

REQUIREMENTS APPLICATION DOCUMENT
(RAD)

RAD – LINK 2000+

**SRC HARMONISED CRITERIA FOR
THE INTRODUCTION OF LINK 2000+**

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F.3 DOCUMENT APPROVAL

The following table identifies all management authorities who have approved this document.

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* In order to reduce the size of files, all documents placed on the SRC Website do not contain signatures. However, please note that all management authorities have signed the master copies held by the SRU. Requests for copies of master documents should be emailed to: sru@eurocontrol.int.

F.4 DOCUMENT CHANGE RECORD

The following table records the complete history of this document.

EDITION NUMBER	EDITION DATE	REASON FOR CHANGE	PAGES AFFECTED
A	08-02-01	Creation of the SRC WP10.xx.	All
0.01	14-05-02	Creation of Working Draft Document for internal circulation (SRU, SQS, LINK 2000+ Programme). Circulation to SRC14 for comments.	All
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F.6 EXECUTIVE SUMMARY

This document has been prepared by the Safety Regulation Commission.

The SRC's role calls for the development of harmonised ATM safety regulatory approaches and requirements for implementation by States. SRC is required to respond to current and anticipated developments in ATM across the core area of Europe, and wider aspects as necessary, including any new safety demands or expectations by the aviation community.

The documents reflects the SRC harmonised minimum regulatory criteria recommended to be used when assessing the safe implementation of LINK 2000+ services within core area of Europe.

It must be stressed that Requirements Application Documents (RAD's) reflect the currently approved regulatory provisions (regulations, requirements and safety regulatory policies), as applied to the implementation of LINK 2000+ services.

It must further be stressed that the contents of RAD's do not represent new provisions, but application of existing generic ones in a specific context. Their status is of recommendations by the Safety Regulation Commission for the benefit and use of national safety regulatory authorities.

1. INTRODUCTION

LINK 2000+ is identified within SRC Work Programme (SRC DOC 3) as Task C 12, whose objectives are to develop a harmonised SRC position on the safety regulatory aspects to the use of those data communication services dealt with within the LINK 2000+ Programme, to develop safety regulatory requirements (where these are needed to supplement the generic ESARRs), and to co-ordinate SRC views on the acceptability of LINK 2000+. The actions in this subtask are;

- through an SRC expert Group, to review the safety plan and safety policy being proposed by the LINK 2000+ programme, to ensure compliance with any applicable released ESARR material,
- through an SRC expert Group, to review safety documentation (safety cases and other deliverables) produced by the LINK 2000+ programme team, and to assess the technical and operational safety arguments developed within the Programme, in order to verify that tolerable safety minima will be met,
- to ensure an appropriate interface with JAA to ensure that the application of ESARR 4 to the introduction of LINK 2000+ service is carried out using a total system approach,
- based on the assessment of the safety argument, to form an opinion and to report to the Provisional Council the SRC harmonised view on the acceptability of LINK 2000+ to enter into service,
- through participation to EUROCAE WG53/RTCA SC 189, to ensure standardisation of the safety requirements.

2. THE ROLE AND USE OF RAD – LINK 2000+

The role of this Requirements Application Document is to present the minimum harmonised baseline to National ATM Safety Regulators recommended to be used for the assessment of the safely implementation of LINK 2000+ services.

However, further benefits of the RAD may include;

- Providing a consistent, harmonised and visible baseline on which the safety regulatory assessments for the core area of Europe will be made, while giving enough flexibility for national safety approval processes to be followed;
- Providing a harmonised basis, in the form of a task list, on which SRC may co-ordinate the individual activities of national regulators, providing a common approach in which variations in national solutions are minimised;
- Providing a clear statement of the safety regulatory position for the benefit and use by all parties, including the Programme;
- Use of the document as a regulatory report, as a means of tracking the extent to which the specific criteria have been met;

- Use of the document as an assurance check that agreed minimum harmonised safety regulatory provisions have been met.

Use in the above ways will facilitate the formation of the recommendation of SRC to Provisional Council.

3. BACKGROUND ON LINK 2000+

3.1 EUROCONTROL EATMP LINK 2000+ Programme

3.1.1 Description

The LINK 2000+ Programme aims to plan and co-ordinate the implementation of operational air-ground data link services for Air Traffic Management (ATM) in the core area of Europe in the timeframe 2000 – 2007.

The use of data link services is not new: airlines already use the Aircraft Communication Addressing and Reporting System (ACARS) system to exchange Airlines Operational Communications (AOC) information and, in a limited way, for ATC messages such as departure clearances and Automatic Terminal Information Service (ATIS). EUROCONTROL and its ATM partners have already demonstrated implementation feasibility of data-link services through pre-operational trial projects such as Preliminary EUROCONTROL Trial on Air/ground Data Link (PETAL II), PROATN, and European Pre-Operational Data-Link Applications (EOLIA).

The data link services for ATS are :

- a) Data Link Initiation Capability (DLIC),
- b) ATC Communication Management (ACM),
- c) Controller Access Parameters (CAP),
- d) ATC Microphone Check (AMC),
- e) ATC Clearance (ACL),
- f) Flight Plan Route Conformance (FLIPCY),
- g) Departure Clearance (DCL),
- h) Digital ATIS (D-ATIS),
- i) Downstream Clearance (DSC).

The LINK 2000+ Programme will maximise the use of the results of these projects and will build on the achievements to co-ordinate the implementation of operational air-ground data link services for ATC.

3.1.2 Interaction with other Programmes

The LINK 2000+ programme interacts with;

- **Mode S**
- **Automatic Dependence Surveillance (ADS)**
- **VDL Mode 2**
- **Preliminary EUROCONTROL Test of Air-Ground Data Link Project (PETAL II)**

3.1.3 Role of the EUROCONTROL Agency

The EUROCONTROL Agency is responsible for developing the overall planning for the LINK 2000+ programme, for co-ordinating programme execution and for undertaking activities requiring international agreements and co-ordinated actions that must be undertaken in common with each other. As overall programme manager, the Agency will monitor progress in the plan execution, identify shortfalls early and initiate necessary proactive actions.

The EUROCONTROL LINK 2000+ Programme shall ensure that correct and complete arguments are established to demonstrate that with the introduction of LINK 2000+ services, the overall ATM System will remain tolerably safe¹. Their role mainly relate to the demonstration of the 'proof of concept'.

A complementary objective is to co-ordinate and ensure support to States so that local implementation of LINK 2000+ services is carried out within agreed safety minima (i.e. safe implementation of the concept, according to agreed set of safety objectives and requirements).

4. SRC / LINK 2000+ DELIVERABLES

4.1 LINK 2000+ Safety Policy

An EATMP Programme Safety Policy defines the set of safety objectives which a programme must meet in accordance with applicable safety regulatory requirements², propose acceptable means of compliance, and identified safety management principles³.

Although, the LINK 2000+ Programme has established an explicit Safety Sub-Programme to ensure that Programme's contribution to the risk of an adverse effect on operations, it is the LINK 2000+ Safety Assessment Documentation to ultimately prove that it is safe to introduce LINK 2000+ services.

¹ i.e., meeting allocated safety objectives and requirements

² Such as ICAO standards, EUROCONTROL Safety Regulatory Requirements, and other applicable regulatory requirements.

³ Such as the EATMP Safety Policy or other EATMP safety objectives.

For the purpose of the LINK 2000+ Programme the Safety Assessment Documentation it will be further called as LINK 2000+ Safety Case. As it is mentioned in the LINK 2000+ Safety Policy (see section 6 of the LINK 2000+ Safety Policy document) there will be several major deliverables of the LINK 2000+ Safety Sub-Programme including a Pre-Implementation Safety Case .

4.2 LINK 2000+ Pre-Implementation High Level Safety Assessment

The LINK 2000+ Pre-implementation Safety Case (PISC) consist of the following suite of documents;

the Operational Services and Environment Definition Document (OSD),

- the Operational Hazard Assessment Document (OHA),
- the Allocation of Safety Objectives and Requirements Document (ASOR),
- the safety requirements from the Safety and Performance requirements (SPR) Document.

The aim of LINK 2000+ Pre-implementation Safety Case is to show by means of argument and supporting evidence that the application of the LINK 2000+ Concept in the European Region, and the Implementation of LINK 2000+ services by the Participating States, satisfy the criteria defined in the LINK 2000+ Safety Policy.

It is expected that Pre-Implementation Safety case to contain in addition to the safety assessment process (FHA, PSSA, etc) the detailed National Safety Plans, results of the real-time simulations and any additional evidences that will prove the objectives established in the LINK 2000+ Safety Policy.

5. HARMONISED REGULATORY CRITERIA

The introduction of LINK 2000+ services is considered as a change to the current ATM system, and as such, should be assessed against ESARR 4 safety regulatory requirements principles (see ESARR 4 section 5 Safety Requirements). Applicable harmonised criteria should envisage all three system components (people, equipment and procedures) and have to be seen as forming a total aviation perspective, including both ground and airborne elements.

Accordingly, a draft list of harmonised criteria for regulators which are intended to be followed when assessing the introduction of LINK 2000+ is presented at Appendix A to this paper.

6. REFERENCE MATERIAL

A list of further reference material is presented at Appendix B to this paper.

7. STATES READINESS

Through the use of this RAD, SRC will assess States safety readiness, and the outcome will be considered as an input to the SRC's recommendation to the EUROCONTROL Provisional Council/Commission in respect of the implementation of LINK 2000+ services.

The SRC recommendation will be based on those criteria presented in Appendix A of RAD-LINK 2000+ and LINK 2000+ Programme report on the States Preparedness.

APPENDIX A

LIST OF HARMONISED CRITERIA FOR REGULATORS TO BE FOLLOWED WHEN ASSESSING THE INTRODUCTION OF LINK 2000+ INTO OPERATIONAL SERVICE

Each proposed harmonised criteria has been allocated a precise responsibility (i.e. to discriminate which criteria are to be assessed at the SRC/SRU level and which at the National Safety Regulator level). A further mapping for each criterion with the ESARRs requirements has been included.

In the Annex 1 to APPENDIX-A a detailed checklist was developed in order to:

- show the regulatory criteria consistency with safety regulatory requirements and related SRC documents and policies,
- map the possible means of compliance for each criterion. Additional time-scale is envisaged in order to be able to construct an SRC recommendation for EUROCONTROL Provisional Council.
- Indicate the compliance achievement by whom and by when
- Highlight the each Criterion status

The regulatory model recommended to be followed by SRC to derive harmonised criteria for the regulators using ESARRs requirements, is depicted in Appendix F.

Each Safety Regulatory Criterion will be presented in a table as it is shown in the template table below:

Criterion No: (This box will contain a reference criterion no.)	Text of Criterion: (This box will contain the text of the criterion)	
	Means of Compliance: (This box will contain reference to the non-exhaustive existing means of compliance)	
	Requirement Mapping: (This box will contain mapping reference to the SRC safety regulatory requirements and policies. The mapping is intended to provide links to the well established regulatory principles)	Compliance assessment (by whom): SRC <input type="checkbox"/> National ATM Safety Regulators <input type="checkbox"/> ASR <input type="checkbox"/> National OPS Approval Body <input type="checkbox"/> Other <input type="checkbox"/>
Compliance status reporting date (by when): (This box will contain the latest acceptable date to report the achievement of the criterion to SRC. The date has been foreseen in order to provide sufficient time for the status of the preparation to be advise to the EUROCONTROL Provisional Council. The date provided, by no mean is intending to modify any planned date by LINK 2000+ Programme for their deliverables and milestones)	Tracking Status: Achieved: <input type="checkbox"/> Partially achieved: <input type="checkbox"/> Not Achieved: <input type="checkbox"/>	
NOTES/Remarks/Recommendations: (This box will contain notes, remarks and recommendations foreseen fit with the criterion by SRC. It may contain as well sub-criteria and the arguments to the decision on why the overall criterion was declared Achieved or otherwise.)		

A.1 GENERAL CRITERIA

LINK 2000 – 1

To assess the LINK 2000+ programme safety assessment (including OHA – Operational Hazard Analysis, and where possible, PSSA – Preliminary System Safety Assessment and SSA – System Safety Assessment); i.e. the complete LINK 2000+ Safety Case.

LINK 2000 – 2

To assess the mitigations proposed by the programme following the OHA/PSSA.

LINK 2000 – 3

To assess any eventual safety assumptions and implications within the overall Cost-Benefit Analysis (CBA).

A.2 AIRBORNE

LINK 2000 – 4

To ensure operational approval of those aircraft who are operating or intend to operate within the area of applicability of LINK 2000+ services;

- a) To certify the aircraft scheduled to operate within LINK 2000+ area of applicability airspace (as depicted in appendix E),
- b) To assess equipment compliance of the aircraft population (i.e. to accurately evaluate how many aircraft scheduled to fly in the core area of Europe - area of applicability of LINK 2000+ services - have the equipment compliant with the requirements for LINK 2000+ services),
- c) To assess/ensure OPS approval,
- d) By looking to the above aircraft population to assess the AO readiness,
- e) Additionally the overall State readiness for the Airborne segment is to be checked to ensure safe introduction of LINK 2000+ services.

A.3 GROUND

A.3.1 Procedures

LINK 2000 – 5

Assess the airspace considerations. Particularly attention to be paid, not exclusively, to the following issues;

- a) LOAs - Letters of Agreement updated to reflect the introduction of LINK 2000+ services,
- b) All possible contingency procedures.

LINK 2000 – 6

To assess compliance with the flight Planning procedures (users affected: AO, ATM agencies, AROs and CFMU).

LINK 2000 – 7

To assess compliance with new ATC generic procedures (possible manual on LINK 2000+ – and/or ICAO DOC 7030) To verify the documentation for new procedures (e.g. OPS Manual updates).

LINK 2000 – 8

To Assess ATM/CNS provider monitoring practices.

LINK 2000 – 9

To assess State readiness in respect of ATC procedures (including Maastricht UAC).

LINK 2000 – 10

To assess CFMU readiness on procedures (to verify the IFPS capability of handling the mixture of flight plans) including contingency procedures.

LINK 2000 – 11

To assess/verify the development/existence of contingency procedures for in-flight failures.

LINK 2000 – 12

To assess/verify the development/existence of contingency procedures in case of neighbouring sectors/centres/ States failure to provide LINK 2000+ services.

LINK 2000 – 13

Assess local deviation from ICAO/EUROCONTROL publish procedures.

To verify the publication in National AIP of the deviation from ICAO procedures.

A.3.2 Equipment

LINK 2000 – 14

- a) To assess evidences for FDP modifications,
- b) To assess evidences for radar display modifications,
- c) To assess evidences for flight progress strips (paper or electronic) modifications,
- d) To assess State readiness on equipment (including Maastricht UAC),
- e) To assess CFMU readiness on equipment,
- f) To assess ATS units for data link recording and replay mechanisms.

A.3.3 Training

LINK 2000 – 15

- a) To assess evidences of the ATCOs training in new procedures associated with LINK 2000+ operational services;
- b) To assess evidences of the ATCOs training in contingency procedures;
- c) To assess evidences of the ATCOs training in Phraseology to be used;
- d) To assess State readiness on training (including Maastricht UAC);
- e) To assess CFMU readiness on training (CFMU staff training);

APPENDIX A – ANNEX 1 - CRITERIA CHECK-LIST (TBD)

A1 General Criteria

Criterion No: LINK 2000+ – 1	<i>Text of Criterion:</i>	
	<i>Means of Compliance:</i>	
	<i>Requirement Mapping:</i>	<i>Compliance assessment (by whom):</i> SRC <input checked="" type="checkbox"/> National ATM Safety Regulators <input type="checkbox"/> ASR <input type="checkbox"/> National OPS Approval Body <input type="checkbox"/>
<i>Compliance status reporting date (by when):</i>	<i>Status:</i> <i>Achieved:</i> <input type="checkbox"/> <i>Partially achieved:</i> <input type="checkbox"/> <i>Not Achieved:</i> <input type="checkbox"/>	
<i>NOTES/Remarks/Recommendations:</i>		

APPENDIX B - REFERENCE MATERIAL

ICAO Annex 2 - Rules of the Air

ICAO Annex 3 – Meteorological Service for International Air Navigation

ICAO Annex 6 – Operation of Aircraft

ICAO Annex 10 – Aeronautical Telecommunications

ICAO Annex 11 – Air Traffic Services

ICAO DOC 4444 Procedures for Air Navigation Services – Air Traffic Management

ICAO DOC 9694-AN/955 Manual of Air Traffic Services data link Applications

ICAO DOC 9739-AN/961 Comprehensive Aeronautical Telecommunication Network (ATN) Manual

ICAO DOC 9705-AN/956 Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN)

ICAO DOC 7030 – Regional Supplementary Procedures

ESARR 2 – Reporting and Assessment of Safety Occurrences in ATM

ESARR 3 – Use of Safety Management Systems by ATM Service Providers

ESARR 4 – Risk Assessment and Mitigation in ATM

ESARR 5 – ATM Services' Personnel

SRC POL DOC 1 – ECAC Safety Minima for ATM

SRC DOC 1 – Safety Minima Study – Review of Existing Standards and Practices

SRC DOC 2 – Aircraft Accidents/Incidents and ATM Contribution – Review and Analysis of Historical data

EUROCAE ED-93 Minimum Aviation System Performance Specifications for CNS/ATM message recording systems.

EUROCAE ED-111 Functional Specifications and Operational Procedures for CNS/ATM ground recording and retrieval at Air Traffic Service Units

EUROCAE / RTCA WG-53 SC-189 'safety, performance and interoperability requirements for Air Traffic Services (ATS) supported by data communications

See http://www.mitre.org/tech_transfer/atssir/continental2.html

In particular G6-100 (Operational Hazard Analysis)

G6-003 (Operational System and Environment Description)

APPENDIX C – LINK 2000+ AREA OF APPLICABILITY

