



International Civil Aviation Organization

The Combined Sixth Meeting of the FANS Implementation Team, Bay of Bengal (FIT-BOB/6) and the Third Meeting of the FANS Implementation Team, South-East Asia (FIT-SEA/3)

Bangkok, Thailand, 22 – 25 November 2005

Agenda Item 8: Any other business

**REQUIRED COMMUNICATION PERFORMANCE (RCP) CONCEPTS
– AN INTRODUCTION**

(Presented by the Secretariat)

SUMMARY

The concepts of Required Navigation Performance (RNP) are now widely understood in the civil aviation community. This paper introduces the concepts and progress to date in respect of Required Communication Performance (RCP) and summarizes the work of the Operational Data Link Panel (OPLINKP) in this regard.

1. INTRODUCTION

1.1 ATM is achieved through the collaborative integration of humans, information, technology, facilities and services, and supported by communication, navigation, and surveillance capabilities that are dependent on each other. For instance, the communication and surveillance capabilities and performance required for a given operational capability will depend on the capabilities and performance of the available navigation and other air traffic management functions, including those on the aircraft. Therefore, to establish the capability and performance requirements of the ATM system, it will be necessary to consider it in its overall context, taking into account interdependencies.

1.2 To meet the demands on airspace capacity and operational efficiency, the operational communication capability is increasingly playing an essential role in air traffic management using a mixture of data and voice communication. For example, data link can provide for integration of air traffic management functional capabilities on the aircraft and at the ATS units, and more direct controller-pilot communications enabling user-preferred and dynamic rerouting, and intervention capabilities in reduced separation environments where alternative communications are more cumbersome.

1.3 The RCP concept provides a means to ensure the acceptable performance of communications within a complete ATM system.

2. DISCUSSION

RCP Concepts

2.1 The RCP concept characterizes the performance required for communication capabilities that support ATM functions without reference to any specific technology, and is open to

new technology. This approach is essential to evolving operational concepts using emerging technologies. The RCP concept also assesses operational communication transactions taking into account human interactions, procedures, and environmental characteristics.

2.2 The basis for the development of the RCP concept was the need for objective operational criteria, in the form of an RCP type, to evaluate a variety of communication technologies. Once these criteria have been set and accepted, a specific implementation, considering system technical and human performance, may be assessed for its viability against acceptable operational criteria.

2.3 An RCP type is a label (e.g., RCP 240) that defines a performance standard for operational communication transactions. Each RCP type denotes values for communication transaction time, continuity, availability, and integrity applicable to the most stringent operational communication transaction supporting an ATM function.

2.4 The RCP concept is technology independent. However, it is not intended to promote an unrestricted number of alternative communication technologies for one ATM function. Whilst RCP types will be prescribed on the basis of regional consultation within the ATM community, so too will be the aircraft equipage requirements for communications. Interoperability and cost considerations will be major items to contend with during such consultations.

2.5 Several factors may affect State decisions as to when an RCP type will be prescribed. These factors are based on the ATM functions that an air traffic services (ATS) provider chooses to implement within that airspace. In cases where a safety related change, including the implementation of a reduced separation minimum or a new procedure, are predicated on communication performance, an RCP type should be prescribed. The approval of this change should include showing that the requirements and assumptions defined by the RCP type have been met.

RCP Types

2.6 In order to simplify RCP type naming conventions and to make the required communication transaction time readily apparent to airspace planners, aircraft manufacturers and operators, the RCP type is specified by the value for the communication transaction time (in seconds) associated with the ATM function e.g. RCP400.

2.7 An RCP type comprises values assigned to the communication transaction time, continuity, availability, and integrity in accordance with the following:

- Communication transaction time - The maximum time for the completion of the operational communication transaction after which the initiator should revert to an alternative procedure.
- Continuity - The probability that an operational communication transaction can be completed within the communication transaction time.
- Availability - The probability that an operational communication transaction can be initiated when needed.
- Integrity - The probability that communication transactions are completed within the communication transaction time with undetected error.

2.8 The following table specifies example RCP types proposed for general application. Further development and validation of operational RCP types/selections would be required prior to implementation.

RCP type	Transaction time (sec)	Continuity (probability/flight hour)	Availability (probability/flight hour)	Integrity (acceptable rate/flight hour)
RCP 10	10	0.995	0.99998	10 ⁻⁵
RCP 60	60	0.99	0.9995	10 ⁻⁵
RCP 120	120	0.99	0.9995	10 ⁻⁵
RCP 240	240	0.99	0.9995	10 ⁻⁵
RCP 400	400	0.99	0.999	10 ⁻⁵

- RCP 10 would be used for controller intervention capability supporting separation assurance in a 5 nm radius environment.
- In combination with the RCP 10 in a 5 nm radius environment, RCP 60 may be applied to routine communications on a data link system to offload the voice communication system.
- RCP 120 would be used for controller intervention capability supporting separation assurance in a 15 nm radius separation environment.
- RCP 240 would be used for controller intervention capability supporting separation assurance in a 30/30 separation environment.
- RCP 400 would be used for controller intervention capability supporting separation assurance in current environments where separations are greater than 30/30 and alternative technologies are planned for providing normal means of communication, e.g., Iridium voice or HF data link in lieu of HF voice.

The work of OPLINKP

Development of SARPs, procedures and guidance material relating to the use of RCP is being progressed under the auspices of the ICAO Operational Data Link Panel (OPLINK). The matter was considered during the first meeting of OPLINK (OPLINK/1), held in Montreal, Canada from 12-23 September 2005.

OPLINK/1 considered that RCP had progressed from a conceptual framework to a point whereby the panel could advise the Air Navigation Commission on technically practical and operationally feasible ICAO provisions to support operational requirements. Furthermore, the current work was expected to support the efforts of States to transition to performance-based operations, a critical aspect of evolving to a safer and more efficient global ATM environment.

2.11 OPLINK/1 discussed proposals for the amendment of Annex 6 — *Operation of Aircraft*, Annex 11 — *Air Traffic Services*, and the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444). The meeting also discussed the development of RCP guidance material.

2.12 In respect of Annex 6, OPLINK/1 agreed that where an RCP type has been prescribed, an aeroplane or helicopter would need to, in addition to meeting existing Annex 6

communications requirements, be provided with communication equipment which would enable it to operate in accordance with the prescribed RCP type(s) and be authorized by the State of the Operator for operations in such airspace. Furthermore, the Annex should reference the *Manual on Required Communication Performance (RCP)* for associated RCP procedures and guidance concerning the approval process.

2.13 With regard to Annex 11, OPLINK/1 agreed that RCP types would only be prescribed by States and where applicable, this prescription would be on the basis of regional air navigation agreement. Furthermore, the prescribed RCP type would need to be appropriate for the airspace concerned and therefore necessarily consistent with the air traffic services (ATS) being provided. In addition to existing ground-ground and air-ground communication requirements in Annex 11, ATS units would need to be provided with communication equipment which would enable it to provide ATS in accordance with the prescribed RCP type(s).

2.14 In considering PANS/ATM, OPLINK/1 agreed that, in accordance with the provisions proposed for Annex 6 and with respect to flight planning responsibilities, the operator would need to ensure that, where applicable, the aircraft had an appropriate RCP approval, and that all conditions applying to the operator's approval had been satisfied. This would include ensuring that the operator's flight crews were appropriately trained and qualified and that this was appropriately communicated to ATC for each flight.

2.15 OPLINK/1 further agreed that the ICAO flight plan should be amended to allow for an indication that an operator was approved for operations in accordance with the RCP type prescribed for the ATS route and/or area concerned. In this regard it was noted that the current flight plan structure may not permit the indication of varying performance criteria (such as varying RCP types, RNP types, etc.) along a route of flight or for providing multiple levels of service within a single airspace.

2.16 In reviewing the draft *Manual on Required Communication Performance*, OPLINK/1 considered that the Manual, as shown in Appendix N to the report of OPLINK/1, should be published in all languages of ICAO as a matter of urgency.

3. ACTION BY THE MEETING

3.1 The meeting is invited to note the concept and progress in respect of Required Communication Performance (RCP).

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