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ACCESS

ATN Compliant Communications

European Strategy Study

Institutional Issues

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Executive Summary

In order to avoid duplication of effort and to make best use of available expertise in related study areas, the ACCESS Project has used the first deliverable of the ATN Implementation Issues (ATNII) Study as a baseline document for its work on Institutional Issues (WP224). Whereas ACCESS is primarily an engineering/system design study, the terms of reference of ATNII specifically address non-technical issues and deal mainly with the institutional environment in which the ATN is expected to come into being in Europe.

Using this approach, the ACCESS study is able to investigate the correlation between the findings documented in Deliverable 1 of the ATNII Study and to identify any aspects of the ACCESS technical recommendations which might constrain potential future institutional scenarios for ATN and vice versa.

In general the efforts of the ATSOs supporting the ATN are being devoted to the elaboration of a technical architecture and its implementation plan (which is a necessary task) whereas it will not prove to be successful if it is not complemented by the proposition of adequate solutions for the organisational, institutional and economical aspects which are tightly coupled. The feasibility of the ATN implementation plan proposed by ACCESS is likely to be undermined unless the essential institutional and/or non-technical enabling activities can also be accomplished in a timely way.

It is acknowledged that these difficulties arise because the main players involved in the ATN have not made univocal operational choices and because there is a lack of a clear CNS/ATM operational framework and associated business case. It can be reasonably assumed that a solid business case would free the various players' energies to build the required organisational and institutional solutions.

The range of institutional issues raised is significant in scope, including the need for ATN regulatory framework ("ATN Convention") and a separate operational entity for the European ATN co-ordination and the possible evolution towards a network built around commercial alliances and contracts instead of the usual multi-lateral co-operation between public administrations (ATSOs or CAAs). This evolution implies a new policy for aeronautical charges (e.g., differentiated services and charges) which could represent an incentive for the introduction of the ATN but whose feasibility can be questioned, at least in the ACCESS timeframe.

The interim work completed by the ATNII study identifies the potential need for fundamental changes to the institutional structures to exploit the full potential of enabling technologies such as ATN on the European ATM services. There is significantly commonality of these issues across the CNS/ATM concept and the implementation period to bring about some of these changes would extend beyond the timeframe of the ACCESS study. However the impact of institutional issues when planning the development of the ATN is an important consideration: *a purely engineering approach might come up with solutions which, for institutional reasons, are not feasible in reality.*

By taking a more pragmatic approach, ACCESS has examined the mechanisms required to put the technical building blocks in place to enable an initial ATN to be implemented. For example, the use of third party communications service providers and the development of detailed service level agreements to control and manage this relationship; the development of techniques to enable the end-to-end "certification" issue to be addressed through a modular approach to the construction and maintenance of system safety cases. Where the possible evolution of institutional arrangements, as foreseen by the ATNII Study, introduces a potential impact on the technical approach taken by ACCESS, *no conflicts or constraints have thus far been identified and vice versa.*

In conclusion, it is beyond the scope of the ACCESS project to resolve institutional issues such as the need for ATN regulation. This would be a pre-requisite for any European ATN implementation plan. The appropriate 'structures' will have to be defined by ATN stakeholders to address these issues in a timely manner in order to ensure a successful operational ATN deployment. It is expected that the future LINK2000+ programme will contribute to the creation of these 'structures'.

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1. Introduction

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Using this approach, the ACCESS study is able to investigate the correlation between the findings documented in Deliverable 1 of the ATNII Study and to identify any aspects of the ACCESS technical recommendations which might constrain potential future institutional scenarios for ATN and vice versa.

2. Overview of ATNII Deliverable 1

This chapter aims at outlining the main issues and conclusions raised by the ATNII report that are thought to be of particular interest to ACCESS. It is therefore not intended to be a complete summary of the report.

2.1 Scope and Structure

The aim of the ATNII study is to analyse the non-technical obstacles which could affect the implementation of the ATN and to develop organisational, regulatory and institutional configurations capable of facilitating the implementation of the ATN.

The document is structured as follows:

- The first chapter defines the goal of the study and presents the structure of the report,
- The second chapter highlights the tendencies affecting the European CNS/ATM system in general and the aeronautical communications in particular, this will identify the overall context surrounding short term choices concerning the ATN implementation,
- The third chapter presents the positions of the various actors that can be involved by the ATN implementation (AOs, ATSOs, APOs, ACSPs, etc.), focusing on their short and long term motivations and interests with regards to the ATN,
- The fourth chapter addresses the main issues facing the ATN implementation within the overall context presented in the previous chapters. The questions thus raised are identified as either trends or key issues, depending on the answers or the absence of clear answers associated to those questions,
- The final chapter proposes likely scenarios for the ATN implementation based on the combination of possible outcomes of key issues.

2.2 A New ATM Paradigm

This chapter essentially presents the tendencies governing the foreseeable evolution of the CNS/ATM system in Europe and the related aeronautical telecommunications. It therefore describes a context within which the ATN will take place.

It describes the current CNS/ATM system while outlining the various functions (navigation, surveillance, control) of the system. It subsequently presents the future ATM techniques that

should be able to cope with the current limits of the system induced by the continuous air traffic growth: saturation of airport capacity and saturation of certain control sectors.

The new ATM paradigm becomes possible thanks to a certain number of enablers such as the increase of on-board and ground calculation capacity (automated systems), the introduction of navigation by satellite and the use of datalinks. Of course these new techniques require substantial changes, either financial, organisational or procedural, although all in all they will stay human-based for safety reasons.

The 2005-2010 period is thought to be critical, since the overall system capacity shall have been expanded by that period for the correct operation of air traffic services. Therefore the 2000-2005 period must be used to prepare for the required changes.

The changes affecting the ATM tend to reconsider the classical association of specific means to specific functions, e.g. communication (voice channels) for control, beacons for navigation and radar for surveillance; the new technologies tend to merge the different systems into an integrated architecture which can be used by the different functions of the system.

The current legal and operational context is determined by ICAO standardisations, which results for aeronautical communications in a clear classification of aeronautical messages and flows. The technical changes particularly affecting the communications are driven by the need to migrate voice communications functions to data communications functions and to automatically manage communications to and from mobiles, with the objective of improving the overall system performance: this evolution is the main factor that should enable the ATN implementation.

2.2 Player's Views

Apart from the necessary cost/benefit analysis that the ATN has to face like any other similar project, the introduction of the ATN raises specific questions about the modalities of the cost and benefit sharing between the various ATN users. This issue is rather complex due to the co-operative and distributed nature of the ATN and will highly depend on institutional, regulatory and legal modalities.

This chapter therefore presents the motivations and the interests of the various actors involved in the ATN whose actual deployment will necessarily be linked to the ATN actors' strategies.

Their current position with regards to the ATN can be summarised as follows:

AOs

- AOs are profit-oriented and thus have a strong requirement for a clear ATN business case. They prefer to wait for a ground ATN to be ready before investing in onboard ATN equipment and they push for systems providing solid cost accounting so as to get a clear vision of what they are paying for. Some AOs believe a good ATN incentive would be constituted by the favouring of ATN-capable flights (priority for clearances, direct routes, reduced fees, etc.).

- AOs stress the ATN is focused on ATSC whereas their basic communication needs are based on AOC and AAC: they will therefore preserve the existing ACARS infrastructure (when used and possibly with the VDL2 update) rather than shift to new ATN-compliant AOC/AAC applications, unless clear profits can be envisioned with such a migration.

Their current position is therefore relatively passive vis-à-vis the ATN.

ATSOs

- ATSOs are on the front line for the ATN implementation process since the first ATN-compliant applications are related to ATSC. However the ATN implementation is facing difficulties due to the commercialisation process which has seen a number of European ATSOs shift from the status of public administration to privatised companies. This institutional change consequently influences ATN investments in that the traditional approaches to cost/benefit assessments are evolving into a far more rigorous process and, potentially, with additional or changed objectives. There are also growing concerns about the benefits that can be brought by the ATN for ATSO ground communications as the ATN choice of OSI protocols goes against general market trends in ground communications (TCP/IP-based) and some ATSOs tend to outsource their ground networks.

- Another area of uncertainty is related to the way the ATN will be managed by ATSOs: although the technical architecture is distributed, a need for a coherent management scheme has arisen, especially for backbone resources. This management issue is still to be clarified (Eurocontrol promotes the setting-up of a co-ordination entity, the EACE, to that purpose).

Manufacturers

- ATN manufacturers are either aircraft manufacturers or communication systems manufacturers.

- Aircraft manufacturers have a very cautious position about the ATN: they do not see a clear operational concept based on a new CNS/ATM system, consequently they are aware of a lack of a fully developed business case for the ATN. Moreover the necessary phased introduction of the ATN raises problems as each phase should have an adequate business case. They are therefore in a situation where they are awaiting the AOs and CAAs decisions about the ATN implementation.

- Though the most active in the ATN since they are involved in the experimental ATN projects, communication systems manufacturers are part of a very closed club which rarely attracts new competitors, mainly for very constraining development methodologies (certification) and for the lack of a clear business case.

ACSPs

- ACSPs: the main player in Europe is SITA, although ARINC has recently entered the AOC/AAC European market and new competitors may emerge with new technologies (e.g., LEO/MEO satellite services). SITA's strategy and investment choices, influenced by the AOs technological choices, are therefore a key factor for the ATN implementation, especially for air/ground VHF datalinks.

- The position of ACSPs with respect to the ATN development is very complex and still evolving. ARINC's apparent support for ATN solutions in Europe along with its new relationships with some European ATSOs should impact SITA's ATN strategy which is not clearly stated, as SITA currently supports a "ACARS over VDL X.25" solution below ATN expectations and waits for airlines to push ATN solutions: SITA's concerns are mainly focused on the support of existing customers and investments for AOC/AAC

(ACARS applications, VDL X.25, etc.) rather than promote a new architecture like the ATN.

- In all cases the VDL question seems to be a central issue for ACSPs, depending on the way VDL is managed in Europe: by ATSOs or by contracts with ACSPs (SITA or ARINC).

APOs

- Although they recognise the need for more efficient ATM systems to solve growing congestion problems, airport operators' ATN strategies remain fuzzy: the main enablers of the ATN in airports will be directed by the airlines' requirements.

- Meteorological Services: they have a rather passive role in the ATN implementation and do not have a clear vision of what ATN could provide.

The players' game is quite complex with regards to the ATN implementation as there is a great diversity of the economic rules they are bound to and of their objectives in the ATM area.

2.4 ATN Issues

The main questions raised by the introduction of the ATN are grouped in the following categories:

- ATN availability: when will the ATN products be available and at which costs ?

- ATN deployment: who will operate the future aeronautical communications ?

- ATN motivation: what incentives can be introduced to encourage the ATN deployment? What obstacles may diminish the interest of ATN solutions?

The main trends and key issues identified by this chapter are presented hereafter (key issues are presented in italics):

1. ATN availability:

   - the ATN is the only coherent and complete solution which can satisfy the communication system performance requirements likely to be imposed by the new ATM system in the 2000-2010 timeframe. Alternate solutions that could emerge from the convergence of the IP world and the mobile network technology cannot be complete and certified by that period,

   - *two scenarios can be envisioned for ATN certification: either only airborne equipments are certified or both airborne and ground ATN equipments need to be certified (the ground certification process should hence be defined),*

   - the availability of many ATN services and applications in the ATSC area is ensured through experimental programs managed by or on behalf of the EC or Eurocontrol,

   - there is a conflict between the current AOs networks' evolution which pushes for homogeneous networks around the IP technology and the ATM environment which aims at integrating its ATN architecture around A/G links as well as ground networks. *The key issue that is being thus raised concerns the use of the ATN by AOC: either AOC does not use the ATN, or AOC (AAC and maybe APC) use the*

ATN datalinks,

- FANS-1 is a relative success in that it demonstrated the need for new ATM applications but it also presented deficiencies to its users. There will be no massive introduction of FANS-1, but the movement started by FANS-1 could be used for the ATN benefit if a rapid introduction of ATN applications in line with user requirements is achieved,

- the manufacturers' policy can result in two scenarios for the equipment of aircraft. *Either the traditional aircraft equipment strategy is followed whereby the airlines decide what communication equipments they want to install: in that case, the airlines will not invest in any on-board ATN equipment before the whole European ground ATN infrastructure is ready to supply its ATN-based services, which makes ATN deployment proceed very slowly.*

Or the manufacturers integrate communication management systems on their own for various reasons (e.g., for allowing incremental and flexible upgrades) and the on-board ATN equipment cost is limited to a software installation. If ATN software license fees are kept relatively low, ATN will appear to be able to improve the aeronautical players' profitability and its introduction will be facilitated.

2. ATN deployment: this aspect essentially addresses organisational and institutional issues that could impair the ATN deployment:

   - competition regulation: no matter what their legal status is, the ATSOs will face growing pressures resulting from the application of EC regulations in order to better discern their activities that are part of monopoly operation (on behalf of the States), to discriminate their services according to their content and to invoice them according to cost,

   - institutional evolution of the sector: ATSOs will become more autonomous in the coming years, no matter the form that autonomy may take. This will introduce a new flexibility in their commercial and service charging policies and will lead them to increased outsourcing whenever deemed more advantageous,

   - telecommunication sector interference: the ATN will be set up at the initiative of players of the aeronautical sector, no significant outside competition is likely to emerge. However there will be increasing pressure to delegate ground subnetworks operation to global telecommunication operators under the protection of strict Service Level Agreements,

   - ATN management: two alternatives are proposed for this key issue. *The first is based on the implementation of a European ATN backbone on which the ATN development is to be co-ordinated. In that scheme the backbone is managed by a special central entity, the EACE. The second alternative is based on the progressive and co-ordinated implementation of the ATN over the existing networks in a decentralised fashion, with no initial backbone installation. This leads to a decentralised management of the European ATN made of bi- or multi-lateral agreements,*

   - VHF datalinks: the VDL subnetworks constitute a decisive factor in the deployment of the ATN. It is believed that VDL 2 will be the dominant mode for the implementation of the VDL in Europe. Two alternatives are proposed for this key issue: *the first alternative assumes that ATSOs outsourcing their VDL networks to ACSPs put ACSPs in a decisive position for the ATN deployment. Faced with the airlines' reluctance to manage their AOC traffic in an ATN mode which would require specific investments and faced with the difficulty of negotiating*

interconnection agreements with ATSOs, ACSPs limit the penetration of ATN on air-ground links. The second alternative conversely assumes that ATSOs outsourcing their VDL networks to ACSPs set up in parallel the framework for agreements with ACSPs (e.g., interconnection agreements, traffic distribution according to specified rules, establishment of rules for cost and benefit sharing), which limits the barriers to the ATN introduction.

3. ATN motivation: two central questions need to be answered to better understand the enablers and obstacles to the ATN introduction: What are the economic incentives in the ATN ? What are the possible risks which generate negative reactions ? The possible answers are built around three considerations: the impossibility to get direct State aids for financing the ATN deployment, the differentiation of charges based on onboard equipments and the risks taken by the ATN actors in terms of liability:

   - State aids: no direct, large scale State aid to airline companies can reasonably be envisioned in the normal operational context of the aeronautical industry,

   - differentiation of services: the evolution towards a new ATM opens up possibilities for discrimination of procedures and services offered based on the introduction of concepts such as those included in the notion of RSP (Required System Performance),

   - effects induced on the ATC economy: the double subsidy among users and geographical areas currently in use for ATC charges should evolve by taking into account a closer relationship with costs and with effective consummation of services. Two alternatives can be envisioned with respect to the way ATM services are charged: *the first assumes the current situation is maintained by 2010 (charges remain uniform and homogeneous without relation with the new ATM technology). The second alternative assumes the current system is fundamentally changed around the year 2005 so that incentives are offered for those users of the new ATM technology, based on their RSP level,*

   - liability issues: it is a central and complex question for the migration towards a new CNS/ATM system and therefore for the ATN introduction. A liability framework is required to avoid the case of “diffused responsibility”, especially considering the numerous ATN actors and the distributed nature of the ATN.

     It is thought that the rule of ATN by means of contractual liability relationships between the different actors could be one of the preferred solutions, while acknowledging that the setting up of a legal framework for the ATN is currently hard to achieve, due to the international nature of the ATN, its strict safety requirements and the numerous uncertainties affecting its introduction. However a regulatory framework defined by a central ATN Regulating Authority could form the basis for the contractual regulation and the consequent delineation of contractual and extra-contractual liability.

     Consequently the analysis of liability issues reveals the need for specific international charters or conventions which would particularly deal with the sharing of responsibility within predetermined frameworks.

2.5 Scenarios for the ATN

This chapter proposes scenarios for the ATN based on the previous analyses and on the identified trends and key issues.

The key issues for those scenarios can be summarised as follows:

1. the competition facing the ATN: the relative success of FANS 1/A products has demonstrated the relevance of the datalink concept and has set a favourable context for the introduction of the ATN solution, provided that ATN products will rapidly emerge with relatively low costs and that the FANS 1/A solutions are not widely used,

2. the organisational conditions for the ATN deployment: either the ATSOs keep the control of their networks and positively influence the migration to the ATN, by setting up an ATN backbone and a centralised management to co-ordinate its development and by controlling their VHF networks in order to progressively deploy VDL subnetworks for their own ATSC applications; or outsourcing is given precedence, especially for the VHF networks, which will push ACSPs on the front line for the ATN development with a sort of initial duopoly (SITA and ARINC). This latter alternative would necessitate strict interconnection agreements among the networks and regulatory measures imposing obligations to the ATN operators, possibly linked to a more global ATM regulation,

3. the motivation for the ATN: strong incentives could be provided by differentiated services and more particularly by differentiation of routes with differentiation of charges although that policy is not in line with the current ATM policy based on uniformity and equality of rights for all airspace users. The risks associated with the ATN are mainly linked to its economical accessibility and the liability issues (sharing of responsibilities). Two scenarios can be envisioned based on those considerations: the first maintains the current situation (uniformity of charges, segmented liability scheme where each actor is governed by the public law of each country). The second scenario conversely is based on differentiated services and charges, with appropriate contractual relations governed by an international convention defining the responsibilities of the ATSOs.

In conclusion two overall scenarios are described:

- the first one (“Public Voluntarism”) assumes the ATSOs stay the masters of the game but do not fundamentally change the rules of the game. The ATN takes place on the ground first and is managed in a co-operative way by the various ATSOs. AOC messages will not be transported over the ATN, so there will be no true convergence of aeronautical flows around the ATN. Public law stays dominant for both liability and charges issues. Only the ATN backbone will be subject to a convention for its operation,

- the second scenario (“Market Driven”) assumes the airlines arrive at the limit of FANS capabilities before turning to the ATN. The ATSOs no longer control their networks which are more and more managed by the ACSPs as a consequence of the major institutional and economic evolution of the ATSOs. A set of regulations are enforced on ACSPs to ensure the strict needs of ATSOs. The regulation also concerns the essential requirements that are imposed on the ATSOs (e.g., service levels for certain critical applications). The tendency to limit the ATN to the critical part of the network which is induced by this scenario is countered by the incentive policy set up by the ATSOs and by differentiated corridors yielding a financial incentive for AOs through the reduction of charges for ATN-based flights.

In the conclusion the authors of the report stress the need for a regulation of the ATN: instead of focusing on one or another scenario, they suggest a thorough reflection to be undertaken to determine the rules to be favoured in order that aeronautical telecommunications are able to satisfy the ATM needs. In particular this should lead to the definition of a regulation authority and the content of that regulation, as well as the breakdown between regulatory and operational functions in the ATM sector.

3. The ACCESS Perspective

3.1 General

The ATNII Deliverable 1 report places the ATN implementation within the overall context raised by a new CNS/ATM system, thus allowing to better understand the non-technical obstacles the ATN has to face.

The general impression is that many efforts of the ATSOs supporting the ATN are being devoted to the elaboration of a technical architecture and its implementation plan (which is a necessary task) whereas it will not prove to be successful if it is not complemented by the proposition of adequate solutions for the organisational, institutional and economical aspects which are tightly coupled. The feasibility of the ATN implementation plan proposed by ACCESS is likely to be undermined unless the essential institutional or non-technical enablers can also be put in place in a timely way.

Although the Deliverable 1 report raises many important issues to that purpose, it does not propose practical solutions; this work is to be considered in the second phase of the ATNII study programme. Moreover the issues proposed by the report extend beyond the aeronautical communications up to the future CNS/ATM system and even to the strategic changes currently affecting the landscape of air traffic control activities in Europe (ATSOs' corporatisation process, economical relationships between AOs and ATSOs, regulation of European ATM activities, etc.): those high-level considerations suggest that more efforts are required from ATSOs in order to pave the way for an easier introduction of the ATN in the context of the new CNS/ATM system in Europe.

However the report acknowledges the difficulties raised by those issues because the main players involved in the ATN have not made univocal operational choices and because there is a lack of a clear CNS/ATM operational framework and associated business case (it can be reasonably assumed that a solid business case would free the various players' energies to build the required organisational and institutional solutions).

For the ACCESS Project the significant elements identified in the report are:-

- The need for an ATN regulation and of a subsequent ATN regulation authority, which should define a regulatory framework ("ATN Convention"), within which parties can define their contractual agreements or conventions (in case of State administrations) and the specific liability rules. The authors of the report call for a separation of regulatory and operational functions in the aeronautical community, similarly to what has been done in Europe in the telecommunication sector under the EC pressure.

- The need for an operational entity for the European ATN co-ordination and possibly for certain management and/or accounting tasks to be defined (e.g., management of the backbone, cost/benefit sharing, etc.). This European entity should not be entrusted with any regulatory function.

- The foreseeable evolution towards a network built around commercial alliances and contracts instead of the usual multi-lateral co-operation between public administrations (ATSOs or CAAs). This evolution implies a new policy for aeronautical charges (e.g., differentiated services and charges) which could represent a strong incentive for the ATN but whose feasibility can be questioned, at least in the ACCESS timeframe. This issue is particularly related to the institutional evolution of some ATSOs coupled with EC regulations concerning competition (what are the core activities of ATSOs that can stay under State monopoly ? what activities should be open to competition ?). Even if the comparison of the ATM sector with the public telecommunication sector is adequate, in

view of the specific constraints of air transportation (e.g., safety, certification, time required to make any large evolution effective, etc.) it is rather difficult to assess the likeliness of such profound changes within the ACCESS timeframe.

- The importance of the AOC for the ATN and subsequently of the VHF datalink question (who will operate and manage the VDL subnetworks in Europe ? Will AOC and ATSC fully converge into a single solution, the ATN ?). This issue can be a decisive factor for the ATN business case but it places ACSPs and AOs at the core of the ATN introduction process in addition to ATSOs, which unfortunately generates a rather complex game around the ATN introduction. The necessary co-operation between such various actors enforces the regulatory and organisational needs previously presented.

- The need for strict SLAs governing the interconnections of the various actors' networks making up the ATN (especially for outsourced ground networks and air/ground networks operated by ACSPs, e.g. in the case of VDL subnetworks provided by ACSPs or future LEO/MEO satellite subnetworks provided by equivalent operators). The required SLAs shall not be restricted to purely commercial agreements with liability and indemnity rules: they shall encompass technical agreements and strict co-ordination rules aiming at ensuring the strict performance and availability requirements of the ATN.

3.2 Relation of the Scenarios to the ACCESS Strategy

The scenario implicitly assumed in the context of ACCESS anticipates a hybrid version of both of the ATNI2 scenarios A and B containing market driven and long-term investment elements:

- The involvement of ACSPs in the provisioning of A/G subnetworks is fully in line with the market driven approach and recognises the key role of AOs as the major force in the future acceptance of the ATN.
- Co-ordinated ("voluntary") ATSO long-term investment in the ground infrastructure will be necessary in order to make the migration to the ATN attractive to AOs.
- The simultaneous usage of existing ground networks for current applications and for ATN subnetworks means that the major ATSO network investments will be in ATN routers and end systems.

3.3 Synergy with Individual ACCESS WPs

3.3.1 General

As no "ready-to-use" organisational or institutional scheme is proposed by the ATNII report for the management and the regulation of the European ATN, there is no obvious incompatibility between the assessments of that study and the ACCESS propositions which could be highly impacted by non-technical aspects.

3.3.2 System Management (WP227)

The system management framework proposed in WP227 shows the importance of the co-ordination and co-operation required between ATSOs for ensuring the correct operation of the network for either day-to-day on-line supervision as well as for its off-line management. An inter-organisation system management model (i.e., the centralised co-ordination model) is proposed to that purpose whereby responsibilities for some inter-domain system management activities are in the hands of a central co-ordination entity. The creation of such

a central body and the definition of the roles and responsibilities of each implied party raise specific institutional issues that need to be addressed.

Hence system management solutions for the European ATN are particularly affected by institutional issues that must be satisfactorily addressed in order to set a coherent system management framework.

3.3.3 Security (WP222)

The planned operation of the same ATN security mechanisms throughout Europe (and even on a world-wide scale) raises questions about the compatibility of those mechanisms with the various national legislations (e.g., the use of private key-based encryption and/or digital signature technologies may be subject to legal restrictions depending on the countries).

The ATN regulatory framework (still to be defined) should therefore be set so as to take into consideration the specific problems raised by the diversity of the current national legislations in Europe (especially if encryption will have to be used for some ATN exchanges). One possible solution would consist in having the international "ATN Convention" integrate appropriate dispositions for enforcing the use of well-defined ATN security services in all countries (but is it feasible ?).

3.3.4 Deployment Scenarios for VDL 2 (WP220A)

The institutional issues related to the VDL deployment as presented in the WP220A document mainly service level agreements (SLAs) with CSPs in order to ensure the strict QoS requirements of ATSC traffic and the liability question associated to the use of communication paths extending beyond the direct responsibility of a single ATSO (e.g., encompassing outsourced ground networks or ACSP-managed air-ground datalinks).

Those considerations are in line with the ATNII report analysis although there is no practical solution proposed at that stage of the study.

3.3.5 Third Party Service Provision (WP220)

This work package extends the discussion first identified in WP220A for mobile subnetwork service provision to consider the points/segments in the end-to- end communications architecture which can be contracted out to Third Party Communications Service Providers. Consideration is also given to management of such an arrangement through an SLA and detailed guidance is provided on how to create such a document. This approach provides a flexible mechanism and is scaleable to deal with differing institutional arrangements during the evolution of the ATN environment. The ACCESS approach complements the ATNII assumptions and does not preclude any of the possible scenarios under discussion.

3.3.6 Safety Assessment/Certification (WP223)

The ACCESS study recognises the need for appropriate certification activities and the importance of a clear safety management process to enable the assessment of any system which supports a safety related service. It identifies the ongoing nature of discussions concerning on the most appropriate techniques for certification and safety management in the light of a new environment which significantly increases the integration between air and ground systems to provide an overall ATM service. International consensus has not yet been achieved on these issues and it is expected that discussions to formalise common approaches will continue for some time.

The ATNII Deliverable1 foresees two alternative outcomes to the certification approach;

either the airborne component alone of the ATN will need to be certified or the entire ATN infrastructure will need to be certified. The ACCESS philosophy to can be applied in both of these scenarios , and it does not attempt to resolve the basic question of the scope of the certification process. However the full certification of ATN ground communications infrastructure would almost certainly bring the certification status ATN end-systems into question and prove to be very problematic for implementation within the ACCESS timeframe.

The ACCESS project is proposing a modular approach to the construction of system safety cases by the establishment of clear targets for the quality of service of the component parts of the ATN infrastructure which are verifiable in operation and effectively decoupled in performance terms from other components.

4. Conclusions

The work completed by the ATNII study identifies the potential need for fundamental changes to the institutional structures to benefit from the full potential of enabling technologies such as ATN on the European ATM services. There is significantly commonality of these issues across the CNS/ATM concept and the implementation period to bring about some of these changes would extend beyond the timeframe of the ACCESS study. However the impact of institutional issues when planning the development of the ATN is an important consideration: *a purely engineering approach might come up with solutions which, for institutional reasons, are not feasible in reality.*

By taking a more pragmatic approach, ACCESS has examined the mechanisms required to put the technical building blocks in place to enable an initial ATN to be implemented. For example, the use of third party communications service providers and the development of detailed service level agreements to control and manage this relationship; the development of techniques to enable the end-to-end “certification” issue to be addressed through a modular approach to the construction and maintenance of system safety cases. Where the possible evolution of institutional arrangements, as foreseen by the ATNII Study, introduces a potential impact on the technical approach taken by ACCESS, *no conflicts or constraints have thus far been identified and vice versa.*

In conclusion, it is beyond the scope of the ACCESS project to resolve institutional issues such as the need for ATN regulation. This would be a pre-requisite for any European ATN implementation plan. The appropriate ‘structures’ will have to be defined by ATN stakeholders to address these issues in a timely manner in order to ensure a successful operational ATN deployment. It is expected that the future LINK2000+ programme will contribute to the creation of these ‘structures’.

Glossary

AAC	Aeronautical Administrative Communication
ACCESS	ATN Compliant Communications - European Strategy Study
ACSP	Aeronautical Communications Service Provider
AMSS	Aeronautical Mobile Satellite Service
AO	Aircraft Operators
AOC	Aeronautical Operational Communication
APC	Aeronautical Passenger Communication
APO	Airport Operators
ATC	Air Traffic Control
ATCC	Air Traffic Control Centre
ATM	Air Traffic Management
ATN	The ICAO Aeronautical Telecommunications Network
ATNITF	ATN Implementation Task Force
ATS	Air Traffic Services
ATSC	Air Traffic Service Communication
ATSO	Air Traffic Service Operator
CEC	Council of the European Commission
CNS/ATM	Communications, Navigation and Surveillance / Air Traffic Management
FANS	Future Air Navigation System
ICAO	The International Civil Aviation Organisation
ISO	International Standards Organisation
OSI	Open System Interconnection
QoS	Quality of Service
SARPs	Standards and Recommended Practices
SLA	Service Level Agreement
TCP/IP	Transport Control Protocol / Internet Protocol
TPSP	Third Party Service Provider

VDL	VHF Datalink