



AIRLINES ELECTRONIC ENGINEERING COMMITTEE



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M. CUTHBERT..... NORTHWEST AIRLINE
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TO: AEEC MEMBERS

AEEC LETTER

01-250/SAI-782

Year-Serial No. / Project No.

SUBJECT: REPORT OF THE AIRCRAFT DATA NETWORK (ADN)
WORKING GROUP MEETING HELD NOVEMBER 27-29, 2001,
IN CONCORD, CALIFORNIA

DATE January 11, 2001

SUMMARY

1. The Aircraft Data Network (ADN) Working Group is developing a second-generation, aircraft Ethernet communications network. The objective of the meeting was to continue the development of Project Paper 664, "Aircraft Data Network." The AEEC adopted the following Parts via mail ballot:

Part 1 - Systems Concepts
Part 3 - Internet-based Protocols and Services
Part 4 - Internet-based Address Structures and Assigned Numbers.
2. The working group is concentrating on completing the following Parts:

Part 2 - Ethernet Physical and Data Link Layer Specifications
Part 5 - Network Interconnection Services and Functional Elements
Part 6 - Network Management Specification
Part 8 - Upper Layer Services for Aeronautical Telecommunication Network (ATN) and Airline Operational Control (AOC).
3. The ADN Working Group and the Connector Working Group, convened in a joint meeting. The joint meeting reviewed Draft 7 of Project Paper 664, Part 2, which identifies copper-based Ethernet connectors and cables including quadrx (two twisted pairs) and twinax (co-axial) approaches for 100BaseT Ethernet networks. Part 2 points to Supplement 14 to ARINC 600 for the specification of connector and cable types.
4. The working group supported proposals to incorporate Internet Protocol version 6 (IPv6) into ARINC 664, Part 3, 4 and 8.
5. The next meeting of the ADN Working Group is tentatively scheduled for February 12-15, 2002 in Orlando, Florida.
6. The handouts from this meeting are documented in AEEC Letter N01-251/SAI-783 and on CD-ROM (CD01-041/SAI).

ADN WORKING GROUP MET

The Aircraft Data Network (ADN) Working Group, chaired by Acting Chairman Roger von Doenhoff of Boeing, met November 27-29, 2001, in the Holiday Inn - Concord, Concord, California. The ADN Working Group Chairman, Jean-Paul Moreaux of Airbus-Deutschland, was unable to attend. The goal of the meeting was to develop standards for Ethernet-based data networks for airplane designs. The working group concurred with the

draft agenda, reproduced as Attachment 0-1 to AEEC Letter N01-251/SAI-783.

The working group changed the title of Part 5 to "Network Interconnection Services and Functional Elements" to emphasize its evolving scope.

Attachment 1 records the status of action items from prior meetings and the action items developed during this meeting.

STATUS OF PART 1 - SYSTEMS CONCEPTS

AEEC adopted ARINC 664, Part 1 - Systems Concepts via mail ballot on October 24, 2001. Jim Meer, Industry Editor of Part 1, volunteered to monitor the development of all the other Parts of Project Paper 664 relative to the purpose, scope, and content of Part 1. Jim will propose revisions to Part 1 to the working group as the other Parts are developed.

JOINT MEETING CONVENED

The ADN Working Group convened in a joint meeting with the Connector Working Group (CWG) of the Cabin Equipment Interfaces (CEI) Subcommittee for the following purposes:

- Review Draft 7 of Part 2 of Project Paper 664 and Draft 1 of Supplement 14 to ARINC 600, which implements the transfer of the specification of the quadax and twinax connectors from Project Paper 664, Part 2 to Supplement 14 of ARINC 600.
- Review fiber optic technology for inclusion in the Supplement 1 of Project Paper 664, Part 2, and a future supplement to ARINC 600.
- Develop a plan for coordination of fiber optic technology for Ethernet in both documents.

Earl Nicks, AEEC staff for the CWG, announced that the AEEC Special Session, scheduled for December 11-12, 2001, will consider a proposal to reactivate the New Installations Concepts (NIC) Subcommittee of the AEEC. The NIC Subcommittee would take responsibility for ARINC 600 and address issues involving avionics and cabin connections.

Review of Draft 7 of Project Paper 664, Part 2

Project Paper 664, Part 2, "Ethernet Physical and Data Link Layer Specifications," defines the Physical Layer and the Data Link layer specifications for aircraft Ethernet data networks. Part 2 specifies the avionics LRU connector interface based on the IEEE 802.3 standard.

The ADN Working Group and the CWG reviewed Draft 7 of Project Paper 664, Part 2, circulated with AEEC Letter 01-230/SAI-781. The working groups reviewed the following proposals, which are reproduced as attachments to AEEC Letter N01-251/SAI-783:

- Larry Paterson, Boeing, provided editorial comments in a working paper, which is reproduced as Attachment 2-1.
- Michel Ramez, Draka-Filecia, recommended a revision to the value of the linear cable weight parameter recorded in Appendix B, which is reproduced as Attachment 2-2.
- Roger Kemp, IO Limited, suggested a revision to the text of Section 2.5.1.1 that clarified the characteristics of 10Base-2, which is reproduced as Attachment 2-3.

The working groups supported these proposals. Attachment 2 to this report shows their implementation in Part 2. The AEEC staff will incorporate these revisions into Draft 8 of Project Paper 664, Part 2, which the working groups considered to be a mature draft.

Roger Von Doenhoff affirmed Boeing's support of the current direction of the working groups to transfer the

physical layer definition to ARINC 600 and evolve ARINC 664 into a systems document that points to other sources for specific definitions. Derek Anderson, Boeing, proposed to refocus the scope of Part 2 relative to specifying connectors and cables. Derek volunteered to prepare a proposal for changes to be considered in the first supplement to an adopted Project Paper 664, Part 2.

[*AEEC Staff Note:* The AEEC Special Session, held December 12, 2001, directed the ADN Working Group to continue work on Project Paper 664, Part 2 to assure that all detail specifications of connectors and contacts be removed and that appropriate pointers to ARINC 600 be incorporated before Part 2 should be submitted for adoption consideration. Therefore, the working group will review Draft 8 at its next meeting.]

Review of Draft 1 of Supplement 14 to ARINC 600

The working groups reviewed Draft 1 of Supplement 14 to ARINC 600, which was circulated by AEEC Letter 01-231/NIC-185. The working groups supported revisions, including guidelines for testing, that are summarized in the CWG Meeting Report, AEEC Letter 01-257/CEI-199. The AEEC staff will incorporate these revisions into Draft 2 the Supplement 14 to ARINC 600. The working groups considered Draft 2 of Supplement 14 to ARINC 600 to be a mature draft.

Review of Fiber Optic Technology for Ethernet

The working groups reviewed fiber-optic connector technology for implementation of Ethernet data systems on aircraft through the following presentations, reproduced as attachments to AEEC Letter N01-251/SAI-783:

- Derek Anderson, Boeing, used charts reproduced as Attachment 2-4, to summarize the Boeing proposal for Ethernet fiber-optic connectors and cable in ARINC 664 and 600.
- Gerard Walles, Naval Air Warfare Center, used charts reproduced as Attachment 2-5, to summarize the work and organization of the Society of Automotive Engineer (SAE) AS3 Division – Fiber Optics and Applied Photonics. This group is developing international standards for fiber optical cables and connectors for applications primarily in military aircraft. He invited cooperation between the SAE and the AEEC groups. The AEEC staff will follow up on his invitation.
- Greg Powers, Tyco Electronics, used charts reproduced as Attachment 2-6, to summarize AEEC specifications for fiber-optical connectors in several ARINC documents.

Based upon these presentations, Derek Anderson volunteered to provide an input that would specify fiber optical connectors requirements and guidelines within the framework of Project Paper 664, Part 2. The ADN Working Group will review this proposal at its next meeting.

STATUS OF PART 3 - INTERNET-BASED PROTOCOLS AND SERVICES

AEEC adopted Part 3, "Internet-based Protocols and Services," via mail ballot on October 24, 2001.

The working group supported the development of Supplement 1 to ARINC 664, Part 3 to incorporate provisions for Internet Protocol version 6 (IPv6). Gerry Van Baren, Smiths Industries, volunteered to provide a proposal.

STATUS OF PART 4 - INTERNET-BASED ADDRESS STRUCTURES AND ASSIGNED NUMBERS

AEEC adopted Part 4, "Internet-based Address Structures and Assigned Numbers," via mail ballot in October 24, 2001.

The working group supported the development of Supplement 1 to ARINC 664, Part 4 to incorporate provisions for IPv6. Bob Stephens, Boeing, volunteered to provide a proposal.

The working group reviewed a working paper of Appendix K to ARINC 664, Part 4, prepared by Roger von Doenhoff and reproduced as Attachment 4-1 to AEEC Letter N01-251/SAI-783. The working group changed the title of Appendix K to "Example of Address Resolution for Aircraft-to-Aircraft Swappable Devices." David Miller, Rockwell Collins, who prepared an earlier draft of Appendix K, was requested to review the new Appendix K.

REVIEW OF PART 5 - NETWORK INTERCONNECTION SERVICES AND FUNCTIONAL ELEMENTS

The ADN Working Group reviewed Draft 1 of Project Paper 664, Part 5, which was circulated with AEEC Letter 01-112/SAI-742. The working group re-evaluated the purposes and topics that Part 5 should address and developed the following list of services or functions for Part 5:

- Network Security
- Quality of Service
- Mobility
- Transport of data across networks and subnets
- Network management and administration
- Directory services
- Virtual Local Area Networks (VLANS)
- Network Topology
- Name service
- Network initialization.

Jim Meer, Microflight, volunteered to re-assess the tutorial information in Part 5 and propose its re-organization.

Chris Wargo, CNS, volunteered to provide an input on security and quality of service.

Bob Stephens, Boeing, volunteered to provide an input on mobility.

Gerry Van Baren, Smiths Industry, volunteered to provide an input on transport of data.

Greg Sheffield, Rockwell Collins, volunteered to provide a revised draft of sections 4.3 to 4.X, which would adapt information from sections 3.0, 4.0 and 5.0 of Draft 1.

The topics of firewalls and gateways will remain as placeholders in section 4.X.

Attachment 3 shows the revised outline of Part 5.

REVIEW OF PART 6 - NETWORK MANAGEMENT SPECIFICATION

The ADN Working Group reviewed a strawman of Project Paper 664, Part 6, reproduced as Attachment 6-1 to AEEC Letter N01-251/SAI-783. Jean-Paul Moreaux was requested to review the strawman and recommend a plan and timeline for its development.

The working group was informed that Airbus recently received from the InterNet Assigned Numbers Authority (IANA) a Management Information Base (MIB) number allocation as a private enterprise. The working group supported requesting IANA for a MIB number allocation for the entire avionics community at a higher level in the assignment tree, possibly for ARINC as a standards development organization (SDO). This would benefit the avionics industry with a shorter MIB number requiring fewer spaces in the addressing scheme, which is used by every component and message on aircraft Ethernet networks. Staff will investigate this suggestion.

REVIEW OF PART 8 - UPPER LAYER SERVICES FOR AERONAUTICAL TELECOMMUNICATION NETWORK (ATN) AND AIRLINE OPERATIONAL CONTROL (AOC).

Chris Wargo, CNS, used a handout entitled "ADN 664 Part 8, Upper ATN and AOC" and reproduced as Attachment 8-1 to AEEC Letter N01-251/SAI-783, to propose an outline for Part 8, summarized as follows:

- 1.0 Introduction
- 2.0 ATN over IP Reference Model with Switch Sublayer
- 3.0 ATN over IP via Transport Switch
- 4.0 GACS (AOC) over IP via Transport Switch Sublayer

The working group supported this proposal.

In support of Part 8, Chris Wargo used a handout entitled "Why IPv6" and reproduced as Attachment 8-2 to AEEC Letter N01-251/SAI-783, to propose incorporation of IPv6 into ARINC 664, Parts 3 and 4, and Project Paper 664, Part 8, and other appropriate places. As background information, Chris provided two IEEE Workshop Papers, reproduced as Attachment 8-3 and 8-4 to AEEC Letter N01-251/SAI-783, that describe the advantages of using IPv6. The Working Group supported this proposal.

Chris volunteered to provide a working paper for Part 8 based upon the outline and the use of IPv6.

FUTURE WORK

The working group identified for ARINC Report 664, Aircraft Data Network documents the following targets for the end of 2002:

Part 1 - Audit activities of other Parts for possible revision.

Part 2 - Adoption of a mature draft that baselines copper-based technology. Also, development of a mature draft of Supplement 1 that includes provisions for fiber-optic cables and connectors.

FUTURE WORK (cont'd)

Part 3 – Development of a mature draft of Supplement 1 to address Internet Protocol version 6 as a possible basis for Ethernet for airplanes.

Part 4 – Development of a mature draft of Supplement 1 to address Internet Protocol version 6 as a possible basis for Ethernet for airplanes and development of Appendix K, Multiple Network Devices Example.

Part 5 - Development of a mature draft

Part 6 – Development of a mature draft. Target submittal for adoption consideration at the AEEC meeting, October 2002.

Part 7 - Develop first draft

Part 8 - Develop first draft

The next meeting of the ADN Working Group is tentatively scheduled for early February 2002, in Florida with joint meetings with the Cabin Equipment Subcommittee. Also in 2002, the working group supported a second meeting in Seville, Spain, June 17-21, 2002 and a third meeting in southern California, November 18-22, 2002.

COMMENTS WELCOMED

Roy Courtney, AEEC staff, prepared this meeting report. Please direct any comments and questions concerning ADN Working Group activities to Roy's attention at ARINC. Roy can be contacted by telephone at 410 266-4689. Electronic inputs can be sent by E-mail rcourtne@arinc.com or by facsimile at 410 266-2047.

Roy L. Courtney
AEEC Staff

Roy T. Oishi, Chairman
Airlines Electronic Engineering Committee

RLC/ldh
cc: SAI & ADN Mail Lists
Attachments

ATTENDANCE LIST
AIRCRAFT DATA NETWORK (ADN) WORKING GROUP MEETING
NOVEMBER 27-29, 2001, IN CONCORD, CALIFORNIA

AIRLINES/AEEC STAFF

Roger VonDoenhoff, Acting Chairman	BOEING	Seattle Washington
Paul Prisaznuk	AERONAUTICAL RADIO, INC.	Annapolis, Maryland
Timothy Shaver	UNITED AIRLINES	Indianapolis, Indiana
Roy Courtney	AERONAUTICAL RADIO, INC.	Annapolis, Maryland

MANUFACTURERS / OTHERS

James Denyer	AMPHENOL AEROSPACE	Olympia, Washington
Eddie Gambardella	AIRBUS-FRANCE	Toulouse, France
Derek Anderson	BOEING	Seattle, Washington
Larry Patterson	BOEING	Seattle, Washington
Robert Stephens	BOEING	Sunnyvale, California
Chris Wargo	COMPUTER NETWORKS & SOFTWARE	Annapolis, Maryland
Joseph Evrard	DELPHI CONNECTION	Irvine, California
Gene Thompson	DEUTSCH CO ECD	Hemet, California
William Ellena	GTE AIRFONE	Oak Brook, Illinois
Ingeborg Ray	I. RAY DLC, INC.	Phoenix, Arizona
Peter Hyzin	ITT CANNON	Santa Ana, California
Tim Hallmark	MATSUSHITA AVIONICS SYSTEM	Bothell, Washington
James Meer	MICROFLIGHT	Bethesda, Maryland
Gerard Walles	NAVAIR SYSTEMS	Patuxent River, Maryland
Alain Chartier	RADIAL-JERRIK	Tempe, Arizona
Rob Winkle	RADIAL-JERRIK	Tempe, Arizona
David Eicher	ROCKWELL COLLINS	Cedar Rapids, Iowa
Greg Sheffield	ROCKWELL COLLINS	Cedar Rapids, Iowa
Tony Cardino	SABRITEC	Irvine, California
Michael West	SIKORSKY AIRCRAFT	Stratford, Connecticut
Gerald Van Baren	SMITHS INDUSTRIES	Grand Rapids, Minnesota
Bill DeRooche	SYMBOL TECHNOLOGIES	San Jose, California
Joe Devita	SYMBOL TECHNOLOGIES	Marietta, Georgia
Dennis Horwitz	TEMPO/RIFOCS	Camarillo, California
Michael Lowe	TENSOLITE	St. Augustine, Florida
Gregory Powers	TYCO ELECTRONICS	Maple Valley, Washington
Bevan Jones	TYCO ELECTRONICS/RAYCHEM	Menlo Park, California

ATTACHMENT 1
ADN WORKING GROUP (PROJECT PAPER 664)
OPEN ACTION ITEMS AND ACTIONS CLOSED AT THIS MEETING

A six-digit number identifies Action Items as follows:

- * The first two numbers identify the year of the meeting, for example 00 stands for 2000, 01 indicates 2001.
- * The third and fourth numbers identify the month of the meeting with 01 for January, 02 for February, etc.
- * The fifth and sixth numbers identify the sequence from 01 to 99 of assigned actions from that meeting.

<u>AI No.</u>	<u>Action.</u>	<u>Action Organization (Action Officer)</u>	<u>Date input due to AEEC staff</u>
#011101	Prepare a Working Paper to recommend changes to Project Paper 664, Part 2, Supplement 1. Boeing (Anderson) Due January 18, 2002.		
#011102	Prepare a draft input for ARINC 664, Part 2, Supplement 1 based upon the Fiber Optic presentations presented at the joint meeting. Boeing (Anderson). Due January 18, 2002.		
#011103	Re-assess tutorial information in Part 5 and propose its move to Part 1 or, if appropriate, to an Appendix. Microflight (Meer) Due January 18, 2002		
#011104	Provide a Working Paper on Security and Quality of Service sections for Project Paper 664, Part 5. CNS (Wargo) Due January 18, 2002		
#011105	Provide a Working Paper on the Mobility section for Project Paper 664, Part 5. Boeing (Stephens) Due January 18, 2002		
#011106	Provide a Working Paper on Transport of Data section for Project Paper 664, Part 5. Smiths (Van Baren) Due January 18, 2002		
#011107	Provide a Working Paper on Sections 4.3 to 4.X that would be adapted from the Sections 3.0, 4.0, and 5.0 of the Draft 1 of Project Paper 664, Part 5. Rockwell - Collins (Sheffield) Due January 18, 2002		
#011108	Provide a Working Paper that recommends revisions to Sections 1.0 and 2.0 of Draft 1 of Project Paper 664, Part 5. Smiths (Van Baren) Due January 18, 2002		
#011109	Provide a Working Paper for Project Paper 664, Part 8 based upon the proposed outline reviewed by the ADN Working Group. CNS (Wargo) Due January 18, 2002		
#011110	Provide a Working Paper to provide an initial proposal on Supplement 1 to ARINC 664, Part 3 to address IPv6. Smiths (Van Baren) Due January 18, 2002		
#101111	Provide a Working Paper to provide an initial proposal on Supplement 1 to ARINC 664, Part 4 to address IPv6. Boeing (Stephens) Due January 18, 2002		
#011112	Reference AI #010508 reassigned to Smiths. (Van Baren) Due December 14, 2001		
#011113	Requested to review the Working Paper on Part 6 and recommend a plan and timeline for its development. Airbus (Moreaux) Due January 18, 2002		
#101114	Revise Part 4, Appendix K based upon the discussion in the meeting. Roger and Joe DeVita will serve as reviewers. Rockwell-Collins (Miller) Due January 18, 2002		
#011115	Provide a presentation on address space allocation at the next meeting. Boeing (von Doenhoff) and Airbus (Moreaux) Due January 18, 2002		
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#010701	Lead a team of connector manufacturers to revise the figures of Part 2, Attachment 5, Connector Electrical and Mechanical Characteristics Size 8 Quadrx Type, and to provide revised figures. Gambardella (Airbus – France) Completed - CLOSED.		
#010702	Provide a revised Part 2, Attachment 6, Connector Electrical and Mechanical Characteristics Size 8 Twinax Type. Paterson (Boeing) Completed - CLOSED.		

ATTACHMENT 1
ADN WORKING GROUP (PROJECT PAPER 664)
OPEN ACTION ITEMS AND ACTIONS CLOSED AT THIS MEETING

- #010703 Participate in a ADN Working Group teleconference to review the inputs from Action Items #010701 and #010702. All Working Group Members Completed - CLOSED.
- #010704 Provide revised text for a section on circular-styled connectors in Part 2, Appendix G. Paterson (Boeing) Completed - CLOSED.
- #010705 Provide revised text for Part 3, Section 3.2.7, Simple Network Management Protocol (SNMP). Jerry Van Baren (Smiths Group) Completed - CLOSED.
- #010706 Provide a revised illustration of Part 4, Appendix J, Airborne Global Networking Example, to reflect the new approach to network addressing. Larry Hannert (Honeywell) Completed - CLOSED.
- #010707 Provide a revised Part 4, Appendix K. Vondoenhoff (Boeing) On Agenda, Completed - CLOSED.
- #010708 Provide a Strawman document for Part 7, An Example Implementation of a Deterministic Network. Saint-Etienne (Airbus-France) Completed - CLOSED.
- #010709 Lead a task group to harmonize connector, cable, and link test procedures and considerations including appropriate standards developed by, for example, AEEC Standards, European Norms, Military Specifications, International Standard Organization (ISO), International Electrotechnical Committee (IEC). Provide input for review at the next working-group meeting. Goedecke (Airbus-Deutschland) and Paterson (Boeing) On agenda, Completed - CLOSED.
- #010508 Revise the RFC Table to include all RFCs in Part 3. Smiths (VanBaren) OPEN on agenda.
- #010109 Provide a proposal on the transition of information between SNMP and CMNP. CNS (Wargo) and Honeywell (Nguyen) On agenda for Part 6, CLOSED
- #010110 Propose for the next meeting a subset of the Management Information Base (MIB) in Part 6, which should be considered as mandatory in the specification. On agenda for Part 6, CLOSED
- #000816 In Part 2, Attachment 2, Electrical Characteristics Section, Parameter #5 provide text to address shielding effectiveness. Rockwell-Collins (Morrison) On agenda for Part 2, CLOSED
- #000717 Review the section in Part 3 on SNMP and recommend which MIB sections should be transferred to Part 6. Reassigned to Sextant (Sannino) On agenda for Part 6, CLOSED
- #000718 Enhance Part 6, Sections 6.1. and 6.2 by adding the definitions of “Manager” “Agent” and the “Manager to agent relationship.” On agenda for Part 6, CLOSED
- #000719 Incorporate an input on Profile MIB - II and new sections entitled “Use of MIB-II in a PADN End System” and “Use of RMON in a PADN Intermediate System,” which were provided by Reynolds, into a revised Strawman of Part 6. Sextant (Sannino) On agenda for Part 6, CLOSED
- #990517 Part 6 - Aircraft Data Network Part 6, Full Duplex for Closed Network Aircraft Full Duplex functional description and linkage to other parts of Project Paper 664. On agenda for Part 6, CLOSED

ATTACHMENT 2
ADN WORKING GROUP (PROJECT PAPER 664)
REVISIONS OF PART 2 – ETHERNET PHYSICAL AND DATA LINK LAYER SPECIFICATION

The Aircraft Data Network Working Group and the Connector Working Group supported revisions to Draft 7 of Project Paper 664, Part 2 as follows:

Section 1.1, Purpose of Document. In the second paragraph, change the first sentence as follows:

“It is the intention of this document to modify the existing applicable IEEE and ISO standards as little as possible so as to enable maximum utilization of components, both hardware and/or software.”

Section 1.4.4, IEEE and ANSI Documents. Change TIA/EIA reference to: “TIA/EIA-568-A with Addendums 1 thru 5, Commercial Building Telecommunications Cabling Standard”

Section 2.5.1.1, 10Base-2 Overview. Replace the second and third paragraphs with: “Characteristics of 10BASE-2 include low cost, simple interconnects and hence a vulnerability to connector failures that may interrupt the entire segment. Also there is no inherent isolation of misbehaved nodes that may cause effective segment failure.”

Section 3.4.1.2.1, Shielded Twisted Pair Cable. In the last sentence, change “twin axial” to “twinaxial.”

Change the term “ARINC Report 664” to “ARINC 664” in the following locations:

- Section 3.4.3.1.1, third sentence.
- Section 3.4.3.2, first sentence.
- Section 3.4.3.2.1, last sentence.
- Section 3.4.3.2.2, last sentence.

Figure 3-5, Twinax Contact Signal Allocation. Delete “TX-/RX- “ from the Shield Contact and add “TX- or RX- “ to the Intermediate Contact.

Section 4.3, MAC and Physical Layer MIB. Delete this section. Part 6 will address this topic.

Attachment 3, Test Procedures for Twisted Wire Connectors, Cables, and Links. Change the reference from “Appendix I” to “Appendix H.”

Appendix B, Guidelines for Avionics 10/100Base-T Cable Characteristics. Revise as follows:

- Description. Item 3 – Linear Cable Weight, revise Value as follows:
 - 45.0 for star quad cable, refer to Figure 3-3
 - 63.4 for shielded twisted pair cable (2-pair), refer to Figure 3-1
 - 59.5 for shielded twisted pair cable (2-pair), refer to Figure 3-2.
- Description. Item 4 - Overall Cable Diameter,
 - 5.0 for star quad cable, refer to Figure 3-3
 - 7.8 for shielded twisted pair cable (2-pair), refer to Figure 3-1
 - 7.4 for shielded twisted pair cable (2-pair), refer to Figure 3-2.
- Description, Item 7 – Markability, add “Note 5” to Value column.
- Electrical Characteristics. Item 6 Attenuation, enter the following values that reflect Baseline ISO 11801 at 20 deg C:

1 MHz	2.1
4 MHz	4.3
10 MHz	6.6
16 MHz	8.2

ATTACHMENT 2**ADN WORKING GROUP (PROJECT PAPER 664)****REVISIONS OF PART 2 – ETHERNET PHYSICAL AND DATA LINK LAYER SPECIFICATION**

20 MHz	9.2
31.25 MHz	11.8
62.5 MHz	17.1
100 MHz	22.0

- Electrical Characteristics, Item 8 - Near End Crosstalk. Replace Note: TIA/EIA with “Note 8.” Also, delete the word “and” in front of “(Note 6).”

- Electrical Characteristics, add a new Item 9 “Structural Return Loss” with the following values:

1 MHz	23.0
4 MHz	23.0
10 MHz	23.0
16 MHz	23.0
20 MHz	23.0
31.25 MHz	21.1
62.5 MHz	18.1
100 MHz	16.0

- Physical and Environmental Characteristics, Item 1 - Flammability. Add “Note 5” to the Value column.
- Add Note 8. “TIA/EIA 568-A-5 Cat 5E.”

Appendix F, Cable Parameter Comparison for Category 5 Specifications. Repeat the values for “Minimum Structural Return Loss” from the ISO 11801 column into the “ARINC 664 Pt. 2” column.

ATTACHMENT 3
AND WORKING GROUP (PROJECT PAPER 664)
REVISIONS TO PART 5 – NETWORK INTERCONNECTION SERVICES AND FUNCTIONAL ELEMENTS

Revised Outline of Part 5:

- 1.0 Introduction – similar to current draft
- 2.0 Overview
- 3.0 Description of Services
 - 3.1 Introduction
 - 3.2 Security
 - 3.3 Quality
 - 3.4 Mobility
 - 3.5 Transport of Data (Packet forwarding)
 - 3.6 Network Management
 - 3.7 Directory Services
- 4.0 Functional Elements
 - 4.1 Description of Functional Elements
 - 4.2 Mapping of Services to Functional Elements
 - 4.3 More Details about Functional Elements
 - 4.X More Details about Functional Elements