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Proposed Backward Compatibility Requirements

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Summary

This paper defines the need for ADS-B implementations to consider backward compatibility features to support future interoperability between ADS-B participants when changes are incorporated. It is assumed that changes may be optional or implemented by the ADS-B user population over some interval of time where mixed configuration operations will be encountered. During these situations, compatible and appropriate interactions will need to be maintained.

Introduction

This paper defines the need for ADS-B implementations to consider backward compatibility features to support future interoperability between ADS-B participants when changes are incorporated. It is assumed that changes to ADS-B systems may be optional or may be implemented by the ADS-B user population over some interval of time where mixed configuration operations will be encountered. During these situations, compatible and appropriate interactions will need to be maintained.

Discussion

ADS-B applications and associated requirements are expected to evolve over time. Likewise, ADS-B implementations, both on the transmitting side and on the receiving side (air and ground), are expected to incrementally implement ADS-B capabilities as the user's needs evolve and benefits can be realized. Under these conditions, varying configurations of ADS-B systems will be fielded and expected to inter-operate.

Some of this variability between ADS-B users has been recognized and has already been addressed by features in the ADS-B MASPS. These features include:

- Capability Codes – Transmitting A/Vs can announce the capabilities that they support, thus allowing using applications to verify that targets support required capabilities and respond accordingly.
- Service Levels – Similar to Capability Codes but defined at levels of service supported.
- Data Available Flags – Transmitting A/Vs can announce when specific data elements are not available on either a temporary or permanent basis.
- Data Type Flags – Transmitting A/Vs can announce the type characteristic for data elements defined to allow type differences, e.g. True/Magnetic Heading.

However, new changes in ADS-B requirements result in different interoperability concerns. When these changes are the result of defining new features and capabilities, they can be announced by one of the above methods, e.g. addition of a new Capability Code or Service Level. These types of changes are "additive" in nature. In these cases, the using applications will be able to check the target data set for support of the new capabilities.

When a requirements change is made to an existing data definition or to an existing performance characteristic, the above methods may not be adequate to recognize an interoperability affect. In some of these situations, the developers of the MASPS and MOPS can define the change in a way that the difference results in an acceptable affect on the using applications or is transparent, i.e. equivalent, to the using application when interacting with updated and non-updated targets.

However, the situation of concern is when requirements changes cannot be defined this way. These situations can occur for requirements changes at either the MASPS level or at the MOPS level. For these cases, another means to deal with non-interoperable

configurations needs to be addressed. Since mixed configurations will need be tolerated, at least during a transition interval during which affected A/V are updated, the MASPS should incorporate requirements to handle this problem. A potential means to address requirements incompatibilities is to identify the version of requirements that is supported by the A/V. Using applications can then verify version compatibility and appropriately respond.

Recommendation

1) Add a "version" data element into the Mode Status report to identify the current requirements version that is supported by a transmitting A/V. This "version" element could address the ADS-B MASPS level and/or link MOPS version identifiers.

2) Add requirements text that identifies the need to analyze changes in requirements to assess potential incompatibility or interoperability impacts. This analysis should consider compatibility with existing fielded ADS-B systems and with ADS-B systems having different capability levels.

3) When compatibility impacts are identified, define the appropriate ADS-B requirements associated with the change that assures acceptable operational compatibility is managed.