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Agenda Item 5: Radio Navigation Aids

IATA POLICY AND POSITIONS ON NAVIGATION

(Presented by IATA at the Working Group of the whole of NSP
St. Petersburg, Russia, from 25 May to 4 June 2004)

SUMMARY

This paper presents a framework industry policy and positions related to navigation and GNSS. The policy and positions, recently adopted by IATA in consultation with 270 airline members, support the transition away from ground based navigation infrastructure and the development of navigation solutions “fit for purpose”. Any strategy requiring multiple equipage or solutions, deliberate or unintentional seams in service, or non-standard applications is discouraged.

1. INTRODUCTION

1.1 Existing ground based navigation infrastructure is costly to maintain, and in many instances, redundant for the purposes for which it was originally developed. On the whole, self-contained on-board navigation systems – augmented internally, or with reference to limited ground-based or space-based infrastructure – are able to fulfil all en-route navigation requirements, almost anywhere on the globe. Increasingly, the on-board navigation systems are being proven to meet navigation requirements in terminal areas, and to some extent in approach and departure environments.

1.2 The continued move in this direction, as a cost-effective and efficient navigation solution is supported. The efficacy of blanket solutions to terminal and approach navigation proposed under the general umbrella of “wide area augmentation systems” is questioned, especially when - in certain areas of the world - simple and reliable non-precision approach procedures would meet most user expectations. This paper presents recently agreed industry positions on operational requirements for navigation.

2. IATA’S ROADMAP TO ONE SKY ... GLOBAL ATM

2.1 The International Air Transport Association (IATA) - as the industry association that represents the majority of the world’s international airlines - has developed *One sky...global ATM* to present IATA’s vision of a future integrated global air navigation system. It is a vision offering enhanced safety and efficiency whilst accommodating worldwide air traffic growth in an airspace that is seamless and devoid of the inefficiencies resulting from national borders and poor use of the global airspace resource. *One sky...global ATM* includes a transition roadmap to guide implementation strategies in the various regions of the world.

2.2 The roadmap outlines seven ATM Result Areas, applicable in part, or in whole, across all regions of the globe. It also outlines a transformation path for the communications, surveillance and navigation enablers, which will allow the transition away from the traditional reliance on ground-based infrastructure.

2.3 As recently as the 18th and 19th of May 2004, at the 6th Air Navigation Commission (ANC) Meeting with Industry to discuss progressing the recommendations of the 11th Air Navigation Conference, it was agreed that a Global Roadmap for transition to future ATM should be prepared and included in the Global Plan. Industry has agreed to develop this plan - based on IATA's Roadmap, and those of other organizations and States - and submit it for ANC consideration by the end of November 2004. The plan will include broad transition strategies for navigation infrastructure, including potential decommissioning schedules. It was stressed that this plan was essential to ensure global harmonization, and to avoid significant and wasted efforts of the past, an example of which is the VDL 3 debacle, which cost over one billion US dollars for zero benefit.

3. IATA NAVIGATION POLICY AND POSITIONS

3.1 In support of the navigation element of the roadmap to *One sky...global ATM*, IATA recently adopted, in consultation with 270 airline members, navigation policy and positions that support the transition away from ground based navigation infrastructure and the development of navigation solutions "fit for purpose". A key tenet is that any strategy requiring multiple equipage or solutions, deliberate or unintentional seams in service, or non-standard applications is discouraged.

3.2 The IATA policy and positions on navigation are may be found in the Attachment

4. RECOMMENDATIONS

4.1 The working group is invited to note and discuss the attached air transport industry positions on navigation, GNSS and related subjects and to take into account these airline user viewpoints during deliberations on all aspects of its work programme.

ATTACHMENT

IATA POSITIONS ON NAVIGATION, GNSS AND RELATED SUBJECTS

NAVIGATION

1. In the evolutionary improvement of the aeronautical navigation infrastructure to support current and future air traffic management, the following requirement set must be met:
 - a. The navigation system will continue to allow air transport aircraft to operate within all airspace, at least to the level of individual system performance currently provided by ground-based navigation aids, GNSS, and/or self-contained navigation equipment;
 - b. The navigation system mix¹ will be capable of supporting justifiable² en-route navigation requirements based on ICAO specified RNP values;
 - c. Aircraft with lesser individual navigation system capability will be allowed to operate without unreasonable penalty³, subject to conditions defined by appropriate regulatory authority or service provider;
 - d. The navigation system mix will support gate-to-gate all-weather operations including non-precision and precision approaches, straight-in and/or curved, to justifiable minima.
 - e. Where justified, the navigation system mix will support
 - Taxi in low visibility conditions
 - Takeoff in low visibility conditions
 - Departure procedures with flight paths that support airspace deconfliction and capacity benefits
 - User-preferred routing between major airport pairs
 - Arrival procedures with flight paths that support airspace deconfliction and capacity benefits
 - Approach operations that provide continuous stabilized descent to all runway ends
 - Landing and Rollout in low visibility conditions
 - Missed approach, including straight out and flight paths intended to support airspace deconfliction and capacity benefits
 - Advanced surface movement guidance and control subject to local assessment of user need and technical risk
 - f. The system mix will be capable of providing availability and continuity of service such that current requirements for navigation guidance to alternate aerodromes are met or exceeded;
 - g. The navigation system mix will be capable of supporting Automatic Dependent Surveillance [ADS] requirements at aerodromes and in controlled airspace globally; and

¹ “Navigation system mix” refers to the set of navigation aids or sources used to provide or derive navigation guidance.

² In the context of this policy and associated position statements, the words **justify**, **justified**, and **justifiable** have the following meaning: “able to transparently demonstrate net positive benefit [cost and/or safety] to the air transport user community – or a section thereof - either directly, or peripherally, and, where applicable, without imposing undue penalty on other sections of the airspace user community, in accordance with basic principles of equity and access”.

³ the operation of lesser equipped aircraft should be accommodated where there is no substantial impact on the operations of equipped aircraft. Service providers should not impose blanket exclusions, or practices which restrict the operation of non-equipped aircraft, unless it can be shown that such measures are required for overall safety or overall economic benefit. Notwithstanding, when developing procedures to support equipped aircraft, efforts should be made to either encourage or incentivize greater fleet equipage, or to accommodate non-equipped aircraft in special time bands, level bands, or other such processes.

- h. The navigation system mix will be harmonized with other elements of the global ATM system.
2. Where the evaluation of navigation requirements determines that a number of elements in the navigation mix are no longer required by the air transport community, costs associated with the continuation of those elements should immediately be removed from air navigation charges to the air transport community. Due notice should be given to the various airspace users to enable them to plan the transition.
 3. The evolving navigation mix should, to the maximum extent possible, make use of free and freely available public navigation services to satisfy the requirements above. There may be no need or justification for additional aeronautical augmentation and integrity systems built into the satellite system, which carry additional costs.
 4. Basic radio navigation satellite services should be provided free of charge.
 5. Currently available navigation services, including standards and radio spectrum should be protected until such time as alternative navigation services become available, which provide at least equally safe and cost effective service to the user as present navigation services and the majority of operators are suitably equipped.
 6. As there is no justification for revalidation of the signal-in-space, airspace users should not be charged in cases where a State chooses to exercise its sovereign right in this regard.
 7. States should not require a specific navigation mix or preclude aircraft certified combinations; the only requirement should be that the combination meets the RNP requirements.
 8. Airspace users should not be constrained for institutional reasons to the use of specific GNSS services when alternatives are available.
 9. When designing or modifying airspace structures, air routes, transition procedures and approach/departure procedures to take advantage of emerging navigation capabilities, the design authority must take into account the net benefit of the changes, the ability of the airspace user to effectively use the procedures, and the ability of the service provider to effectively apply the procedures. Early consultation at operational level with users and service providers must be undertaken, and users must be included in all aspects of design work to ensure that outcome best meets the intended objectives.
 10. Information on system degradation or outages related to the underlying navigation infrastructure, including localised and regional effects, must be provided in a timely manner and a user-friendly format.

GNSS AND THE TRANSITION TO GNSS

1. States should - in collaboration with airspace users and subject to cost benefit analyses – move in a timely and coordinated manner from the current ground-based system to a harmonized, compatible, cost-effective and interoperable space-based radio-navigation system capable of being used in all airspace during all phases of flight. States should implement GNSS procedures, with a view to achieving as soon as possible worldwide navigation capability from departure, through en-route to justified minima.
2. Basic radio navigation satellite services should be provided free of charge.
3. IATA urges States to undertake the transition to a cost-effective, beneficial, harmonized and seamless satellite-based navigation service. Benefits include:

- Increased safety, including a reduction in CFIT risk
- Reduced flight time, operating cost and fuel consumption
- On-time operation
- Enhanced position and situational awareness for pilots
- Reduction in user charges through a rationalization of the navigation infrastructure

Such Cost/Benefit analysis must take into account the full costs of airborne equipage for airspace users and not be based solely on reduction of costs of service provision.

4. Minimal safe terrestrial infrastructure should be retained until sufficient experience has been gained to validate GNSS in terms of safety, efficiency and cost-effectiveness. The frequency bands allocated to ILS/GLS⁴/MLS shall be protected.

5. The withdrawal of ground based navigation aids should allow a reasonable period of transition. The full benefits of GNSS-based applications will only become available when a majority of airspace users has assessed and agreed to equip. The business case for decommissioning ground based navigation aids should include the cost of early depreciation/decommissioning of aircraft equipment and functionality, and retrofit of equivalent GNSS-based equipment & functionality. Air navigation service providers, should be encouraged to enter into early operational assessment programs to provide early benefits to interested operators.

6. Interoperability between various different satellite constellations is required, with no common mode of failure. The aircraft GNSS receiver should be able to produce a navigation/time solution output that is independent of the GNSS (and GBAS/SBAS) constellation used.

7. The increased number of navigation signals and services, and their potential combinations require careful management at a user level. The ways that the different elements can be combined must be limited to a manageable number.

8. When evaluating means of enhancing safety, or reducing minima associated with approach operations, Barometric VNAV [Baro-VNAV] procedures, taking advantage of existing equipment, should be immediately considered as an alternative augmentation, particularly in areas of the world where ground based navigation aids are unreliable or non-existent.

9. Any introduction of new augmentation systems should be justified, and where required must be amortized over the entire user community, not just the aviation or airline sector, considering that augmentation systems are already available – both autonomous (RAIM, AIM, IRS filtering) and external (GBAS).

10. In considering the business case to retrofit/equip for SBAS or GBAS, airlines will take into account that future constellations, like Galileo and modernized GPS, may alone or in combination provide advanced services without costly augmentation. The business case to retrofit/equip for SBAS or GBAS will take into account the complexities of integrating the capability into aircraft systems (e.g. displays, alerting, maintenance, etc.).

NON-VISUAL AIDS FOR CATEGORY II AND CATEGORY III APPROACH AND LANDING

1. The long-term goal of IATA Member airlines is implementation of globally harmonized, compatible and interoperable navigation procedures supported by GNSS for all phases of flight, including CAT II/III operations, provided the latter are demonstrated to be efficient and cost effective.

⁴ GLS – an abbreviation for GNSS-based Landing Systems. This term is not yet in common use.

2. States should collaborate with airspace users to determine if improvements in efficiency and cost effectiveness can be realized, taking into account the costs of airborne equipage for all operators that use the airfield, before taking action to decommission ILS CATII/III facilities. States should continue ILS service to the highest sustainable category until such time as the majority of operators are equipped with the GNSS Landing System.
3. Considering the potential complexity of GBAS architecture to support CATII/III, airlines and service providers will need to assess user need, achievable schedule and technical risk.
4. States should ensure there is no degradation of services related to non-visual aids for approach and landing during the transition phase.
5. States should take action against interference caused by construction and radiating sources in close proximity to airports in order to extend the lifecycle of ILS CAT II/III operations.
6. States should only consider MLS/GLS implementation in specific cases where existing ILS CAT II/III cannot be maintained or where MLS/GLS operational and/or economic benefits are proven. Implementation of MLS/GLS alone should not be a justification for any reduction in services to aircraft that are not MLS-equipped.

REQUIRED NAVIGATION PERFORMANCE (RNP)

1. Airspace users support global implementation of the RNP concept originally developed by ICAO and amplified by the aviation industry, in order to provide a seamless environment and standard aircrew procedures. RNP will allow the most efficient operations based on navigation performance of available sensors rather than assumed worst-case performance.
2. The choice by a State or Region of ICAO specified RNP route or airspace values/requirements must, in all cases, be benefit driven. States and Regions should only select RNP values in accordance with those promulgated in Annex 11. Where other values are considered, they must be justified.
3. RNP can be presently met using either GNSS, the current ground based navigation infrastructure, airborne self-contained systems or a combination of these. The choice of navigation mix to meet a specified RNP value/requirement should be at the discretion of the aircraft or operator, subject to assessment of the availability and continuity thereof. States and/or regions should not unnecessarily restrict the use of navigation solutions. Notification of the ability of an aircraft or operator to meet the prescribed navigation performance will be provided in the appropriate flight notification.
4. In light of the urgent need for global harmonization, ICAO should take the lead on RNP implementation issues and encourage States to develop all future procedures based on these standards. States should be encouraged to transition current procedures to conform to RNP standards.

Reasons

The aviation community requires a worldwide system providing services that are safe and efficient, globally harmonized, compatible and interoperable and do not require different avionics and procedures in different regions. Airspace users require benefit driven solutions.

Airspace users support global implementation of the concept of Required Navigation Performance (RNP) developed by ICAO. RNP creates a seamless environment that allows standard classification of airspace and standard aircrew procedures while allowing the most efficient operations based on navigation performance of available sensors rather than assumed worst-case performance.

RNP can be presently met using either GNSS, the current ground based navigation infrastructure, airborne self-contained systems or a combination of these. The choice of technology must, in all cases, be benefit driven, and selected in close collaboration with airspace users.

Without ICAO standards and guidance there is the potential for proliferation of differing requirements in States and/or regions, which may eventually result in additional burden on aircraft operators and service providers. ICAO should therefore designate a suitable body to act as the focal point for further development of Area Navigation (RNAV) and RNP. This activity should build on the experience of early operations and give strong consideration to the installed RNP functionality in a large number of modern air carrier aircraft and most new aircraft.

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