FAA-STD-025e
August 9, 2002

U.S. Department
of Transportation

**Federal Aviation
Administration**

U.S. Department of Transportation

Federal Aviation Administration

Standard

PREPARATION OF INTERFACE DOCUMENTATION

FOREWORD

This standard contains the requirements for preparing Interface Requirements Documents (IRD), Interface Control Documents (ICD), and Interface Revisions (IR). This standard specifies the format and minimum acceptable content for documenting interfaces within the Federal Aviation Administration (FAA) National Airspace System (NAS) and with other external entities.

This standard is intended for use by the FAA and associated contractors preparing interface documentation.

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1 SCOPE

This standard establishes the format and minimum content of Interface Requirements Documents (IRD), Interface Control Documents (ICD), and Interface Revisions (IRs) used by the Federal Aviation Administration (FAA).

1.1 Purpose

The purpose of this standard is to provide a set of instructions for the preparation of IRDs, ICDs, and IRs. This standard is applicable to all programs responsible for acquiring, upgrading, or developing NAS subsystems.

1.2 Order of Precedence

In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

1.3 Document Organization

This standard is organized into six major sections and an appendix covering the scope, general document, common content, detailed IRD, ICD, IR, and development requirements.

Section 1 provides the scope and purpose of the document. Section 1 also lists applicable reference documents and defines terms and abbreviations.

Section 2 provides general document requirements on reference standards and publications, format, cover pages, revision records, etc.

Section 3 provides content requirements that are common to IRDs and ICDs. These requirements include the scope, applicable documents, quality assurance, and preparation for delivery.

Section 4 provides detailed content requirements for IRDs. These requirements include common IRD requirements, analog interface, discrete interface, network interface, and facility IRD requirements.

Section 5 provides detailed content requirements for ICDs. These requirements include common ICD requirements, analog interface, discrete interface, and network interface requirements.

Section 6 provides content requirements on IRs.

Appendix I provides a development process guide for IRDs, ICDs, and IRs.

1.4 Applicable Documents

The following documents form a part of this standard and are used, by date, in this standard. IRDs shall reflect the latest version of the documents or the date of the documents that are under contract by a project.

1.4.1 Government Documents

Federal Aviation Administration

Standards:

FAA-STD-002e	Engineering Drawing Preparation & Support, September 21, 1999
FAA-STD-005e	Preparation of Specification Documents, August 1996
FAA-STD-019c	Lightning Protection, Grounding, Bonding and Shielding Requirements for Facilities, June 1999
FAA-STD-020b	Transient Protection, Grounding, Bonding and Shielding Requirements for Electronic Equipment, May 1992
FAA-STD-032	Design Standards for National Airspace System (NAS) Physical Facilities, April 1986
FAA-STD-039b	NAS Open Systems Architecture and Protocols, October 1995
FAA-STD-060	Data Standard for the National Airspace System, December 2001

Orders:

Order 1800.66	Configuration Management Policy, Change 1, December 13, 2000

Specifications:

FAA-G-2100g	Electronic Equipment, General Requirements, October 2001

Handbooks:

FAA-HDBK-002	Systems Management, June 27, 1997
FAA-HDBK-003	National Airspace System (NAS) Open System Environment (OSE) Application Services, June 1997
FAA-HDBK-004	National Airspace System Internet Protocol Suite, September 1997

Other Publications:

DOT/FAA/ES-85/01	NAS Interface Management Plan and Appendices, ATC-94-1075 Revision, November 1994
FAA WA FORM 4510-1	Materiel Specification Typing Guide Sheet, January 1974
NAS-DD-1000	NAS Level 1 Design Document, July 1994
NAS-SR-1000	NAS System Requirements Specification, October 1994
NAS-SS-1000	NAS SYSTEM SPECIFICATION, September 1994, VOL 1 APPENDIX II

FAA Acquisition Management System (revised), 1999

Copies of FAA specifications, standards, and publications may be obtained from The National Airspace System (NAS) Documentation Control Center (DCC).

Federal Aviation Administration
ACM-20 - NAS Documentation Control Center
800 Independence Avenue, SW
Washington, DC 20591

http://www.faa.gov/cm/dcc.htm

Requests shall clearly identify the desired material by number and date and state the intended use of the material.

1.4.2 Non Government Documents

American National Standards Institute (ANSI)

ANSI/AIIM MS52	Recommended Practice for the Requirements and Characteristics of Original Documents Intended for Optical Scanning, 1991
ANSI/AIIM MS38	Recommended Practice for the Microrecording of Engineering Graphics-Computer-Output Microfilm, 1995

Copies of ANSI standards can be obtained from:

http://webstore.ansi.org/ansidocstore/shopper_lookup.asp

Global Engineering Documents
15 Inverness Way East
Sales - C303B
Englewood, CO 80112-9649
Tel: (800) 854-7179
FAX: (303) 397-2740

International Civil Aviation Organization (ICAO)

Doc. 9705-AN/956	Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN), Second edition, 1999

Telecommunication Glossary

T1.523-2001	American National Standard for Telecommunications – Telecomm Glossary 2000

Access to the American National Standard for Telecommunications glossary may be done via http://www.its.bldrdoc.gov/projects/t1glossary2000/.

1.5 Definitions

The following definitions apply to the terms used in this standard. These definitions shall apply when the terms are used in interface documentation.

Analog Interface. An analog interface is a customized or specialized interface between two systems or subsystems that uses analog signals to transmit information.

Application Entity (AE). An AE is the part of the Application Process (AP) concerned with communications necessary for the distributed APs to interact. A particular AP may be represented by one or more AEs, but each invocation of an AE can only represent a single AP. Two or more APs exchange information via their respective AEs to support an overall distributed application within the NAS. The system-independent application activities are made available as application services to the application agent (e.g. a set of application services elements that together perform all or part of the communication aspects of an application process).

Application Process (AP). An AP is an identifiable set of cooperating capabilities within an open system that takes part in the execution of one or more information processing tasks. A particular NAS subsystem may include one or more application processes.

Computer-Human Interface (CHI). A CHI is the set of inputs, outputs, and special actions as well as the computer-human interaction mechanism, including dialogue procedures and the interrelationship identified for these entities in the various functional areas.

Data Element. A data element is a basic unit of identifiable and definable information that occupies the space provided by fields in a record or blocks on a form. A data element has an identifying name and value or values for expressing specific facts.

Data Type. The data type is the type of the data in a data field used for data interchange. Examples of data types are binary, bitmap, boolean, date, date time, decimal, integer, string, and time. For information about data types, see the FAA Data Registry (FDR) (http://fdr.faa.gov/).

Demarcation Point. The demarcation point is the point at which operational control or ownership of communications changes from one organizational entity to another.

Drawing. Figures, block diagrams, schematics, wiring diagrams, or any other form of government or industry-accepted graphic representation approved by the FAA for use in interface documentation.

Discrete Interface. A discrete interface is a customized or specialized digital interface between two systems or subsystems. The discrete interface may not conform to any open system or network standards.

End System (ES). An ES is one or more equipment items (or part of an equipment item) whose operation provides the functions of an open system associated with the interconnection of systems and the associated exchange of information. The ES contains the application processes that are the eventual sources and destinations of user-oriented message flows.

Facility. The total plant (e.g., building, structure, enclosure, assembly, Open-Air Plan "site") required for a subsystem/equipment item to function. The facility houses, supports, and protects the subsystem/equipment item. Facility characteristics are determined by the total complement of dependent subsystems/equipment items.

Facility/subsystem IRD (or Facility IRD). A facility/subsystem IRD is an IRD used to specify the requirements for an interface between the given facility and the given subsystem.

Field Name. A descriptive name that reflects the business meaning of the data field (e.g., "Aircraft Inspection Date"). This is not to be confused with an abbreviated or cryptic name (also

referred to as internal, access, or symbolic name) that is often used in the software or database environment.

Field Definition. A statement that expresses the essential nature or meaning of the data field (e.g., "the date on which the aircraft was most recently inspected by the FAA").

Functional Interfaces. A functional interface is a boundary between two function and is described in terms of information transfer.

Interface. An interface is a common functional and/or physical boundary where hardware and software interact.

Interface Control Document(ICD). An ICD) is a formal agreement that documents how the interface requirements between two subsystems, between a subsystem and a "user" (where the "user" can be viewed as a variable that can be filled with multiple subsystems) or between a facility and a subsystem are implemented; the as-built configuration. The ICD identifies, quantifies, and controls the design characteristics of the interface. The ICD ensures interface compatibility by documenting form, fit, and function.

Interface Requirements Document (IRD). An IRD is a formal document that specifies the functional, performance, and verification requirements for an interface between two subsystems, between a subsystem and a “user” (where the “user” can be viewed as a variable that can be filled with multiple subsystems), or between a facility and a subsystem. An IRD is also used to ensure that the interface requirements between an existing subsystem/facility and a new subsystem/facility are formally agreed to by all affected FAA project offices.

Interface Revision (IR). A document used to revise an IRD or ICD under configuration management control and to ensure that proper incorporation of revisions occur. The IR is designed to work within established FAA configuration management procedures.

Intermediate System (IS). An IS is a system of one or more equipment items (or part of an equipment item) and/or communications media that performs the function of relaying, routing, and encapsulating information to end systems or other intermediate systems. An IS is further detailed to provide network-layer relay functions and is allocated only to the lowest three layers of the open system interconnection (OSI) reference model in order to support the associated network-relay function. Included in the network-relay functions are routing, forwarding, and all associated header processing functions necessary to provide the required communications services requested by the upper-layer protocols.

Internet Protocol (IP). An IP is a standard protocol designed for use in interconnected systems of packet-switched computer communication networks. The IP provides for transmitting blocks of data from sources to destinations, where sources and destinations are hosts identified by fixed-length addresses. The IP also provides for fragmentation and assembly of long data blocks, if necessary, for transmission through small-packet networks.

Internet Protocol Suite (IPS). An IPS is a set of protocols based on Request for Comments (RFC) defacto standards used within the data link, network, transport and application layers of the OSI model for establishing communications between systems.

Local Area Network (LAN). A LAN is a data communication system that lies within a limited spatial area, has a specific user group and topology, and is not a public switched

telecommunications network, but may be connected to one. LANs are usually restricted to relatively small areas, such as rooms, buildings, and aircraft.

Maximum Field Length. The maximum field length is the upper limit of the size of a data field, expressed in characters or bits (not applicable to fields of data type bitmap).

Open System. A system with characteristics that comply with specified, publicly maintained, readily available standards and that therefore can be connected to other systems that comply with these same standards.

Open Systems Interconnection (OSI). OSI is the logical structure for communications networks standardized by the International Organization for Standardization (ISO). *Note:* Adherence to the standard enables any OSI-compliant system to communicate with any other OSI-compliant system.

OSI Protocol Suite. The OSI protocol suite is composed of numerous standard ISO protocols that are based on the OSI reference model.

Permissible Values. The specification of the set of allowable instances of a field (e.g., "Postal U.S. State Codes"; "integers greater than 20 and less than 50."). The set can be specified by name, reference to a source, listing the values, or rules for generating the values.

Physical Interfaces. Interfaces associated with material contact. Physical interfaces are described in terms of their characteristics such as mechanical, electrical, and environmental.

Quality of Service (QoS). QoS is a set of parameters and measurement procedures that quantify loss, errors, delay, and delay variation to indicate the performance of a communications channel or system. QoS may be quantitatively indicated by channel or system performance parameters, such as bit error rate (BER) and message throughput rate.

Subsystem. A subsystem is a set of one or more computers, associated software, peripherals, terminals, human operators, physical processes, information transfer means, etc., that forms an autonomous whole capable of performing information processing and/or information transfer.

Subsystem/Subsystem IRD. An IRD that specifies the interface between two subsystems.

Subsystem/User ICD. An ICD designed for a given subsystem that interfaces with at least several other subsystems (i.e., users) in a very similar way. This ICD specifies the common interface properties shared by the interfaces of the given subsystem with these users.

Subsystem/User IRD. An IRD designed for a given subsystem that interfaces with at least several other subsystems (i.e., users) in a very similar way. This IRD describes the common interface properties shared by the interfaces of the given subsystem with these users.

Type of Service (ToS). ToS is a field within an internet protocol version (I4Pv4) header which can be used by the device originating the packet, or by an intermediate network device, to signal a request for a specific QoS level.

Unit of Measure. A name for a standard measure of extent, dimension, capacity, etc. for describing quantity-oriented data fields (e.g., watt, mile, miles-per-hour, ton, ampere).

User. A user is a computer, computer system, or other entity that employs the services of a telecommunication system or information processing system to transfer information. A user functions as a source or final destination of user information or as both.

Wide Area Network (WAN). A WAN is a physical or logical communication network used to link computers and associated devices connected to different LANs. A WAN is usually spread over a larger geographic area (e.g., nationwide) than a LAN.

1.6 Abbreviations

The following abbreviations and acronyms are used in this standard. Where the terms are used in interface documentation, these definitions apply.

AC	Alternating Current
AE	Application Entity
AMS	Acquisition Management System
ANSI	American National Standards Institute
AP	Application Process
APB	Acquisition Program Baseline
ARTCC	Air Route Traffic Control Center
ASCII	American Standard Code for Information Interchange
ASE	Application Service Element
ASP	Acquisition Strategy Paper
ATC	Air Traffic Control
ATCT	Airport Traffic Control Tower
ATM	Asynchronous Transfer Mode
ATN	Aeronautical Telecommunications Network
BER	Bit Error Rate
CATS	Capability Architecture Tool Suite
CCB	Change Control Board
CCD	Configuration Control Decision
CCITT	International Telegraph and Telephone Consultative Committee
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CIP	Capital Investment Plan
CM	Configuration Management
CoS	Class of Service
COTS	Commercial-off-the-shelf
CSMA	Carrier Sense Multiple Access

DC	Direct Current
DCC	Document Control Center
DOCCON	Documentation and Configuration Identification System
DSR	Display System Replacement
EMC	Electromagnetic Compatibility
FAA	Federal Aviation Administration
FAST	FAA Acquisition System Toolset
FDR	FAA Data Regeistry
GFP	Government Furnished Property
HVAC	Heating, Ventilation, and Air-Conditioning
ICAO	International Civil Aviation Organization
ICD	Interface Control Document
IWG	Interface Working Group
IEC	International Electro-Technical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
IPP	Integrated Program Plan
IPS	Internet Protocol Suite
IPv4	Internet Protocol Version 4
IPv6	Internet Protocol Version 6
IR	Interface Revision
IRD	Interface Requirements Document
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ITU-T	International Telecommunication Union (formerly CCITT) – Telecommunication Standardization Sector
IWG	Interface Working Group
KVA	Kilovolt Ampere
LAN	Local Area Network
ME	Must Evaluation
MIL	Military
MOA	Memorandum of Agreement
NADIN	National Airspace Data Interchange Network

NAS	National Airspace System
NCP	NAS Change Proposal
NDI	Non-Developmental Item
NIST	National Institute of Standards and Technology
OSE	Open System Environment
OSI	Open Systems Interconnection
PDR	Preliminary Design Review
PIP	Project Implementation Plan
PLP	Packet Layer Protocol
PM	Project Management
QoS	Quality of Service
RFC	Request for Comments
RFP	Request for Proposal
RMM	Remote Maintenance Monitoring
SE	System Engineering
SEC	System Engineering Council
SLS	System Level Specification
SOW	Statement of Work
SS	Selective Signaling
STD	Standard
SUT	System Under Test
TBS	To Be Supplied
TCP	Transmission Control Protocol
TDWR	Terminal Doppler Weather Radar
TIM	Technical Interchange Meeting
TMS	Traffic Management System
ToS	Type of Service
VRTM	Verification Requirements Traceability Matrix
WAN	Wide Area Network
WARP	Weather and Radar Processor
WJHTC	William J. Hughes Technical Center
WMSCR	Weather Message Switching Computer Replacement

2 GENERAL DOCUMENT REQUIREMENTS

2.1 Interface Documentation

The IRD, ICD, and IR are closely related and each has a specific purpose. The Integrated Product Team (IPT) or program office is typically responsible for developing IRDs, ICDs, and IRs.

IRDs identify the interface requirements between two subsystems, between a subsystem and a "user" (where the "user" can be viewed as a variable that can be filled with multiple subsystems), or between a facility and a subsystem. The requirements in an IRD are often traced to or derived from requirements in a system-level specification or system requirements document.

ICDs describe the formal agreement that documents how the interface requirements between two subsystems, between a subsystem and a "user" (where the "user" can be viewed as a variable that can be filled with multiple subsystems), or between a facility and a subsystem are implemented; the as-built configuration. The design characteristics in an ICD trace to and are derived from the interface requirements in an IRD.

The IR is used to revise an IRD or ICD under configuration management control and to ensure that revisions occur properly. An IR may be used to improve interface requirements, add information, resolve interface incompatibility, or correct errors.

When IRDs and ICDs are approved, they become baseline documents and are placed under configuration management. The development and approval process for IRDs and ICDs is described in appendix I of this document.

The requirements in this document shall apply to all subsystem/subsystem and subsystem/user IRDs and ICDs.

2.2 Basic Approach

For IRDs, government and industry standards, specifications, and documents that act as de facto standards or specifications shall be used to specify interface requirements whenever possible. Drawings, figures, tables, and written text shall be used to supplement requirements contained in a standard or specification, or in the absence of an applicable standard or specification. Standards or specifications may also be used in an IRD to provide information or clarification without imposing requirements.

For ICDs, interface design characteristics shall be documented through drawings, tables, and written text. Drawings include figures, block diagrams, schematics, wiring diagrams, or any other form of government or industry-accepted graphic representation approved by the FAA for use in interface documentation. The ICD shall completely document the interface design characteristics. The ICD shall also show design compliance with specified interface requirements, including those imposed by referenced documents.

2.3 Reference Standards

IRDs and ICDs shall be prepared in accordance with this document and the most recent version of FAA-STD-005. Drawings prepared for use in imposing requirements shall comply with the

most recent version of FAA-STD-002. Clarity and legibility shall meet the reproducibility requirements of ANSI/AIIM MS52 AND ANSI/AIIM MS38.

2.4 Reference Publications

IRDs and ICDs shall reflect the specific versions of the documents or the date of the documents that are under contract. Where these documents have been updated, the superseding versions of the documents shall be referenced instead. The author shall specify the extent of tailoring of the requirements and shall specify the verification methods when requirements are contained in reference documents. The choices and options shall be clearly indicated when lower-level documents are referenced.

2.5 IRD and ICD Format

Each IRD and ICD shall at a minimum, conform to the generic format presented in figure 2-1. Appendices may be used to specify requirements or to provide information in an IRD or ICD when the interface design details are lengthy or otherwise do not fit their respective figure's format. The appendices shall be referenced in a manner that specifies that they are requirements when appendices are used to impose requirements.

If an item required by the format in figure 2-1 is not applicable to the interface being specified, these words shall be used *"This IRD imposes no explicit [title of subsection or paragraph] requirements"*. Likewise, if an item required by the format in figure 2-1 is not applicable to the interface design, these words shall be used *"This ICD imposes no explicit [title of subsection or paragraph] requirements"*. In instances where the requirements imposed by an entire subsection are imposed by reference to an IRD/ICD, only the number and title of the subsection, followed by the reference to the appropriate IRD/ICD, shall be listed.

Each facility IRD shall at a minimum, conform to the generic format presented in figure 2-2. If an item required by the format in figure 2-2 is not yet sufficiently defined to permit specification of requirements, it shall be identified by use of the term "To Be Supplied" (TBS). If "TBS" is used, it shall be defined prior to the baselining of the IRD. If an item required by figure 2-3 is not applicable to the interface being specified, it shall be identified by use of the term "Not Applicable."

For all documents, figures shall be numbered using Arabic numerals for the second digit (i.e., 3-1, 3-2), and tables shall be numbered using capital Roman numerals for the second digit (i.e., 3-I, 4-I).

2.5.1 Header/Footer

Each page, including the front cover, shall contain a header in the upper right-hand corner. Each header shall contain the IRD or ICD number and the date of the document. If the document is a draft, the word "DRAFT" in capital letters shall follow the date. Respective document numbers shall be obtained from the FAA. If the document is a revision to a baselined IRD, the word "REVISION" in capital letters, followed by the revision letter, shall be included immediately under the document's number.

2.5.2 Page Numbering

The cover of the document shall be the first page and shall have no page number. Page numbering shall begin on the Approval Signature page. The Approval Signature, Revision Record, and Table of Contents pages shall be numbered sequentially using lowercase Roman

numerals. The Approval Signature page shall be numbered "ii." All subsequent pages beginning with page “1” of Section 1, SCOPE, shall be numbered sequentially using Arabic numerals.

2.5.3 Paragraph Numbering

This standard uses the terms section, subsection, and paragraph in discussing the structural requirements for an IRD and the interface design characteristics for an ICD. The terms section and subsection are used in the conventional sense. The use of the term paragraph is far more liberal and can mean a single paragraph or multiple paragraphs that are subparagraphs of a main paragraph. The author of an IRD shall subparagraph as necessary to present interface requirements in a logical, concise, and understandable manner.

For IRDs, each subparagraph shall be numbered. All requirements are to be structured such that only one "shall" statement appears in a uniquely identifiable portion of the subparagraph. The use of “shall not” statements is prohibited. Requirements must be stated in Section 3, Interface Requirements. There is a one-to-one correspondence between each “shall” statement and each entry in the Verification Requirements Traceability Matrix (VRTM).

2.5.4 Drawings and Tables

Drawings and tables may be used to document interface requirements or design characteristics. IRD drawings and tables shall document interface requirements where the interface requirements are of sufficient complexity. ICD drawings and tables shall document interface design characteristics where the design characteristics are of sufficient complexity.

Once a single drawing or table is used in an IRD or ICD, it may be referenced from any paragraph that contains interface design characteristics documented by that drawing or table. It is not necessary to reproduce the drawing or table for multiple references.

2.6 Required IRD/ICD Front Matter

The publication requirements in this section shall apply to all IRDs and ICDs.

2.6.1 Covers

IRD and ICD covers shall be in accordance with the format presented in figure 2-3. Covers shall be produced using FAA WA Form 4510 or a template reproducing the form. Covers for subsystem/user documents differ from subsystem/subsystem document covers in that the second occurrence of the word “subsystem” shall be replaced with the word “user.” Covers for Facility IRD documents differ from subsystem/subsystem document covers in that the first occurrence of the word “subsystem” shall be replaced with the word “facility.”

2.6.2 Approval Signature Page

The Approval Signature page shall be the first interior page of an IRD or ICD and shall conform to the format presented in figure 2-4. Signatures on this page ensure that the interested parties have approved the data.

2.6.3 Revision Record

The Revision Record page for an IRD and IRD shall conform to the format presented in figure 2-5. The "REVISION LETTER" column shall show the revision letter assigned at the time each revision is incorporated. The "DESCRIPTION" column shall briefly describe the change that

was incorporated. In the "DATE" and "ENTERED BY" columns, approval signatures shall be affixed and dated for each revision letter entry.

2.6.4 Effectivity

No effectivity pages shall be included for IRDs or ICDs. The equipment location shall be specified in NAS System Specification (NAS-SS-1000) Volume I, Appendix II.

2.6.5 Table of Contents

The Table of Contents shall outline the contents of the document by sections and paragraphs. Their respective titles and page numbers shall be listed in parallel columns in the order in which they appear in the document.

DISCRETE INTERFACE	NETWORK INTERFACES	ANALOG INTERFACE
Cover Page	Cover Page	Cover Page
Approval Signature Page	Approval Signature Page	Approval Signature Page
Revision Record	Revision Record	Revision Record
Effectivity Page	Effectivity Page	Effectivity Page
Table of Contents	Table of Contents	Table of Contents
1. SCOPE	1. SCOPE	1. SCOPE
1.1 Scope	1.1 Scope	1.1 Scope
1.2 Subsystem Responsibility List	1.2 Subsystem Responsibility List	1.2 Subsystem Responsibility List
2. APPLICABLE DOCUMENTS	2. APPLICABLE DOCUMENTS	2. APPLICABLE DOCUMENTS
2.1 Government Documents	2.1 Government Documents	2.1 Government Documents
2.2 Non-Government Documents	2.2 Non-Government Documents	2.2 Non-Government Documents
3 INTERFACE Requirements/ Characteristics	3 INTERFACE Requirements/ Characteristics	3 INTERFACE Requirements/ Characteristics
3.1 General Characteristics	3.1 General Characteristics	3.1 General Characteristics
3.1.1 Human System Interface Requirements	3.1.1 Human-System Interface Requirements	3.1.1 Human System Interface Requirements
3.2 Functional Requirements/Design Characteristics	3.2 Functional Requirements/Design Characteristics	3.2 Functional Requirements/Design Characteristics
3.2.1 Discrete Interface	3.2.1 Application Processes	3.2.1 Analog Interface
3.3 Physical Characteristics	3.2.1.1 Identification of Each Application Process	3.3 Physical Characteristics
3.3.1 Electrical Power and Electronic Requirements/Characteristics	3.2.1.2 Category of Services Required by the Application Process	3.3.1 Electrical Power and Electronic Requirements/Characteristics
3.3.1.1 Connectors	3.2.1.3 Information Units	3.3.1.1 Connectors
3.3.1.2 Wire/Cable	3.2.1.4 Quality of Service	3.3.1.2 Wire/Cable
3.3.1.3 Electrical Power/Grounding	3.2.1.5 AP Error Handling	3.3.1.3 Electrical Power/Grounding
3.3.1.4 Fasteners	3.2.1.6 Interface Summary Table	3.3.1.4 Fasteners
3.3.1.5 Electromagnetic Compatibility	3.2.2 Protocol Implementation	3.3.1.5 Electromagnetic Compatibility
4 QUALITY ASSURANCE PROVISIONS	3.2.2.1 Application Services	4 QUALITY ASSURANCE PROVISIONS
4.1 Responsibility for Verification	3.2.2.2 Network Services	4.1 Responsibility for Verification
4.2 Special Verification Requirements	3.2.2.3 Medium Services	4.2 Special Verification Requirements
4.3 Verification Requirements Traceability Matrix	3.2.3 Security	4.3 Verification Requirements Traceability Matrix
4.4 Verification Levels and Methods	3.2.4 Interface Design Characteristics Table	4.4 Verification Levels and Methods
4.4.1 Verification Levels	3.3 Physical Design Characteristics	4.4.1 Verification Levels
4.4.2 Verification Methods	3.3.1 Electrical Power and Electronic Requirements/Characteristics	4.4.2 Verification Methods
5 PREPARATION FOR DELIVERY	3.3.1.1 Connectors	5 PREPARATION FOR DELIVERY
6 NOTES	3.3.1.2 Wire/Cable	6 NOTES
6.1 Definitions	3.3.1.3 Electrical Power/Grounding	6.1 Definitions
6.2 Abbreviation and Acronyms	3.3.1.4 Fasteners	6.2 Abbreviation and Acronyms
	3.3.1.5 Electromagnetic Compatibility	
	4 QUALITY ASSURANCE PROVISIONS	
	4.1 Responsibility for Verification	
	4.2 Special Verification Requirements	
	4.3 Verification Requirements Traceability Matrix	
	5 PREPARATION FOR DELIVERY	
	6 NOTES	
	6.1 Definitions	
	6.2 Abbreviation and Acronyms	

Figure 2-1: IRD/ICD Format Outline (Network, Analog, and Discrete-Type Interfaces)

FACILITY IRD FORMAT OUTLINE

Cover Page
Approval Signature Page
Revision Record
Effectivity Page
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1. SCOPE
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1.2 Facility/ Subsystem Responsibility List
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2.1 Government Documents
2.2 Non-Government Documents
3. INTERFACE REQUIREMENTS
3.1 General Requirements
3.2 Physical Requirements
3.2.1 Space
3.2.2 Electrical
3.2.2.1 Load Power Characteristics
3.2.2.2 Load Balance
3.2.2.3 Harmonics
3.2.2.4 Overload Protection
3.2.2.5 Input Power Conditions
3.2.2.6 Grounding and Bonding
3.2.2.7 Electrical Power Availability
3.2.2.8 Critical/Essential Power Bus
3.2.2.9 Electrical Wiring
3.2.3 Environmental
3.2.3.1 Thermal/Cooling
3.2.3.2 Noise Levels
3.2.3.3 Lighting
3.2.4 Security
3.2.5. Project Unique
3.2.5.1 Structural
3.2.5.2 Grounding, Shielding and Lightning Protection
3.2.5.3 Power Conditioning
3.2.5.4 Raised Flooring
4 QUALITY ASSURANCE PROVSIONS
4.1 Responsibility for Verification
4.2 Special Verification Requirements
4.3 Verification Requirements Traceability Matrix
5 PREPARATION FOR DELIVERY
6 NOTES
6.1 Definitions
6.2 Abbreviation and Acronyms

Figure 2-2: Facility IRD Outline

[*IRD/ICD* Number]
[Rev Letter]
[Date]

U.S. Department of Transportation

Federal Aviation Administration

Facility Interface *Requirements/Control* Document

NAS-IR/IC-XXXXXXXX

[*(Subsystem1/Facility)*/Subsystem *2*]

Figure 2-3: IRD/ICD Cover Page (FAA WA Form 4510-1)

[*IRD/ICD* Number]
[Rev. Letter]
[Date]

INTERFACE *REQUIREMENT/CONTROL* DOCUMENT
APPROVAL SIGNATURE PAGE
[*(SUBSYSTEM 1 /FACILITY)* / SUBSYSTEM *2*]

APPROVAL SIGNATURES		
PARTICIPANT	NAME	DATE
[Subsystem 1 Project Organization/ Facility System Engineering Organization]		
[Subsystem *2* Project Organization]		
NAS System Engineering/ NAS Transition and Implementation Organization		
Subsystem 1 Contractor (ICD Only)		
Subsystem 2 Contractor (ICD Only)		

Figure 2-4: IRD/ICD Approval Signature Page

[IRD/ICD Number]
[Rev Letter]
[Date]

REVISION RECORD

REVISON LETTER	DESCRIPTION	DATE	ENTERED BY
[Revision letter]	[Brief summary of change, including IR number]	[CCD approval date]	[Name of person editing document]

Figure 2-5: IRD/ICD Revision Record

3 COMMON CONTENT REQUIREMENTS

3.1 Scope

Section 1 shall consist of a brief summary of the contents of the IRD or ICD and its intended purpose. At a minimum, the scope shall contain the following sentences: "This IRD/ICD provides the design characteristics for an interface between the [subsystem 1] and the [subsystem 2]. This IRD/ICD satisfies the interface design requirements contained in [requirements document number and title]." For a subsystem/user IRD or ICD, replace the second occurrence of "subsystem" with "user."

For a facility IRD, section 1.1 shall consist of a brief summary of the contents of the facility IRD and its intended purpose. At a minimum, the scope shall contain the following sentence: "This IRD provides the requirements for an interface between the [facility] and the [subsystem]."

3.1.1 Subsystem Responsibility List

This list shall appear in subsection 1.2. For IRDs, the list shall consist of the interfacing subsystems with their respective common names and the responsible FAA organizations. For ICDs, the list shall consist of a list of the interfacing subsystems with their respective common names and the responsible contractor/FAA program office for the detailed design specification. For subsystem/user IRDs and ICDs, it is not necessary to list all the subsystems that could be replaced by the word "user," but reasonable attempts should be made to identify and coordinate with as many users as possible.

3.1.2 Facility/Subsystem Responsibility List

This responsibility list shall appear immediately after the scope in subsection 1.2. It shall consist of a list of the interfacing facility/subsystems with their respective common names and the responsible FAA project offices.

3.2 Applicable Documents

These documents shall be listed in section 2 in accordance with FAA-STD-005E. The contents of this section are defined in the following paragraphs. The specific issue of all cited documents shall be identified. Document sources shall include the names and addresses of organizations and the types of documents they have available.

3.2.1 Government Documents

Government source documents (standards, orders, handbooks, specifications, publications) referenced in the IRD/ICD shall be listed in subsection 2.1. Other IRDs referenced shall be listed under "OTHER PUBLICATIONS." For ICDs, government interface documentation referenced shall also be listed under "OTHER PUBLICATIONS."

3.2.2 Non-Government Documents

Non-government source documents referenced in the IRD shall be listed in subsection 2.2.

3.3 Quality Assurance

Contents of this section apply to all IRDs and ICDs unless otherwise specified.

For IRDs, section 4 shall specify the process of verification for interface requirements presented. The Test and Evaluation process guidelines within the Acquisition Management System (AMS) shall be used, and shall be tailored as necessary for the levels and methods of verification identified in the Verification Requirements Traceability Matrix (VRTM).

For ICDs, section 4 shall specify the process of verification for interface design characteristics presented.

3.3.1 Responsibility for Verification

For IRDs, subsection 4.1 shall contain a statement to the effect that the government is responsible for developing and implementing the verification of requirements for each project. The government may delegate verification activities to other organizations, independent contractors, and/or the major prime contractor.

For ICDs, subsection 4.1 shall contain a statement documenting the contractor's testing responsibilities.

3.3.2 Special Verification Requirements

For IRDs subsection 4.2, shall list and describe any special verification requirements necessary to verify the technical requirements imposed within the IRD. Conformance and interoperability verification requirements shall be performed for ATN and IPS-Type subsystems. The government shall approve all conformance and interoperability verification activities conducted by the contractor. FAA program offices are responsible for obtaining the results of conformance and interoperability testing from the contractor.

For facility IRDs, subsection 4.2 shall list and describe any special verification requirements necessary to verify the technical requirements imposed within the IRD.

3.3.3 Verification Requirements Traceability Matrix

Subsection 4.3 shall contain the following statement: "Verification shall be in accordance with Table [4-x], Verification Requirements Traceability Matrix (VRTM)." The format of the VRTM shall comply (and be tailored if necessary) with Appendix C-8, Content and Format of Verification Requirements Traceability Matrices, within the AMS. The contents of the VRTM shall provide verification of each technical requirement contained in the IRD with the appropriate verification method(s). Only those verification methods used in the VRTM shall be identified at the top of the VRTM. The appropriate verification levels and methods for use in the VRTM are defined in the following paragraphs.

3.3.4 Verification Levels

The three levels of verification are Subsystem, Integration, and Site. All requirements imposed by section 3 of the IRD shall be verified at one or more of these three levels.

a. **Subsystem level.** This level is usually conducted at the contractor's facility and culminates in the formal acceptance of a contractual end-item.

b. **Integration level.** This level is conducted at the FAA Technical Center or at a key site. The verification conducted shall determine if the hardware, software, or subsystem to be deployed for site installation will perform in a NAS environment and in accordance with NAS system-level operational and functional requirements.

c. **Site level.** This level is usually performed at the designated site. The verification portion of the subsystem installation and checkout shall emphasize demonstration of the overall system performance requirements. It includes the demonstration of an end-item, subsystem and/or system, the final acceptance demonstrations, and commissioning activities.

3.3.5 Verification Methods

The four verification methods that can be used at any of the three verification levels are as follows.

a. **Inspection.** This method is used to determine compliance without using special laboratory equipment, procedures, or services and consists of a nondestructive static-state examination of hardware, software, and/or technical data and documentation.

b. **Demonstration.** This is a method in which qualitative determination of properties is made for a configuration item, including software and/or the use of technical data and documentation. The items being verified are observed, but not quantitatively measured, in a dynamic state.

c. **Analysis.** This is a method in which hardware or software designs are compared with known scientific and technical principles, procedures, and practices to estimate the capability of the proposed design to meet the mission and system requirements.

d. **Test.** This is a method in which performance is measured during or after the controlled application of functional and/or environmental stimuli. Quantitative measurements are analyzed to determine the degree of compliance. The process uses standardized laboratory equipment, procedures, and/or services.

3.4 Preparation for Delivery

For IRDs, section 5 shall specify any special requirements to ensure safe delivery of the subsystem.

For ICDs, section 5 shall document any special preparations for delivery.

Section 5 is not applicable to facility IRDs.

3.5 Notes

Section 6 shall contain information of a general or explanatory nature only.

3.5.1 Definitions

Subsection 6.1 shall define all nonstandard terms used in the document. Terms that are defined in FAA-STD-025, section 1.2, shall have the same definition in the document.

3.5.2 Abbreviations

Subsection 6.2 shall define all abbreviations and acronyms used in the document.

4 DETAILED IRD REQUIREMENTS

4.1 Common IRD Requirements

4.1.1 Interface Requirements

Section 3 of the IRD shall specify the general functions, services, options, and physical requirements between the interfacing systems/subsystems. The detailed protocol layer features shall be consistent with a specific functional specification. Messages and their sizes, options, parameter settings, and class of services shall be defined at each protocol layer.

4.1.2 General Requirements

Subsection 3.1 shall distinctly identify the interfacing subsystem(s), the point(s) of interface including associated cable terminations, and functions and services provided by the interface necessary to achieve connectivity. An example of a NAS subsystem-to-subsystem interface is illustrated in figure 4-1.

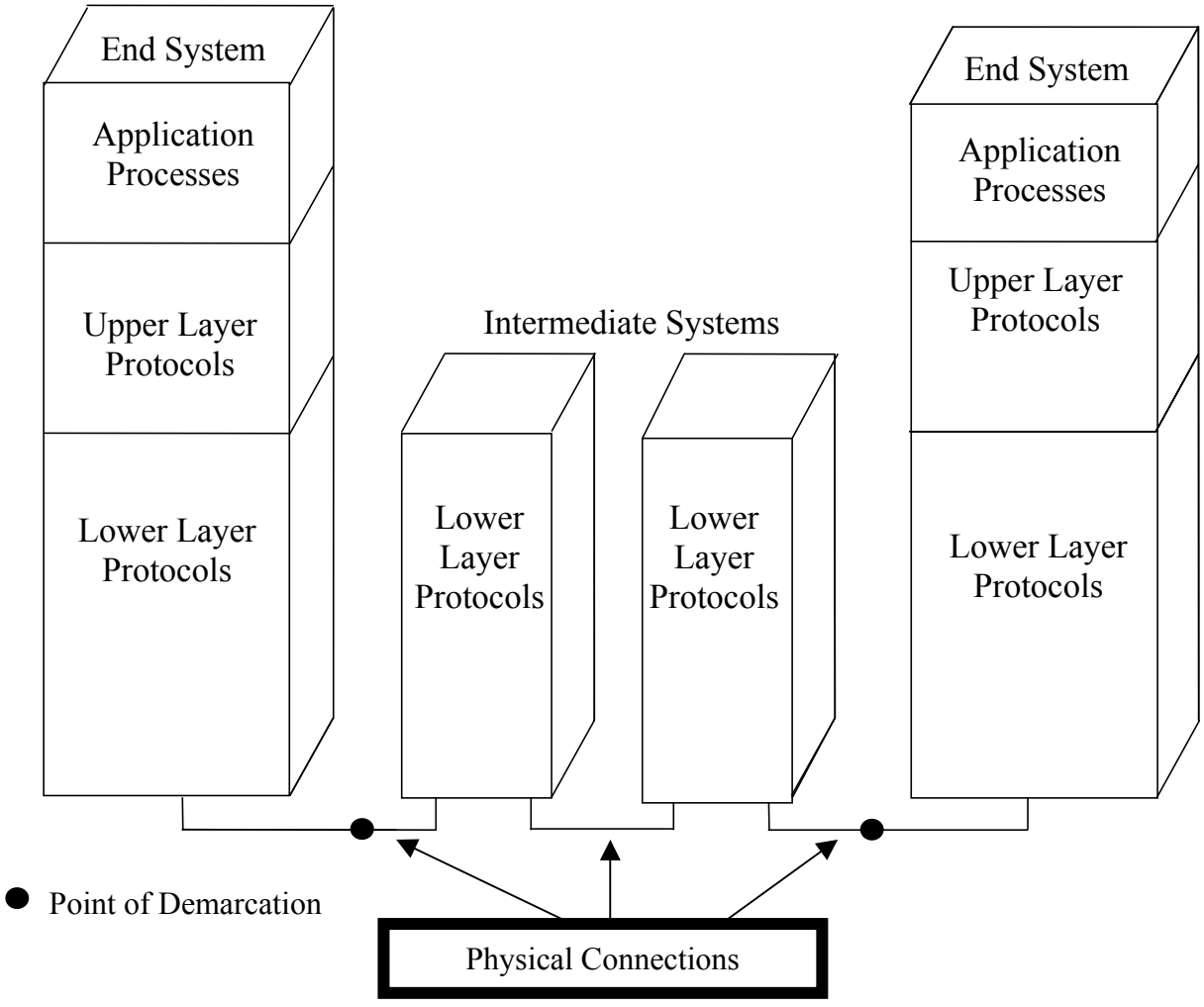

Figure 4-1 NAS Subsystem Interconnectivity

4.1.2.1 Human-System Interface Requirements

Subsection 3.1.1 shall describe the human-system interface characteristics relevant to this IRD.

4.1.3 Functional Requirements

Subsection 3.2 is required in each IRD written to this standard. This subsection will vary based on the intended purpose of the interface. This subsection of the IRD shall specify the functional requirements for the interface. Functional requirements can be identified for the following types of interfaces: Analog, Discrete, and Network. The functions and services provided by the interfaces shall also be specified.

4.1.4 Physical Requirements

In certain cases where one or more of the subsystems supply electrical, mechanical, or environmental support to another subsystem, the physical requirements shall be documented in section 3.3 of an IRD. Performance and tolerance requirements shall be specified to the extent that they are appropriate to the functional requirement being specified.

4.1.5 Electrical Power Requirements

Paragraph 3.3.1 shall provide the electrical power/electronic requirements associated with the interface as specified in section 3.1.1, Electrical Power, of FAA-G-2100g, Electronic Equipment, General Requirements. The electrical power requirements relate to the transfer of primary-type power between subsystems. Electronic requirements relate to the process of signaling or controlling or transferring information. The specific electrical power/electronic factors to be considered in specifying the power transfer requirements are:

a) Voltage (Alternating Current (AC)/Direct Current (DC))

b) Frequency

c) Current (AC/DC)

d) Transients (voltage and current)

e) Harmonic Distortion

f) Polarity (+/-), number of phases

g) Overload Protection (voltage and current)

h) Power and power factor (displacement and distortion)

i) Maximum noise level

j) Load balancing and protection

k) Impedance

l) Grounding and Shielding

This paragraph is required only when one subsystem will provide power to the interfacing subsystem.

4.1.5.1 Connectors

Paragraph 3.3.1.1 shall specify the requirements for electrical power/electronic connectors. When it is necessary to specify requirements for connectors, such requirements may include the mechanical and electrical characteristics of size, shape, type, design, materials, finishes, number of pins, gender, polarity, fastening requirements, and voltage or current limitations.

4.1.5.2 Wire and Cable

Paragraph 3.3.1.2 is required only when there are specific limitations to cable lengths. Reference FAA-STD-019 and FAA-STD-020 when using this paragraph.

4.1.5.3 Grounding

Paragraph 3.3.1.3 shall specify the requirements for connecting each circuit to the common electrical reference(s) for power and signals.

4.1.5.4 Fasteners

Paragraph 3.3.1.4 shall specify the requirements for fasteners to be used to assemble interfacing components. Mechanical jackscrews shall be provided to maintain secure electrical connections between mating parts in accordance with FAA-G-2100.

4.1.5.5 Electromagnetic compatibility

Paragraph 3.3.1.4 is required only when one subsystem imposes specific limits on the electromagnetic compatibility requirements to the interfacing subsystem. Such requirements include signal transmission characteristics, radar interference, and communications interference.

4.2 Analog Interface Requirements

The functional requirements for an analog interface in subsection 3.2.1 shall specify the number of analog signal paths required in each direction; the nature of the signals (e.g., voice band audio, video); the requirements for switching, control, and supervisory signaling; and the common electronic characteristics of the analog signals to be accommodated by the communications link or network that serves the interface (e.g., frequency bandwidth, impedance, signal-level, noise, and distortion limits). Any other requirements (for signal processing, signaling, call setup, toll quality, voice quality, jitter, wander, signal template, signaling etc.) that pertain to the analog portion of the interface shall also be specified.

4.3 Discrete Interface Requirements

The functional requirements for a discrete interface in subsection 3.2.1 shall specify the number of control signal paths to be used in each direction; functional requirements for switching, signaling, etc.; functions controlled on each signal path (e.g., "receiver mute" or "automatic gain control"); the common electrical characteristics (e.g., voltage, polarity, rise time, frequency, pulse rate, etc.) to be accommodated by the communications link or network that serves the interface; and any other requirements that pertain to the discrete control signal portion of the interface.

4.4 Network Interface Requirements

The functional requirements for a network interface shall be documented in subsection 3.2.1. This subsection shall identify each application process and the services required, information units, quality of service, error handling, and security.

Network interfaces shall be identified as end system-intermediate system, intermediate system-intermediate system, and application-application. An end system-intermediate system interface connects the application processes and functions of an open system associated with the exchange of information and the intermediate system functions of relaying, routing and encapsulating information to other intermediate or end systems. The intermediate system-intermediate system interface connects the functions of relaying, routing and encapsulating information between intermediate systems. An application-application interface connects application processes in one or more open systems.

4.4.1 Application Process

Subsection 3.2.1 and the following subsections apply to network interfaces.

4.4.1.1 Identification of Each Application Process

Subsection 3.2.1.1 identifies and describes each application process (AP) that utilizes the interface.

4.4.1.2 Services Required by the Application Process

Subsection 3.2.1.2 shall describe the kind of service(s) required by the AP (e.g., message transfer, file transfer, database inquiry, graphics, surveillance, sensor, etc.) and also specify the NAS category of service (critical, essential, or routine) as specified in NAS-SR-1000.

4.4.1.3 Information Units

Subsection 3.2.1.3 shall identify the requirements for the units of information transferred across the interface between two or more subsystems (e.g., requests, acknowledgments, files, data messages, error messages, control messages, and reports). If message type numbers have been associated with the information units, they shall be listed to provide traceability. Specific information unit types (for example, specific message types) shall be identified. Specify the following requirements for each information unit.

a) **Information code/structure.** Include the format for each information unit exchanged between the APs specifying the fields and field lengths. With respect to specifying the fields, compliance with the NAS-level data exchange standard FAA-STD-060 requires that approved definitions for representing commonly shared NAS data elements be used during the development and support of software systems. These application-independent data element standards are being developed over time and are maintained in the FAA Data Registry (FDR) (http://fdr.faa.gov/). If any field within an information unit will hold a data element that has been defined by an existing data standard in the FDR, specify the field by referencing the data standard's descriptive name and data identifier number assigned by the FDR. If there is no established standard by which the data in the field can be described, specify, at a minimum the following: field name, definition, data type (e.g., date, integer, decimal, bitmap, string), permissible values (and their meanings if they are codes), units of

measure for data involving quantities (e.g., feet, kilograms), format or layout, and maximum field length. This may be indicated in an appendix.

b) **Information Unit Segmentation.** Specify any segmentation required of the AP for each information unit. Include the maximum and minimum information unit sizes.

c) **Information flow Direction.** Indicate the direction of flow of each information unit (e.g., indicate initiator/responder of the information unit). Describe the procedures for initiating and responding to each information unit.

d) **Transmission Frequency.** Indicate scheduled and unscheduled information unit transfer (include the times for the scheduled transfers and the average number of transfers per unit of time for the unscheduled transfers). Include maximum requirements that can occur (e.g., peak transmission frequency).

e) **Responses.** Indicate if responses (including acknowledgments) are required for specific information unit transfers. Specify the response (e.g. the specific information unit type) and the response timer values. Indicate the maximum time allowed for receipt of an expected response.

4.4.1.4 Quality of Service

The QoS parameters in subsection 3.2.1.4 shall be in accordance with the approved standards listed in section 1.4. The QoS parameters required shall be documented and may include priority, bit error rate, latency, throughput, and sizes.

4.4.1.5 AP Error Handling

AP error-handling procedures shall be specified in subsection 3.2.1.5. Clarify what constitutes an error condition. The error-handling capabilities of the lower layers are assumed to be unrelated to the AP error-handling process.

4.4.1.6 Interface Summary Table

An interface summary table (see figure 4-2) shall be used in subsection 3.2.1.6 to establish associations between the messages that flow across the interface and the functions (APs) by each of the interfacing subsystems. The left side of the interface summary table column shall list the source, AP, and the subprocesses. The middle column shall contain the names of the messages associated with a subprocess and the reference paragraph. The right hand column shall list the sink, the AP, and the subprocess.

The following information shall also be provided:

a) For each cooperating source and sink function that requires interconnection support, the interface summary table shall designate an AP by name and a matching AP for the interfacing subsystems.

b) For each AP, the interface summary table shall designate a set of one or more application entities (AE) corresponding to subfunctions that originate or terminate specific data communications. For convenience, the AEs should be sequentially numbered as a subset within the AP numbering.

c) For each pair of AEs, one or more specific messages shall be listed. Each message shall represent a functional link between a pair of subprocesses listed as the logical interface for the two subsystems.

d) For any AP, AE, or message that cannot be identified, entries in the table shall be marked "To Be Supplied" ("TBS").

WMSCR/WARP Interface Summary Table			
Subsystem A			Subsystem B
WARP	Messages	Dir	W MSCR
Graphics W X Data Processing	Graphics W X Messages		Graphics W X Data Processing
	Hazardous W X Area Outlined	A →→ C	
A/N W X Data Processing	A/N W X Messages		A/N W X Data Processing
	Aircraft Reconnaissance Report	A ←← C	
	A W OS Hourly Surface W x Observations Message	A ←← C	
	A W OS Special Surface W x Observation Message	A ←← C	
	Center Weather Advisory	A ←→ C	
	DoD Point Weather Warning	A ←← C	
	DoD Severe Weather Advisory	A ←← C	

Figure 4-2: Example Interface Summary Table

4.4.2 Protocol Implementation

Subsection 3.2.2 shall identify the required protocols for each layer of each subsystem. For the layers not used, this text shall be used *"This layer is not implemented."* To ensure interoperability, subsection 3.2.2 shall address the specific features of the protocols supported at each layer as required. The protocols shall be described in accordance with FAA-STD-039 and FAA-HBK-04.

4.4.2.1 Application Services

Subsection 3.2.2.1 shall identify the functions and services (e.g., remote login, file transfer, and electronic mail) required for each subsystem.

4.4.2.2 Network Services

Subsection 3.2.2.2 shall identify the network services (end-to-end communications, packet routing, addressing, packet fragmentation, and reassembly, security, physical interface) required for each subsystem.

4.4.2.3 Naming and Addressing

Subsection 3.2.2.3 shall identify the system naming and addressing requirements. Naming and addressing requirements for NAS open systems (i.e., intermediate and end systems) shall be in accordance with FAA-STD-042. Naming and addressing requirements for ATN open systems shall be in accordance with the ATN Manual.

4.4.3 Security

Subsection 3.2.3 shall specify security requirements for the interface in accordance with FAA policy and applicable functional specifications. Security requirements shall be based on a risk assessment performed jointly by end-users of the interface and service providers whose assets support and may affect the interface's security posture. An interface risk assessment addresses the sensitivity and criticality levels of the data; examines risk exposure at both ends of the interface, and includes all security disciplines in the risk assessment.

4.5 Interface Requirements Table

Subsection 3.2.4 shall summarize the interface functional requirements in an interface requirements table or matrix in addition to the text. The interface requirements table shall serve as a "quick-look" reference. Included shall be message identification (e.g., number and name), format type, message sizes (fixed or variable lengths), and frequency/rate of transmission. The reference source for messages mandated by international treaties, agreements with government agencies, and so forth shall also be included. An example of this interface requirements table is illustrated in figure 4-3.

WARP/WMSCR Interface Requirements Table

PRODUCT NAME	PRODUCT MNEMONIC	PRODUCT TYPE	PRODUCT SIZE (BYTES)	TRANSM. FREQUENCY (PEAK)
1. Aircraft Reconnaissance Report	UA	Alphanumeric	.3k	2/hr
2. AWOS Hourly Surface Weather Observations	SAO	Alphanumeric	.2k	905/hr
3. AWOS Special Surface Weather Observation	SAS	Alphanumeric	.2k	95/hr
4. Center Weather Advisory	CWA	Alphanumeric	.2k	69/day
5. Center Weather Advisory*	CWA	Alphanumeric	.2k	3/day
6. DoD Point Weather Warning	WOP	Alphanumeric	3.3k	4/day
7. DoD Severe Weather Advisories	SWA	Alphanumeric	3.3k	4/day
8. DoD Surface Observations	SAOD	Alphanumeric	.09k	165/hr
9. DoD Terminal Forecasts	TAFD	Alphanumeric	.08k	660/day
10. General Information Message	GIM	Alphanumeric	.2k	69/day
11. General Information Message*	GIM	Alphanumeric	.2k	3/day

Note: * Message goes from WARP to WMSCR.

Figure 4-3: Sample Interface Requirements Table

4.6 Facility IRD Requirements

This section describes the detailed requirements unique to a facility IRD.

4.6.1 Interface Requirements

Section 3 of the facility IRD shall specify the general and physical interface requirements between a facility and a subsystem. Requirements shall be specified only to the extent necessary to ensure adequate interface design.

4.6.2 General Requirements

Subsection 3.1 shall contain the following statement: "The [subsystem] equipment shall be installed in the [facility] and conform to the requirements specified within this IRD."

The user subsystem's interface to other NAS subsystems is specified in other documents, and does not form a part of the facility IRD. Only facility-to-subsystem interfaces required for equipment installations are identified in subsection 3.1. An example of a typical facility-to-user subsystem interface is depicted in figure 4-4.

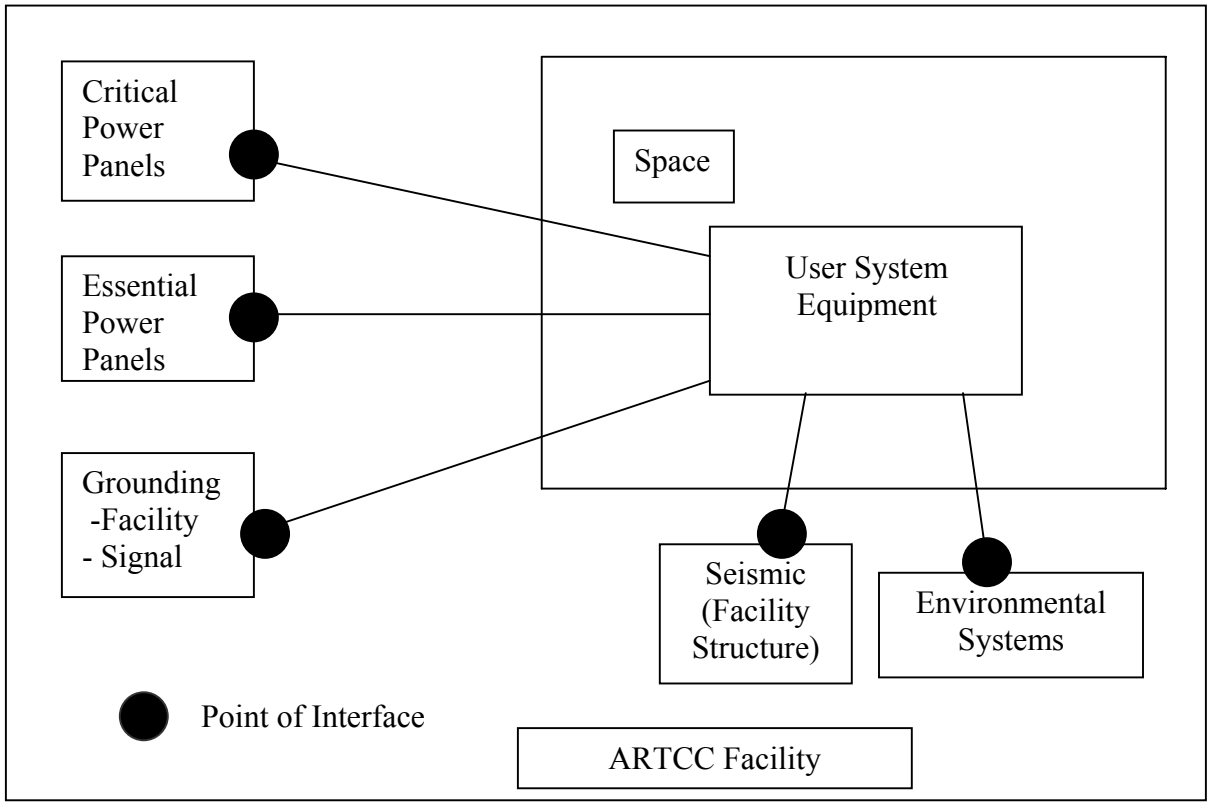

Figure 4-4: ARTCC Facility to User Subsystem Interface Diagram

4.6.3 Physical Requirements

Subsection 3.2 shall specify the space, electrical, and environmental requirements. In some instances, it may be advantageous to use text, as identified in the following paragraphs, to specify requirements in addition to the data tables. Performance and tolerance requirements shall be specified to the extent that they are appropriate to the functional requirement being detailed.

4.6.4 Space

Subsection 3.2.1 shall specify the space, footprint, location, and orientation requirements necessitated by the interface. Minimum and maximum space requirements of subsystem/equipment items shall be specified to ensure compatibility with associated facilities and to mitigate possible detrimental interaction. The impact of weight limits and dimensional limits (accessibility and access clearance for maintenance and repair activities) and durability on the interface shall be taken into account in specifying interface location and orientation. The subsystem space requirements shall be recorded in accordance with table 4-I. The subsystem space allocation shall be recorded in accordance with figure 4-5. If multiple areas are used, multiple figures may be used.

User Subsystem Space Requirements							
QTY	WIDTH (In)	DEPTH (In)	HEIGHT (In)	FRONT CLEAR (In)	REAR CLEAR (In)	UNIT SPACE (Sq. Ft.)	TOTAL* SPACE (Sq. Ft.)

* Includes all access space and “no build” buffer space.

Table 4-I: User Subsystems Space Requirements

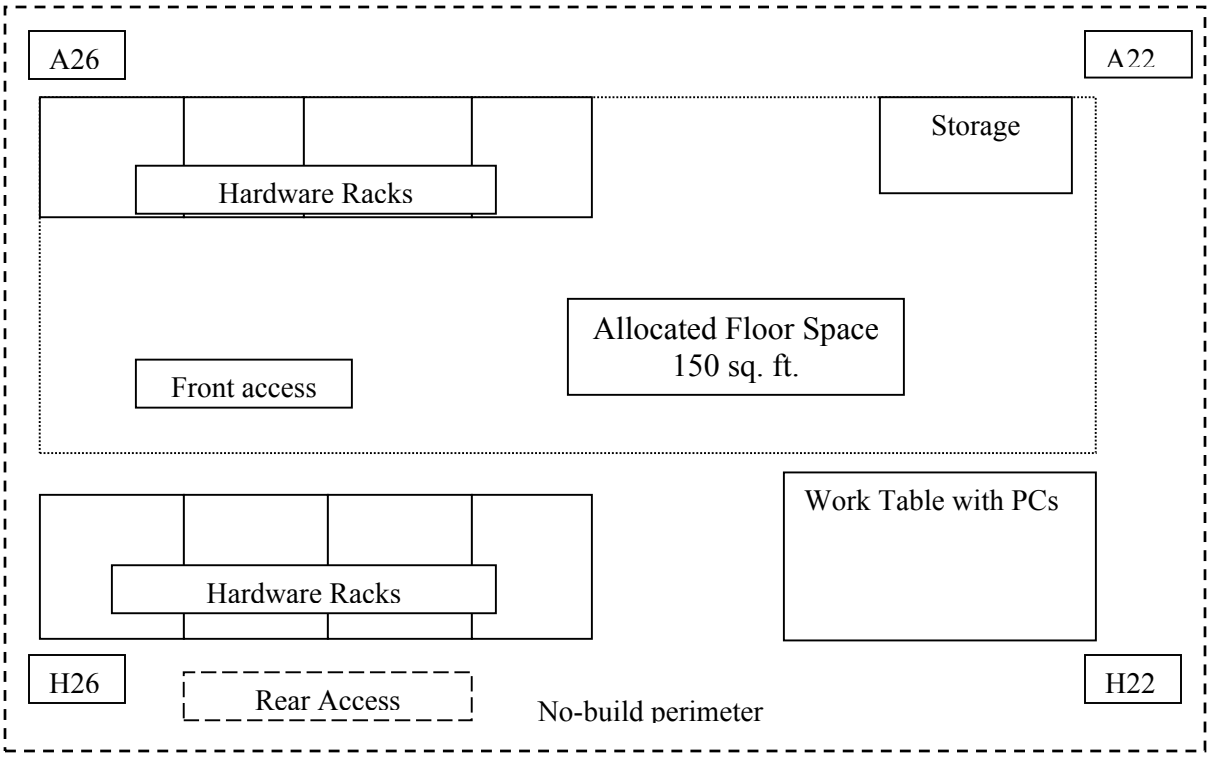

Figure 4-5: Sample Space Distribution

Note: When space considerations are more complex than can be shown on the simplified diagram above, standard facility drawing markups shall be used and attached as necessary.

4.6.5 Electrical

Subsection 3.2.2 shall specify the electrical power requirements the facility must provide to the subsystem in order for the subsystem to operate as designed.

4.6.5.1 Load Power Characteristics

Subsection 3.2.2.1 shall specify the inrush current and power factor requirements of the user subsystems within the facility in accordance with section 3.1.1.3 of FAA-G-2100g, Electronic Equipment, General Requirements.

4.6.5.2 Load Balance

Subsection 3.2.2.2 shall specify the load balance requirements of the user subsystems within the facility in accordance with section 3.1.1.4 of FAA-G-2100g, Electronic Equipment, General Requirements.

4.6.5.3 Harmonics

Subsection 3.2.2.3 shall specify the harmonics requirements of the user subsystems within the facility in accordance with section 3.1.1.5 of FAA-G-2100g, Electronic Equipment, General Requirements.

4.6.5.4 Overload Protection

Subsection 3.2.2.4 shall specify the overload protection requirements of the user subsystems within the facility in accordance with section 3.1.1.6 of FAA-G-2100g, Electronic Equipment, General Requirements.

4.6.5.5 Input Power Conditions

Subsection 3.2.2.5 shall specify the input power conditions such as voltage source, current draw, and power load, voltage/time event requirements (ride-through) required by the user subsystems within the facility in accordance with section 3.1.1.7 of FAA-G-2100g, Electronic Equipment, General Requirements.

4.6.5.6 Grounding and Bonding

Subsection 3.2.2.6 shall specify the grounding and bonding requirements of the user subsystems within the facility in accordance with section 3.1.1.9 of FAA-G-2100g, Electronic Equipment, General Requirements.

4.6.5.7 Electrical Power Availability

Subsection 3.2.2.7 shall specify the electrical power availability requirements of the user subsystem within the facility.

4.6.5.8 Critical/Essential Power Bus

Subsection 3.2.2.8 shall specify the critical and essential power requirements for the user subsystem within the facility.

4.6.5.9 Electrical Wiring

Subsection 3.2.2.9 shall identify wiring by a single line diagram depicting equipment groups, branch circuits, and independent power connections.

4.6.6 Environmental

Subsection 3.2.3 shall specify the environmental requirements for the operation of the subsystem at a facility.

4.6.6.1 Thermal/Cooling

Subsection 3.2.3.1 shall specify the thermal/cooling requirements, including any specialized subsystem water or forced air-cooling requirements.

4.6.6.2 Noise Level

Subsection 3.2.3.2 shall specify noise level and noise abatement requirements for the user subsystem in the Operations and general work areas in accordance with FAA-G-2100g, Electronic Equipment, General Requirements.

4.6.6.3 Lighting

Subsection 3.2.3.3 shall specify any special lighting requirements for the user subsystem within the facility.

4.6.7 Security

Subsection 3.2.4 shall specify unique security and accessibility requirements in accordance with FAA policy and applicable functional specifications.

4.6.8 Project Unique

Subsection 3.2.5 shall specify unique subsystem requirements that the facility must provide to the subsystem in order for the subsystem to operate as designed; this is a service/requirement not typically provided by a facility. Included among the project-unique requirements would be the following sections.

4.6.8.1 Structural

Subsection 3.2.5.1 shall specify any specialized structural requirements for the user subsystem within the facility.

4.6.8.2 Grounding, Shielding, and Lightning Protection

Subsection 3.2.5.2 shall specify any special grounding, shielding, and lightning requirements for the user subsystem within the facility in accordance with FAA-STD-019 and FAA-STD-020.

4.6.8.3 Power-Conditioning Requirements

Subsection 3.2.5.3 shall specify any power-conditioning requirements for the user subsystem within the facility.

4.6.8.4 Raised Flooring

Subsection 3.2.5.4 shall specify any raised flooring requirements for the user subsystem within the facility.

5 DETAILED ICD REQUIREMENTS

5.1 Common ICD Requirements

5.1.1 Interface Design Characteristics

Section 3 documents the general functions, services, options, and physical design characteristics between the interfacing systems/subsystems. The detailed protocol layer features shall be consistent with a specific functional specification. The interface design characteristics shall be documented to the extent necessary to show compliance with interface requirements. Performance and tolerance design characteristics shall also be included.

5.1.2 General Characteristics

Subsection 3.1 shall distinctly identify the interfacing subsystem(s), the point(s) of interface including associated cable terminations, functions and services provided by the interface, and each layer implemented within the interfacing subsystem(s) necessary to achieve connectivity. An example of a NAS subsystem-subsystem interface is illustrated in figure 4-1.

5.1.2.1 Human-System Interface Characteristics

Subsection 3.1.1 shall describe the human-system interface characteristics relevant to this ICD.

5.1.3 Functional Design Characteristics

Subsection 3.2 is required in each ICD written to this standard. The contents of this subsection will vary based on the purpose of the interface. This subsection of the ICD shall specify the functional design characteristics for the interface. Functional design characteristics are, for example, identified in three categories of interfaces: Network (data); Analog; and Discrete. Performance characteristics and the tolerances those characteristics meet shall be documented to the extent that they are appropriate to the functional design characteristics specified.

5.1.4 Physical Design Characteristics

In certain cases where one or more of the subsystems supplies electrical, mechanical, or environmental support to another subsystem, the physical design characteristics shall be documented in section 3.3 of an ICD. Performance characteristics and their respective tolerances shall be documented to the extent that they are appropriate to the functional characteristic being documented. Interfacing subsystems shall be specified in their installed (or "mated") condition. In addition, the "halves" of the interface shall be separated and specified in detailed views. Only that portion of the hardware that is applicable to the interface needs to be identified. Each component or part shall be identified with the participant responsible for supplying it.

5.1.5 Electrical Power and Electronic Characteristics

Paragraph 3.3.1 shall document the electrical power and electronic characteristics associated with the interface as specified in section 3, Requirements, of FAA-G-2100g, Electronic Equipment, General Requirements. The electrical power characteristics relate to the transfer of primary-type power between subsystems. Electronic characteristics relate to the process of signaling or controlling or transferring information. The specific electrical power and electronic factors to be considered in describing the power transfer characteristics are:

a) Voltage (Alternating Current (AC)/ Direct Current (DC))

b) Frequency

c) Current (AC/DC)

d) Transients (voltage and current)

e) Harmonic Distortion

f) Polarity (+/-), number of phases

g) Protection (voltage and current)

h) Power and power factor (displacement and distortion)

i) Maximum noise level

j) Load balancing and protection

k) Impedance

l) Grounding and Shielding

This paragraph is required only when one subsystem will provide power to the interfacing subsystem.

5.1.5.1 Connectors

Paragraph 3.3.2.1 shall document the connectors used in the interface. The mechanical characteristics to be documented shall include size, pin/socket configuration, keyway indexing and tolerance, materials, finish, and torque. Electrical characteristics to be documented shall include pin-to-pin isolation, breakdown voltage, contact resistance, dielectric properties, conductivity, and bonding. Connectors shall be specified in their "mated" condition with the wiring configuration of each half defined. Signal/function-to-pin assignments shall be defined for each connector half to ensure proper connection of the circuits involved. All wires, including jumpers, splices, spares, etc., shall be identified. All unconnected pins, including uninstalled pins, shall also be identified. These documented characteristics may be satisfied using a combination of drawings, tables, and written text.

5.1.5.2 Wire and Cable

Paragraph 3.3.2.2 shall document wire type, American Wire Gauge (AWG) conductor size, conductor material, jacket material, insulation voltage rating, color code, etc. Wire lengths, maximum resistances, cable capacitance, characteristic impedance, etc., shall also be documented. When cable routing is critical to maintain electromagnetic compatibility or pulse isolation, special notes, twist characteristics, views etc., shall be included.

5.1.5.3 Grounding

Paragraph 3.3.2.3 shall document how each circuit is connected to the common electrical reference(s) for power and signals.

5.1.5.4 Fasteners

Paragraph 3.3.2.4 shall document the fasteners to be used to assemble interfacing components. Characteristics to be documented shall include head type, size, diameter, tolerance, thread definition, length, material, finish, and torque/installation values.

5.1.5.5 Electromagnetic Compatibility

Paragraph 3.3.2.5 shall document the specific limits on signal transmission characteristics, radar interference, and communications interference.

5.2 Analog Interface Requirements

The functional characteristics for an analog interface in subsection 3.2.1 shall document the number of analog signal paths required in each direction; the nature of the signals (e.g., voice band audio, video); the functional characteristics for switching, control, and supervisory signaling; and the common electronic characteristics of the analog signals to be accommodated by the communications link or network that serves the interface (e.g., frequency bandwidth, impedance, signal level, noise and distortion limits). Any other characteristics (for signal processing, signaling, call setup, toll quality, voice quality, jitter, wander, signal template, signaling, etc.) that pertain to the analog portion of the interface shall also be documented.

5.3 Discrete Interface Requirements

The functional characteristics for a discrete interface in subsection 3.2.1 shall document the number of control signal paths to be used in each direction; functional characteristics for switching, signaling, etc.; functions controlled on each signal path (e.g., "receiver mute" or "automatic gain control"); the common electrical characteristics (e.g., voltage, polarity, rise time, frequency, pulse rate, etc.) to be accommodated by the communications link or network that serves the interface; and any other characteristics that pertain to the discrete control signal portion of the interface.

5.4 Network Interface Requirements

The functional design characteristics for a network interface shall be documented in subsection 3.2.1. This subsection shall identify each application process and the services required, information units, quality of service, error handling, and security.

Network interfaces shall be identified as end system-intermediate system, intermediate system-intermediate system, or application-application. An end system-intermediate system interface connects the application processes and functions of an open system associated with the exchange of information and the intermediate system functions of relaying, routing, and encapsulating information to other intermediate or end systems. The intermediate system-intermediate system interface connects the functions of relaying, routing, and encapsulating information between intermediate systems. An application-application interface connects application processes in one or more open systems.

5.4.1 Application Process

Subsection 3.2.1 and the following subsections apply to network interfaces.

Interfaces involving computer processing of user application information shall specify the AP present in the interface between two subsystems. The APs present in any interface involving the subsystem shall be specified for a subsystem/user ICD. The requirements listed in the following subparagraphs shall be specified for APs to the degree that they are present. If the interface utilizes a given AP process that has an entry contained in a NAS application process standard, the associated requirements list (with all options specified) shall be placed in an appendix to the ICD. This requirements list shall be referenced wherever applicable in order to satisfy the requirements. If some of the information specifying the AP for an ICD is contained in another ICD, then this second ICD shall be referenced. If such referencing is performed, the relevant portions of the referenced ICD shall be specified.

As an example, it may be convenient for a given ICD to reference a particular subsystem/user ICD. The ICD author may choose to copy appropriate requirements lists contained in an appendix to the referenced ICD into an appendix of the referencing ICD.

5.4.1.1 Identification of Each Application Process

Subsection 3.2.1.1 identifies and describes each AP that utilizes the interface.

5.4.1.2 Category of Services Required by the Application Process

Subsection 3.2.1.2 shall describe the kind of service(s) required by the AP (e.g. message transfer, file transfer, data base inquiry, weather graphics, surveillance, sensor, etc.) and also specify the NAS category of service (critical, essential or routine) as specified in NAS-SR-1000.

5.4.1.3 Information Units

Subsection 3.2.1.3 identifies how the units of information that may be transferred across the interface between two or more subsystems (e.g., requests, acknowledgments, files, data messages, error messages, control messages, and reports) have satisfied the IRD requirements. If message type numbers have been associated with the information units, they shall be listed to provide traceability. Specific information unit types (e.g., specific message types) shall be identified. Specify the following requirements for each information unit.

a) **Information code/structure.** Include the format for each information unit specifying the fields and field lengths. For information units that have incorporated FAA-STD-060 standard data elements into their structures, provide a table associating each field with a reference to its corresponding data standard's descriptive name and data identifier number. For any fields that do not have corresponding data standards, the following at a minimum, shall be specified: field name, definition, data type (e.g., date, integer, decimal, bitmap, string), permissible values (and their meanings if they are codes), units of measure for data involving quantities (e.g., feet, kilograms). This may be indicated in an appendix.

b) **Information unit segmentation.** Specify any segmentation required of the AP for each information unit. Include the maximum and minimum information unit sizes.

c) **Direction of Information flow.** Indicate the direction of flow of each information unit (for example, indicate initiator/responder of the information unit). Describe the procedures for initiating and responding to each information unit.

d) **Frequency of transmission.** Indicate scheduled and unscheduled information unit transfer (include the times for the scheduled transfers and the average number of transfers per unit of time for the unscheduled transfers). Include maximum requirements that can occur (e.g., peak transmission frequency).

e) **Responses.** Indicate if responses (including acknowledgments) are required for specific information unit transfers. Specify the response (e.g., the specific information unit type) and the response timer values. Indicate the maximum time allowed for receipt of an expected response.

5.4.1.4 Quality of Service

The QoS parameters in subsection 3.2.1.4 shall be in accordance with the approved standards listed in section 1.4. The QoS parameters required shall be documented and may include priority, bit error rate, latency, throughput, and sizes.

5.4.1.5 AP Error Handling

In subsection 3.2.1.5, error-handling procedures of the AP shall be specified as required. Clarify what constitutes an error condition. The error-handling capabilities of the lower OSI layers are assumed to be unrelated to the AP error handling process.

5.4.2 Interface Summary Table

An interface summary table (reference figure 5-1) shall be used in subsection 3.2.1.7 to establish associations between the messages that flow across the interface and the functions (APs) by each of the interfacing subsystems. The interface summary table shall consist of three columns. The left column shall list the Source, AP, and the subprocesses. The middle column shall contain the names of the messages associated with a subprocess and the reference paragraph. The right-hand column shall list the sink, AP, and subprocess.

The following information shall also be provided:

a) For each cooperating source and sink function that requires interconnection support, the interface summary table shall designate an AP by name and a matching AP for the interfacing subsystems.

b) For each AP, the interface summary table shall designate a set of one or more AEs corresponding to subfunctions that originate or terminate specific data communications. For convenience, the AEs shall be sequentially numbered as a subset within the AP numbering.

c) For each pair of AEs, one or more specific messages shall be listed. Each message shall represent a functional link between a pair of subprocesses listed as the logical interface for the two subsystems.

d) For any AP, AE, or message that cannot be identified, entries in the table shall be marked "To Be Supplied" (“TBS”).

Source	Message	Ref. Para.	Sink
Subsystem			Subsystem
Application Process			Application Process
Application Entity			Application Entity

Figure 5-1: Example Interface Summary Table

5.4.3 Protocol Implementation

Subsection 3.2.2 shall document the protocols implemented for each layer of each subsystem. For the layers not used, this text shall be used *"This layer is not implemented."* To ensure interoperability, subsection 3.2.2 shall address the specific features of the protocols supported at each layer as required. The protocols shall be described in accordance with FAA-STD-039 and FAA-HBK-04.

5.4.3.1 Application Services

Subsection 3.2.2.1 shall document the functions and services (e.g., remote login, file transfer, and electronic mail) implemented for each subsystem.

5.4.3.2 Network Services

Subsection 3.2.2.2 shall identify the network services (end-to-end communications, packet routing, addressing, packet fragmentation and reassembly, security, physical interface) implemented for each subsystem.

5.4.3.3 Naming and Addressing

Subsection 3.2.2.3 shall identify the system naming and addressing characteristics implemented for each subsystem. Naming and addressing characteristics for NAS open systems (i.e., intermediate and end systems) shall be in accordance with FAA-STD-042. Naming and addressing characteristics for ATN open systems shall be in accordance with the ATN Manual.

5.4.4 Security

Subsection 3.2.3 documents the security characteristics of the interface. The security characteristics shall be based on a risk assessment performed jointly by end-users of the interface and service providers whose assets support and may affect the interface's security posture. An interface risk assessment addresses the sensitivity and criticality levels of the data, examines risk exposure at both ends of the interface, and includes all security disciplines in the risk assessment.

5.5 Interface Design Characteristics Table

Subsection 3.2.4 shall summarize the interface design characteristics in an interface requirements table or matrix in addition to the text. The interface design characteristics table shall serve as a quick-look reference. Included shall be message identification (e.g., number and name), format type, message sizes (fixed or variable lengths), and frequency/rate of transmission. The reference source for messages mandated by international treaties, agreements with government agencies, etc., shall also be included. An example of this interface requirements table is illustrated in Figure 5-2.

MESSAGE NAME	FORMAT	SIZE (bytes)	TIME CONSTRAINTS	FREQUENCY

Figure 5-2: Example Interface Design Characteristics Table

6 DETAILED IR REQUIREMENTS

6.1 Interface Revision (IR) Applicability

An IR shall be used to change an IRD or an ICD. The reasons for originating an IR may include:

a) Improving or expanding interface requirements

b) Adding information to complete an incomplete document

c) Bringing a document into compliance with actual design or operation

d) Incorporating requirement or design changes to resolve interface incompatibility

e) Documenting changes in interfaces

f) Correcting typing errors

6.2 General Preparation Requirements for IRs

The following requirements shall apply to all IRs.

6.2.1 IR Format.

Sheet 1 of an IR shall conform to the format illustrated in figure 6-1. Any additional IR pages required shall use the continuation form illustrated in figure 6-2. Plain 8 1/2 by 11 or larger pages may be used to replace complete pages or to change large pictorial areas.

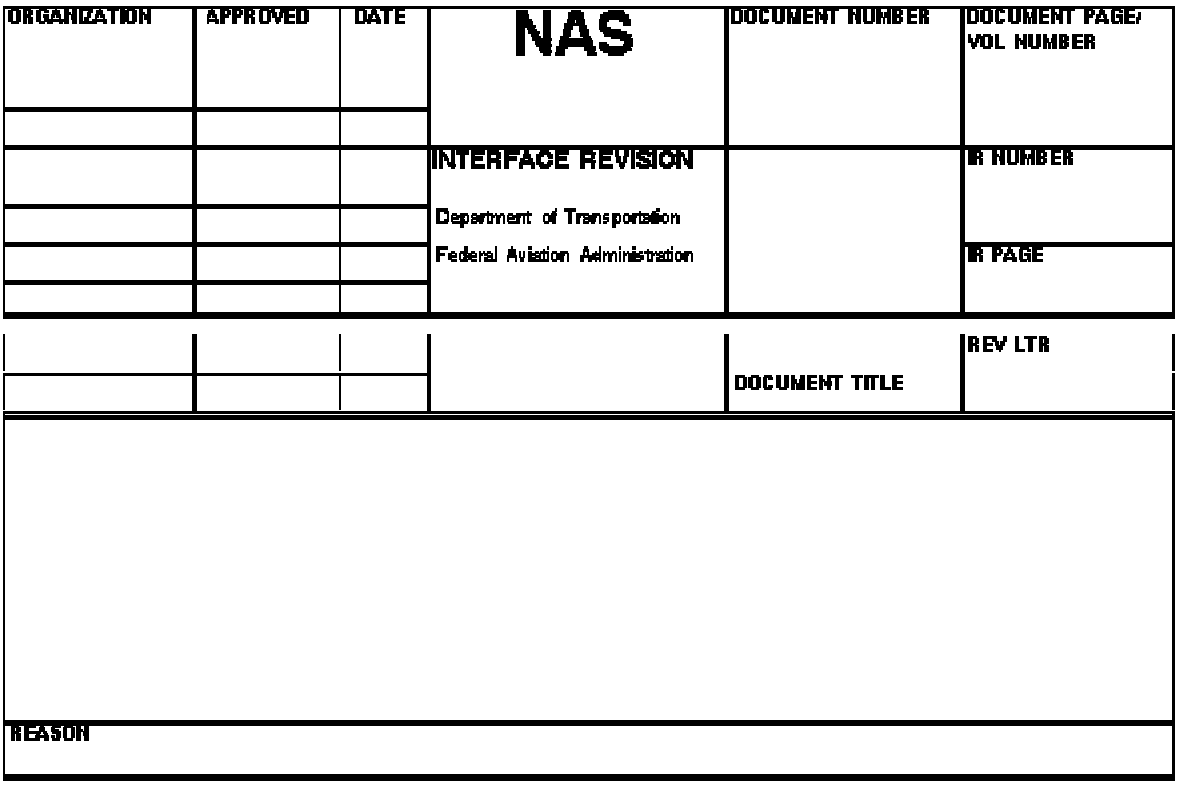

Figure 6-1: Interface Revision Form

NAS INTERFACE REVISION CONTINUATION				
APPROVED	APPROVED			IR NUMBER
APPROVED	APPROVED	DOCUMENT NUMBER	DOC PAGE/VOL NUMBER	IR PAGE

Table 6-2: IR Continuation Form

6.2.2 Standard IR Information

For each IR, the following standard information shall be entered into the respective blocks of figures 6-1 and 6-2.

6.2.2.1 Document Number

This is the number of the document being revised.

6.2.2.2 Document Title

This is the title of the document being revised.

6.2.2.3 Document Page/Volume Number

This is the document volume and/or page number as applicable.

6.2.2.4 IR Number

An IR number may be used only once. The same number shall appear on each sheet of the IR.

6.2.2.5 IR Page

The sequence number of the IR page, on page one only “1” shall be followed by the total number of pages in the IR (e.g., 1 of 10). On a single page IR, use "1 of 1."

6.2.2.6 Revision Letter

This block shall be left blank. At the time of IR incorporation, the document originator shall identify the revision letter under which the IR was incorporated.

6.2.2.7 Approval Blocks

This block shall contain the IR originator and the same approval signatures as required on the document. The IR originator shall be listed first.

6.2.2.8 Reason

This block shall contain a concise description of the reason for the IR.

6.2.3 IR Change Description

The body of the IR shall contain a detailed description of the changes to be made to the document. A number on the IR form shall identify each change. The identifier and location of each change shall be specified; for book-form documents, specify such items as the page, paragraph, and figure. Change descriptions to such items as drawings and figures shall be identified in detail. Previously unincorporated IRs shall be referenced if the change affects or cancels items added or changed by those IRs.

An accurate description of each change shall be specified with any special instructions for site incorporation. These instructions include:

a) If the change modifies an existing interface description, both the old and new configuration shall be identified using the words "was" and "now" respectively.

b) When an entire paragraph is to be changed, the following instruction shall be used: "Revise paragraph to read as shown."

c) If the change involves new information only, the word "delete" shall be used.

d) If a complete revision is to be accomplished, the following instructions shall be used: "DOCUMENT COMPLETELY REVISED" or "PREVIOUS RELEASE IS OBSOLETE."

6.2.3.1 IR Reference Notes

IR references shall be used when it is necessary to include instructions or information on an IR other than the actual document change itself. The reference material shall be identified as "IR reference only; not for incorporation in document change." No IR reference material shall be incorporated.

6.2.3.2 Book-Form Replacement Pages

If a change involves most of a book-form page, a replacement original page may be prepared and included as part of the IR. The IR number and IR sheet number shall be penciled in at the top of the page. When replacement pages are provided, the following instruction shall be used in the IR change description: "Replace document page [x] with page [y] of the IR."

6.2.3.3 Oversize Pages

If a change description for a drawing requires more space than is available on the 8 1/2 x 11 IR form, larger pages may be used to supplement the IR. Pages used in this manner shall carry the IR number and an appropriate IR page number. Change descriptions made on supplemental IR pages shall be referenced by appropriate instruction words on the basic IR form (e.g. "Make changes as described on page 3 of this IR"). At least a one-half-inch margin shall be maintained on all sides of supplemental IR pages.

Appendix I DEVELOPMENT GUIDE FOR INTERFACE DOCUMENTS AND INTERFACE REVISIONS (IR)

10.1 Introduction

10.1.1 Purpose

This appendix is an overview of the interface management process and a guide for developing IRDs and IRs. It is intended for authors responsible for developing and maintaining IRDs and IRs.

10.1.2 Scope

This guide is not meant to be all encompassing, but it does include sources for obtaining the information necessary for developing IRDs and IRs and identifies the organizations involved in coordinating the effort.

10.1.3 Overview

An IRD specifies the interface requirements between two or more subsystems or facilities. It is used to ensure that affected offices agree to the interface requirements between an existing subsystem/facility and a new subsystem/facility. The IRD, except facility IRDs, becomes part of the procurement package to the contractors to ensure that the contractors are designing toward a mutually understood interface.

For the facility IRD, it is recommended that the document be developed in four iterations.

a) **Initial.** At the conception of the program, the document most likely contains minimal information. It is used as a reservation document for transition planning and defining the initial scope of site space and preparation requirements.

b) **Primary.** The document is targeted after the development of the system specification and contains assumptions as well as firm data. It is a first refinement of the initial effort.

c) **Intermediate.** The document is developed after the program has matured to the point that a prototype has been developed or first-article testing has been completed.

d) **Final.** The document is refined and complete based on acceptance testing or key-site testing.

An ICD is a formal agreement prepared by the contractor(s) that documents how the interface requirements between subsystems or between a subsystem and facilities are implemented. The ICD identifies, quantifies, and controls the design characteristics of the interface. The ICD ensures interface compatibility by documenting form, fit, and function.

An IRD should be started in the early phase of an acquisition and must be in place before a statement of work (SOW) is finalized. If both an IRD and ICD are required as a rule, IRDs must be approved prior to an ICD. The ICD implements the IRD requirements in the design. The development of an IR, or a change to a previously developed IRD, can occur anytime after an IRD is baselined.

Any developer of IRDs/IRs (i.e., FAA personnel or appropriate contractors) may use the procedures and processes in this guide.

Specific procedures may vary depending on where the document is initiated. The IRD/IR development process is described below and complies with FAA Order 1800.66, Change 1, National Airspace System Configuration Management Procedures. The ICD approval process is a subset of the IRD/IR approval process.

10.2 IRD Development and Approval Process

The IRD author is responsible for defining the requirements necessary for the interface between two subsystems, a subsystem and a generic user, or between a subsystem and the facility. The author shall draft the IRD, request a document number from the NAS Configuration Management Branch, ACM-20, and lead an Interface Working Group (IWG). The IWG should include representatives from Project Management, Systems Engineering, and stakeholders impacted by the IRD. Technical interchange meetings (TIMs) should be conducted to ensure complete and correct definition of requirements.

The IRD must be coordinated with the System Engineering Council (SEC) as part of the approval process. Once the draft IRD is completed, a draft case file shall be prepared.

The case file originator may be the IRD author or an individual designated by the organization responsible for the IRD. The draft case file and the draft IRD are then submitted to the SEC for a prescreening review. Upon completion of the prescreening activity, the SEC Executive Secretary will sign the final draft case file and provide approval recommendation(s) to the NAS configuration control board (CCB). The case file package shall include FAA form 1800-2, the draft IRD, a comment resolution matrix, a list of reviewers, and approval of the stakeholders impacted by the IRD.

The case file originator will submit the case file to the NAS Configuration Management Branch's control desk for NAS Change Proposal (NCP) number assignment. The NAS Configuration Management branch will process the case file in accordance with FAA Order 1800.66 and the NAS CCB Charter and Operating Procedures. The case file originator is responsible for the IRD through the entire process until approved by the NAS CCB, including comment resolution during prescreening and must evaluation.

Figure 10-1 shows a flowchart of this process.

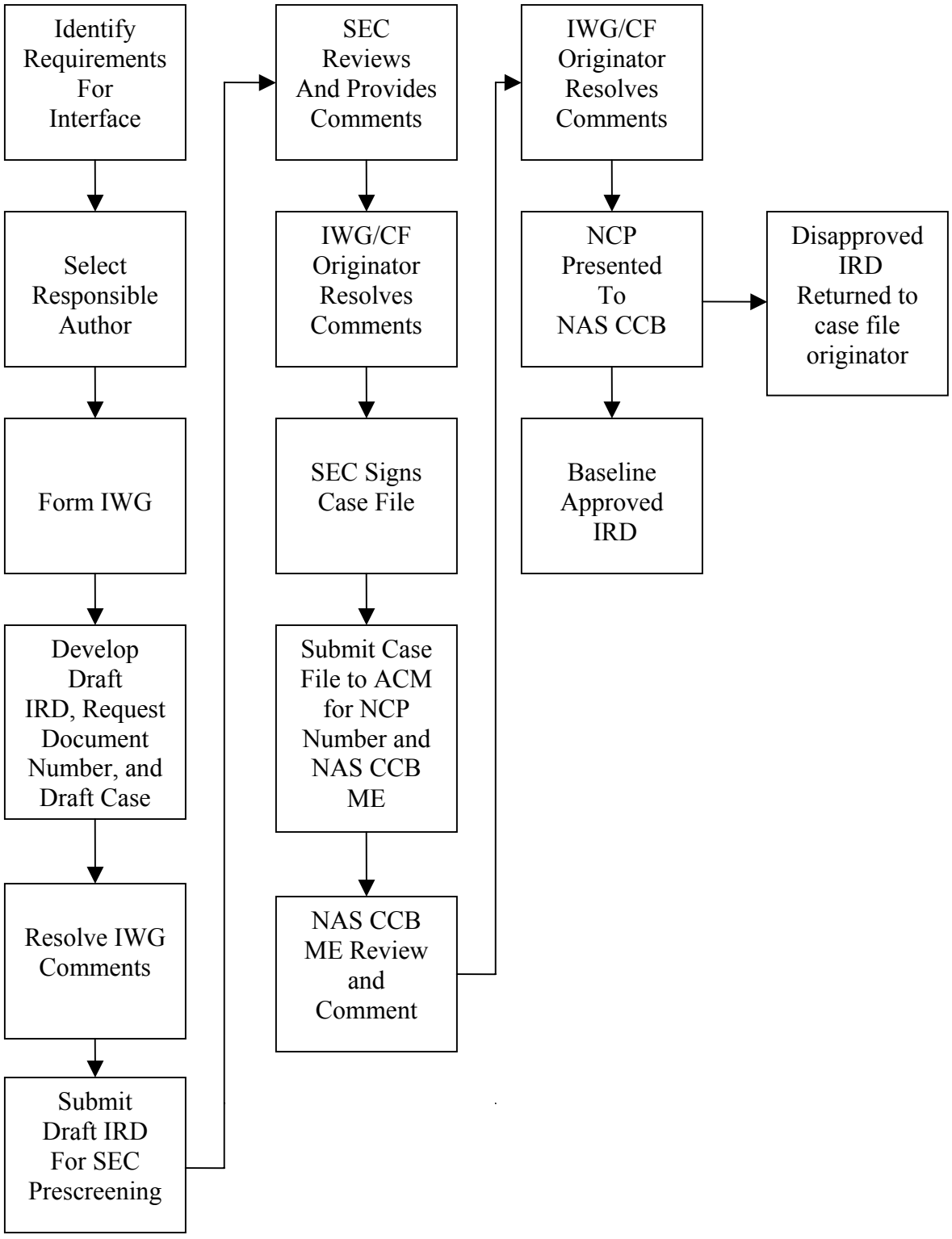

Figure 10-1 IRD/IR Development and Approval Process

10.3 Individual and Organizational Responsibilities

10.3.1 Case file Originator

The case file originator is the document originator representing the IWG. This individual is responsible for the IRD/IR throughout the review process, ensuring that all comments are properly resolved and that the document is in final form when it is presented to the NAS CCB. The case file originator is responsible for submitting the final draft to the SEC for review and comments, and will be required to resolve and incorporate any comments received as a result of the SEC prescreening review.

10.3.2 Interface Working Group

The IWG provides a forum to facilitate coordination of interface activities between project managers for the IRDs/IRs. The IWG is responsible for resolving interface incompatibilities, determining the required interface controls, resolving disputes, and determining document compliance with FAA-STD-025 requirements. The IWG ensures that the interface requirements stated in the document are valid.

10.3.3 System Engineering Council

The SEC is the group/function within Systems Engineering that is the facilitator for the IRD/IR process. The SEC must review the subject IRD/IR for technical content, including the Architecture and NAS Baseline Requirement, and format.

10.3.4 Project Management

Project Management (PM) is responsible for ensuring that all project requirements and funding for the interface are properly defined and that the IRD/IR is used as the agreement for communicating these requirements. PM has one formal and several informal opportunities to comment on the IRD/IR. PM is required to attend meetings associated with the IRD/IR. PM is also responsible for developing required Memoranda of Agreement to detail the specifics of cost and schedule agreements.

10.3.5 System Engineering

The SEC is responsible for ensuring that the requirements in the IRD/IR are consistent with system documentation and sufficiently detailed at the NAS system level. The Architecture and System Engineering Division, ASD-100, is a member of the IWG and has the same opportunities as the PM to comment on the IRD/IR.

10.3.6 Configuration Management

Configuration Management's role is to process the case file in accordance with FAA Order1800.66 and the NAS CCB Charter and Operating Procedures. CM ensures that all documentation necessary for the CCB to make a decision on the IRD/IR is included in the NCP package. CM develops a CCD to indicate formal baselining of the IRD/IR and assigns actions to responsible organizations. The case file originator provides copies of the approved IRD/IR to the Document Control Center (DCC) and CM. CM will enter the IRD/IR into the CM database.

10.4 ICD Development and Approval Process

During development, part of the design effort is to arrive at and document the interfaces that exist between systems and within a system in an Interface Control Document (ICD). The ICD shall implement the IRD requirements in the design. All new or revised ICDs shall be processed for approval and baselining. The new or revised ICD shall be coordinated with all stakeholders and product teams of the interfacing systems. Reviews and agreement shall be documented and the final ICD signed by the product teams of the interfacing systems. A case file shall be developed to accompany the signed ICD and presented to the more mature system's CCB for baselining. The case file package shall include the signed ICD and evidence of the coordination and approval of affected organizations responsible for the subsystems. If a chartered CCB does not exist for the more mature system, the case file shall be submitted to the NAS CCB for processing. If no parent IRD exists for the ICD, the ICD shall follow the IRD process. (Refer to section 10.2)

10.5 IRD/IR Development

10.5.1 Sources of Technical Data

The following are sources of technical data that may be available, depending on where the projects are in their life cycle.

10.5.1.1 Sources of Requirements

The following are the prime sources of requirements:

a) **Capability Architecture Tool Suite (CATS).** NAS-SR-1000 is being incorporated into the NAS Architecture, which can be accessed via the CATS-Internet (CATS-I). The CATS-I has been developed as a systems engineering tool to help sustain the high level of NAS safety and air traffic services; define new NAS capabilities in partnership with the aviation system users to improve safety, security, and efficiency; and increase understanding of the complexity of the airspace system and its services and capabilities.

b) **Capital Investment Plan (CIP)**. This document contains general descriptions of the NAS projects.

c) **NAS-DD-1000, NAS Level I Design Document**. This document contains a high-level definition, which identifies the allocation of functions to specific subsystems.

d) **NAS-SS-1000, NAS System Specification**. This document contains allocated functional/performance requirements and message tables for the information that will cross the interface. The IRD must conform to this system specification. If discrepancies (such as message differences) are found, they must be resolved. If required, NCP(s) shall be generated to make all baselined documents conform.

e) **Mission Need Statement.** This document defines a mission capability shortfall or technological opportunity the agency should address.

f) **Requirements Document.** This document establishes the operational framework and performance baseline for satisfying the mission need of an acquisition program.

g) **Standards and Orders.** These are various Federal and industry standards and orders that specify procedures, practices, and protocols for interfacing subsystems.

It is recommended that the following sources be used as they become available:

a) **Integrated Program Plans (IPP).** The IPP encompasses all elements of program implementation. This may include the acquisition of subsystems and equipment, the construction or modification of facilities and the physical infrastructure; the functional integration of planned capabilities within the existing infrastructure, and the procurement of services.

b) **Acquisition Strategy Paper (ASP).** The ASP documents the strategy for executing the program during the Solution Implementation and for managing fielded products and services during in-service management. The ASP also integrates planning for all functional disciplines associated with program implementation such as systems engineering, system safety management, in-service support, test and evaluation, security, quality assurance, human integration, and configuration management.

c) **Acquisition Program Baseline (APB).** The APB defines the cost, schedule, benefits, and performance baselines for the acquisition program.

d) **Investment Analysis Report.** This report contains the information used by the Joint Resources Council to make a sound and informed selection of the best overall solution to the capability shortfall or technological opportunity identified in the Mission Need Statement.

e) **Related IRDs.** Related IRDs that reference the same subsystem or facility may prove to be useful in providing requirements. A listing of available IRDs/ICDs is contained in appendices I, II, and III of the Interface Management Plan

f) **Project Specifications** - These specifications provide additional information for each subsystem.

10.5.1.2 Other Sources

In addition to the technical sources mentioned above, other information sources should be used. These include, but are not limited to, the following people and organizations:

a) **Project Manager.** This individual is an excellent source for obtaining up-to-date project information, supplemental documentation, and specific interfacing criteria. The project manager can provide schedules and specific information on the subsystem development phase, and subsystem specifications.

b) **System Engineering.** System Engineering provides NAS system requirements information and interpretation of the requirements. System Engineering also provides information relating to requirements verification at the NAS system level (i.e., the Verification Requirements Traceability Matrix (VRTM)).

c) **Documentation Control Center.** The DCC provides copies of interface documentation, FAA standards and orders, and other documents.

10.5.2 IRD/IR Format and Content

The following are the controlling documents to be used in developing the IRD or IR:

a) The applicable sections of this standard are to be used for format and content. As a rule, the latest revision of this standard will be used to develop new IRDs. The only exception is for projects that are already under contract. In this instance, the version identified in the contract(s) will be applicable. If there is a conflict between the projects as to the applicable revision level of this standard, Interface Management will work with the project offices to resolve the conflict.

b) The Interface Management Plan (DOT/FAA/ES-85/01, ATC-85-1070) is to be used for guidance in exercising the IRD/IR process.

10.5.3 Planning, Coordination, and Review of an IRD/IR

Proper planning and early coordination with project managers, Systems Engineering, and Air Traffic will expedite the IRD/IR process.

10.5.3.1 Planning

The author should coordinate early to ensure that word processing, graphics, and editing support are available.

10.5.3.2 IRD/IR Coordination

The author developing IRDs or IRs can use the checklist in table 10-1 to ensure that coordination is formally documented. Coordination with the following organizations is necessary:

a) **Program Office.** Early discussions with the applicable stakeholders and project managers will ensure that they are part of the IRD/IR development process. These early discussions must emphasize the need to assess the cost impact of the IRD/IR. When IRDs/IRs are formally processed and presented to the NAS CCB, they shall include the necessary funds.

b) **Air Traffic Requirements.** Early coordination will ensure that Air Traffic concerns are addressed early in IRD development and should prevent nonoccurrence.

c) **Systems Engineering Organization.** Coordination with the appropriate divisions of the System Engineering organization is required.

d) **Office of NAS Facilities.** This office will review the environmental, electrical, and mechanical characteristics, and maintenance-related messages.

e) **Engineering and Testing Division.** Coordination with the appropriate divisions of the Engineering and Testing Division is required.

Before the IRD/IR is submitted for formal review, final coordination, and approval, the engineer/author should answer the following questions:

a) Are the requirements in the IRD/IR traceable to the NAS Requirements Document?

b) Is the IRD/IR written in accordance with the latest version of FAA-STD-025?

c) Have the VRTMs been developed specifically for this document? Do not copy VRTMs. Verify with the appropriate requirements testing organizations.

d) Are any cost impacts being defined?

Note: Coordination with the project's financial analysis group will identify the cost of implementing these requirements so that the program manager can determine if the costs are within scope. This will assist in the preparation of the case file needed to baseline the IRD/IR.

10.5.3.3 IRD/IR Review

The following is the recommended list of reviewers:

FAA Organization	Area	IRD/IR Content
Engineering and Testing Division	William J. Hughes Technical Center	Dependent on IRD content
Information System Security	All IRDs/IRs	
Affected IPTs or programs office	FAA HQ	Dependent on IRD content
Air Traffic System Development	FAA HQ	Dependent on IRD content
System Architecture & Investment Analysis	FAA HQ	Dependent on IRD content
NAS Implementation	FAA HQ	All IRDs/IRs
NAS Planning and Support	FAA HQ	All IRD/IRs
NAS Operations	FAA HQ	All IRDs/IRs
Air Traffic System Requirements Service	FAA HQ	Future systems projects

The Interface Requirements Document checklist is to be used as an aid in developing interface requirements documentation.

Quality Assurance Checkpoint	Confirmed by	Date
1. Ensure that the IRD is developed in accordance with the latest version of FAA-STD-025, unless there are contractual obligations to use a previous version.		
2. Ensure that "DRAFT" IRD versions are noted as such in the document header.		
3. Ensure that the Table of Contents is generated during IRD development by marking paragraph titles, rather than manually composed.		
4. Ensure that document titles cited in Section 2, Applicable Documents, are correctly defined with the current revision level and date.		
5. Ensure that all documents referenced in the IRD have been cited in section 2.		
6. Ensure that the document revision letters are referenced only in section 2.		
7. Ensure that paragraphs are structured so only one requirement or "shall statement" is defined per each unique identifiable text entity.		
8. Ensure that references to "who does what" are clear and accurate (e.g., CPDLC shall….)		
9. Ensure that each requirement in section 3 is addressed with a one-to-one correspondence in the VRTM.		
10. Ensure that verification phase/method entries in the VRTM have been coordinated with IWG and the project.		
11. Ensure that tables and figures are legible and properly aligned on the page.		
12. Ensure that tables and figures are placed on the page directly following their text reference. In the case of multiple references per page, position figures and tables in the order in which they are referenced.		
13. Ensure grammar is correct and content is clear.		
14. Ensure that the entire document has been spell-checked.		
*15. Ensure that square footage for panel mounted components is calculated using Width x Height.		
*16. Ensure that square footage includes required clearance space for the component.		
*17. Ensure that the heat-generated value is calculated from the kVA value, unless citing known values.		
*18. Ensure that the "Development Guide for IRDs and IRs" has been followed.		
*19. Ensure that IRD development has been coordinated with the project office and Systems Engineering (ASD).		

* For Facility IRDs.

Table 10-1 - IRD/IR Development and Review Checklist