the preferred provider might be performed for Non-AOC operators.

Certain Non-AOC operators may select a particular preferred provider for their own reasons, by mutual agreement with the ACSP, and there is no reason to interfere with any such arrangements.

However, it would be burdensome to expect all Non-AOC operators to select their own preferred provider, and hence an alternative mechanism is desirable to allocate a preferred ACSP to operators in the absence of any other considerations. Important characteristics of any such mechanism would be simplicity, ease of implementation, and achievement of an equitable load between ACSPs.

One approach to do this might be to allocate the default provider on the basis of the country of registration of the aircraft. This would be straightforward to implement, and the EUROCONTROL DST team is currently seeking data on Non-AOC operation in the DLS implementation area, with the aim of exploring the feasibility of such an approach, particularly in achieving a proportionate distribution

of load between ACSPs. Further discussion with relevant stakeholders will be undertaken following this analysis.

Such an approach would most likely not be suitable for operators of a large fleet of aircraft (*e.g.* commercial airlines), since it could distort the distribution of load between ACSPs, and in such cases mutual agreement with an ACSP may be more appropriate.

Other approaches for allocation of the default provider may also be feasible, such as

- a deterministic rule based on the final character of the ICAO address.

Feedback and proposals are invited for consideration and analysis (including the impact on ACSPs) in a future version of this document.

4.4 AIRCREW TRAINING

It is not the aim of this document to give guidance on operational use of DLS and CPDLC to aircrew. Operational procedures are specified in EUROCAE ED-110B [5] and aircrew will be expected to be familiar with the concepts and procedures of ATC related DLS that are specified in that document. Aircrew training is a regulatory matter and is outside the scope of undertakings sought be ACSPs.

In Europe, OPS rules give general provision on crew training on crew training, and Commission Regulation 965/2012 requires operators to ensure that their aircraft are equipped and crews are qualified for the type and area of operation, although these do not address CPDLC specifically. AMC1 FCL.725(a) specifically mentions knowledge of data-link communication in the syllabus for grant of a class or type rating. Class and type ratings courses are approved by National Competent Authorities or EASA, so may differ between European states.

FAA applies less stringent guidelines on training of General Aviation aircrew (AC 90-117 Part 91) compared to Air Transport, but this is not necessarily the case in Europe.

Commercial training courses on datalink operational procedures are available for General Aviation aircrew. However, training alone may not necessarily be sufficient. Proficiency is key, and GA aircrew are likely to fly more diverse routes so may be less familiar with practices in particular airspace. CPDLC simulators may be of value to supplement training courses.

Additional insight may be available from the DST's Operational Focus Group.

4.5 FLIGHT PLAN FILING

In order to perform CPDLC, operators are expected to include in the Flight Plan for the flight in which they intend to use CPDLC the required information for datalink. Information and guidance on what needs to be indicated in the flight plan can be found on the EUROCONTROL datalink wiki page at: https://ext.eurocontrol.int/WikiLink/index.php/Frequently_Asked_Questions#What_should_be_entered_in_the_flight_plan.3F .
A one page reminder on how to fill the flight plan and also highlighting some common errors preventing connectivity is also available in the EUROCONTROL Datalink wiki at: https://ext.eurocontrol.int/WikiLink/images/7/70/FPL_Datalink_Reminder_v3_2023_04_03.pdf .

5. FURTHER STEPS

The issues identified in this document in relation to the access to the ATC datalink of Non-AOC aircraft are potentially important, not straightforward to address, and involve many stakeholders with different concerns. However a common objective should be the efficient use of DLS by all required stakeholders, whether they make use also of AOC or not.

In order to progress the resolution of the issues, it is important to engage and involve all relevant stakeholders and consider appropriately their needs. A dedicated working group has been established to discuss the issues and the way ahead and also identify committed stakeholders to help evaluate the potential solutions.

The output of such activities as described below will be important in preparing an updated version of this document with analysis and recommendations for the way ahead.

5.1 NON-AOC AIRCRAFT TASK FORCE

A Non-AOC Task Force has been established to address outstanding issues raised in this document, particularly those of a non-technical nature, considered in section 4. Ongoing participation of representatives of Non-AOC operators as well as the ACSPs will be vital, with additional input (*e.g.* from avionic vendors and ANSPs) being sought as necessary.

5.2 FAST TRACK NON-AOC OPERATOR INITIATIVE

In parallel with the work of the Task Force outlined above, a small group of Non-AOC Operators has been recruited to a Fast Track Initiative (FTI), with the aim of troubleshooting the process of connecting Non-AOC operators to ATN/VDL networks and operating with DLS, as well as achieving more efficient connection using VDL multi-frequency.

EUROCONTROL has played a central coordinating role, providing guidance and support to participating operators as well as collecting the information needed by ACSPs. Links have been forged with technical contacts at ACSPs and avionic vendors, with the aim of facilitating flow of information, seeking technical solutions when necessary, and capturing lessons learnt.

Findings from the Fast Track Initiative have been incorporated in this Guidance Material, and will also inform the development of technical and administrative procedures for support of larger numbers of Non-AOC operators in the longer term future.

5.3 DEVELOPMEMT OF LONGER TERM SUPPORT FRAMEWORK FOR NON-AOC OPERATORS

Experience gained from the Fast Track Initiative suggests a need for wider and longer term centralised support to Non-AOC operators (and possibly other business operators as well) who may experience difficulties in achieving or maintaining ATN/VDL connectivity. Such a service would also be well placed to address issues such as the provision of information to ACSPs (Section 4.2) and the allocation of a default ACSP to Non-AOC operators (Section 4.3).

Provision of such a service is under consideration with relevant stakeholders, including the development of appropriate funding models.

6. REFERENCES

[1] Commission Regulation (EC) No. 29/2009, of 16 January 2009, laying down requirements on data link services for the single European sky (OJ L 13/3 17.1.2009), as amended by Regulation 2015/310 of 26 February 2015 (OJ 56, 27.2.2015).

[2] Link 2000+ Network Planning Document. Edition 3.007 18th Nov 2013. Ref CFC/Datalink/NPD

[3] ICAO EUR NSAP Address Registry. EUR Doc 028 Version 12.0 18th Nov 2022.

[4] LINK 2000+ ATN Naming and Addressing Plan. Edition 1.3 20th Aug 2012.

[5] Interoperability Requirements Standard for Aeronautical Telecommunication Network Baseline 1 (ATN B1 Interop Standard). EUROCAE ED-110B Dec 2007, as modified by Change 1, March 2014.

ANNEX A – ATN PRINCIPLES AND ARCHITECTURE

ATN/VDL OPERATING PRINCIPLES

During early design of the ATN/VDL network, a number of principles were established to guide its development and evolution. These principles were stated initially in the Link 2000+ Network Planning Document (NPD) [2], and subsequently amplified with regard to Non-AOC operators by collaborative discussions with ACSPs and review by ANSPs.

The principles particularly applicable to Non-AOC operation, and reflected in the current deployment, are as follows:

A) **ATC datalink services must be available to all airlines and operators, irrespective of whether or not they make use of AOC services (NPD-1).**

Funding arrangements between ANSPs and ACSPs provide for ACSPs to carry ATN ATC messages without additional charge to both AOC and Non-AOC operators.

ACSPs will provide ATN/VDL service to support Non-AOC operators, but may do so only when certain requirements relating to qualification of avionics, agreements regarding liability, and other relevant matters have been satisfied. Specific technical requirements are listed in section 3.1 and contractual matters are discussed in section 4.1.

B) **Dual coverage - the two existing commercial ACSPs (ARINC and SITA) provide a DLS-IR compliant ATN/VDL M2 datalink service throughout the entire DLS-IR application area, either directly or in cooperation with ANSPs for a given airspace (NPD-0).**

This implies that an aircraft should not normally need to transfer between ACSPs in order to maintain ATN/VDL coverage while flying in the DLS-IR area. It cannot be ruled out that due to minor discrepancies in coverage, such transfers might occasionally arise, but they should be rare events.

It is technically undesirable for aircraft to transfer between ACSPs frequently, since this typically involves re-establishing a new IDRP Air-Ground Adjacency, which places a significant additional burden on the VDL link.

Note 1: ANSPs (e.g. ENAV) may also provide ATN/VDL M2 service, but this will be advertised on the VDL M2 link so as to appear as one or both of the existing commercial services. Typically, connection to an ATN service provided by an ANSP will also give rise to a new IDRP Air-Ground Adjacency.

Note 2: Creation of a new IDRP Adjacency is normally transparent to the aircrew.

C) **An ANSP shall connect directly with one or more ACSPs of its choice, and indirectly with all other ACSPs meeting the minimum Quality-of-Service requirements for the provision of ATC Datalink services in its airspace (NPD-2).**

This implies that all ACSPs offering coverage within an ANSP's airspace must provide a path to that ANSP, either directly (known as a Primary Provider), or indirectly via ground interconnections (known as an Alternate Provider). Conventionally, ACSPs advertise IDRP routes to 'All ATSC' (Air Traffic Service Communication) in recognition of this principle.

Accordingly the need should not arise for an aircraft to switch from one ACSP to another purely to achieve connectivity with any particular ANSP. As remarked earlier, it is undesirable for aircraft to switch between ACSPs due to the resulting exchanges and corresponding load imposed on the air-ground link.

There should be no need for a Non-AOC aircraft to be informed by technical means which ACSP is the Primary Provider in any given airspace. A Non-AOC aircraft should continue to receive ATN/VDL service supporting DLS from the ACSP to which it is already connected, even if it enters airspace in which that ACSP is no longer the Primary Provider.

Note: Aircraft entering coverage of an ATN/VDL network provided by an ANSP (e.g. ENAV) will typically connect to that network, but will normally appear to the aircrew as though the aircraft remains connected to the current provider, since the ANSP service is advertised to appear as one or both commercial services.

If for any reason an ACSP is unable to provide service to a Non-AOC operator, the ACSP should either refuse a connection, or else disconnect the aircraft if a link already exists with that ACSP. In this circumstance, the Non-AOC aircraft should attempt to connect via another ACSP.

Note: Both commercial ACSPs currently accept all connection requests from Non-AOC aircraft, unless technical issues are detected (e.g. duplicated 24bit addresses).

Recognising that Non-AOC operators may fly a more diverse set of routes than scheduled Air Transport operators, Non-AOC operators are expected to configure their avionics to operate in a multiple provider configuration.

NETWORK ARCHITECTURE

The following figure is reproduced from the NPD [2] to illustrate the current ATN/VDL architecture supporting the principles described in the section above. It seeks to focus on the provision of end-to- end datalink services via interconnected ACSPs rather than ATN/VDL M2 coverage.

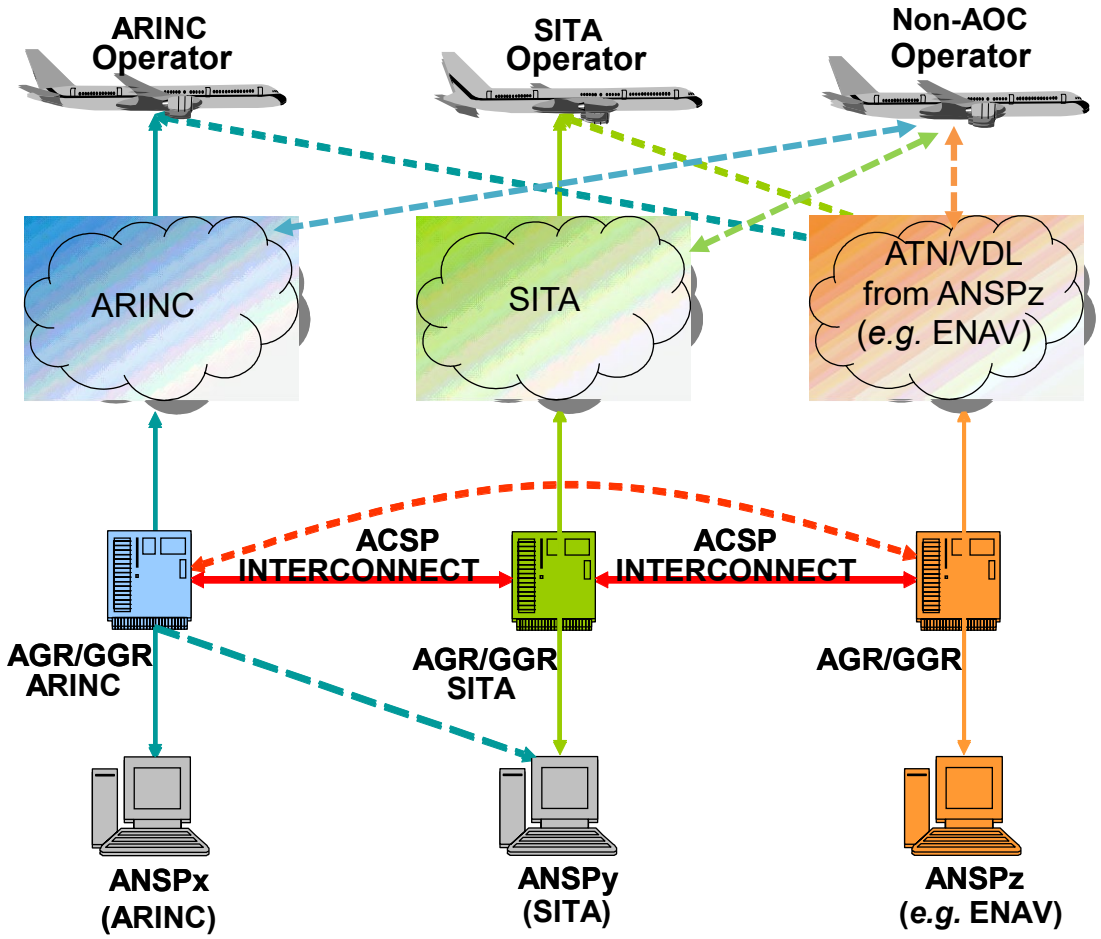

Figure 1: ATN/VDL Network Overview (ATC Datalink Provision)

In the above figure:

- ANSPx contracts with ARINC as its Primary Provider. SITA offers coverage in the same airspace and thus acts as an Alternate Provider. Messages to/from aircraft connected to ARINC will be routed directly from/to ANSPx. Messages to/from aircraft connected to SITA will be routed from/to ANSPx via the ACSP interconnection.
- ANSPy contracts with SITA as its Primary Provider, with ARINC acting as an Alternate Provider. Message routing operates in an analogous fashion to that described above.
- ANSPz (*e.g.* ENAV) operates its own network. Subject to its contractual arrangements with the established commercial ACSPs (SITA and ARINC) its ground stations may advertise themselves as either SITA/ARINC or both (illustrated as dotted blue and green lines).
- Aircraft connected via any ACSP (including service provided by a single ANSP) will enjoy connectivity to all other ANSPs via the ACSP interconnections.

Generally, ANSPs connect with a single ACSP as illustrated by ANSPx and ANSPy in the earlier figure. In this scenario, the ACSP will advertise to the ANSP via the IDRP protocol that it offers a

communication path to all aircraft (known as an aggregated IDRP route), since aircraft connected to other ACSPs will be reached by means of the ACSP interconnections.

In some cases, an ANSP may elect to connect directly to two commercial ACSPs (*e.g.* the dashed blue line connecting ANSPy directly to ARINC as well as SITA), rather than a single Primary ACSP. In such cases, ACSPs cannot advertise an aggregated IDRP route to the ANSP, and the ANSP's own ATN Ground Router must determine which ACSP provides the most efficient communication path to the aircraft. Typically ACSPs advertise to ANSPs the ATN routes for individual aircraft based on their NSAP address.