

ARINC INDUSTRY ACTIVITIES

CABIN SYSTEMS OVERVIEW

Version 2018-01

ARINC Standards

ARINC Industry Activities, an SAE ITC Industry Program, publishes the ARINC Standards produced by the Airlines Electronic Engineering Committee (AEEC), the Avionics Maintenance Conference (AMC), and the Flight Simulator Engineering and Maintenance Conference (FSEMC).

- The AEEC develops engineering and technical standards for airborne electronics of common interest to all segments of the aviation community
- The AMC develops maintenance-related technical standards
- The FSEMC develops technical standards related to simulation and training

Three types of ARINC Standards:

- ARINC Characteristics
 - Define the form, fit, function, and interfaces of avionics equipment, cabin systems, and related peripherals
- ARINC Specifications
 - Define the installed infrastructure, physical packaging, installation of avionics, data buses, protocols, and cabin equipment. This may be communication, networking and data security, or a high-level computer language.
- ARINC Reports
 - Provide guidelines or general information found by the aviation industry to be preferred practices, often related to avionics maintenance and flight simulator engineering and maintenance

ARINC Standard Series

ARINC 400 Series: **ARINC Specifications and Reports** provide a design foundation for avionic equipment specified per the ARINC 500 and 700 Series. They include guidelines for installation, wiring, data buses, databases, and general guidance.

ARINC 500 Series: **ARINC Characteristics** define analog avionics equipment used on early aircraft, B-727, DC-9, and DC-10, as well as on early models of B-737, B-747, and A-300.

ARINC 600 Series: **ARINC Specifications and Reports** define the enabling technologies that provide a design foundation for equipment specified per the ARINC 700 Series of digital avionics systems. Among the topics covered are data link protocols.

ARINC 700 Series: **ARINC Characteristics** define digital systems and equipment installed on current-model production aircraft. They include definitions of form, fit, function, and interface for line replaceable units (LRUs) in a federated architecture.

ARINC 800 Series: **ARINC Specifications and Reports** define enabling technologies supporting the networked aircraft environment using highly-integrated avionics. Among the topics covered in this series is aeronautical databases, high-speed data buses, and fiber optic interfaces.

ARINC Proposal to Initiate/Modify a Standard – The APIM Process

Proposals for AEEC Subcommittee activity are initiated by a draft APIM prepared for AEEC Executive Committee consideration.

- Any interested party can submit an APIM

An approved APIM is a “statement of work” that identifies:

- Deliverables and scope
- Benefits to airlines, benefit to airframe mfgs, benefit to suppliers, etc.
- Schedule for completion

The AEEC Executive Committee has established the APIM review process to:

- Inform a broad cross-section of industry
- Ensure thorough review and understanding of the APIM being proposed
- Ensure resulting ARINC Standard will serve the needs of the greatest cross-section of industry

The SAI Subcommittee reviews all APIMs for the AEEC Executive Committee, broadening exposure and support for the APIM.

Overview of ARINC Standards Development Process

1. The AEEC Executive Committee initiates the ARINC Standards development process upon approval of a draft APIM.
2. A **Strawman** is a document that serves as a starting point for an AEEC Subcommittee. The Strawman may be prepared by any party and may be developed by a group of authors serving as the Industry Editor.
3. A **Draft** is a document prepared by the ARINC staff and circulated on AEEC letterhead with a call for industry review and comment. The Subcommittee will review all comments and the Draft will be updated based on the consensus achieved within the Subcommittee.
4. A **Draft** may take on several iterations, each calling for industry review and comment.
5. A **Draft** is considered to be mature when the Subcommittee reaches overall consensus on the content of the document in an open industry meeting. A mature draft is then offered to the AEEC Executive Committee for adoption consideration.
6. An **ARINC Standard** results upon formal publication by ARINC Industry Activities.
7. ARINC Standards are available free of charge to our Members and Corporate Sponsors.

Cabin Systems Subcommittee (CSS)

The AEEC Executive Committee formed the Cabin Systems Subcommittee (CSS) to respond to cabin-related APIMs and to prepare technical standards for the airline community.

The CSS is chartered to develop standard interfaces that will provide airlines with freedom of choice in the selection and installation of many types of cabin equipment.

IFE, communications, interface protocols, seat integration issues, and connector and cable standardization are an important part of this activity.

The Connector Working Group (CWG) supports the CSS in the development and definition of connectors and cables for cabin applications.

ARINC Specification 485

Part 1: Cabin Equipment Interfaces, Head End Equipment Protocol

- Specifies the ARINC 485-control protocol used by the Line Replaceable Units (LRUs) described in ARINC Specification 628, Part 1
- Defines the electrical characteristics, protocol, and data content for a data bus used with cabin electronics equipment
- Describes functional requirements of the head end equipment as they relate to the communication over the bus
- Current Status
 - ARINC Standard (April 2001)
 - Supplement 1 (August 2008)
 - Supplement 2 (December 2013)
 - Supplement 3 (December 2014)

ARINC Specification 485

Part 2: Cabin Equipment Interfaces, Physical Layer – In-Seat Protocol

- Specifies the ARINC 485 control protocol used by the Line Replaceable Units (LRUs) described in ARINC Specification 628, Part 2
- Defines the electrical characteristics, protocol, and data content for a data bus used with cabin electronics equipment
- Describes functional requirements of the seat end equipment as they relate to the communication over the bus
- Current Status
 - ARINC Standard (December 2003)
 - Supplement 1 (August 2005)
 - Supplement 2 (July 2008)
 - Supplement 3 (December 2013)
 - Supplement 4 (December 2014)

ARINC Specification 628

Part 0: Cabin Management and Entertainment System – Overview

- A general description of the various parts of ARINC 628
- Current Status
 - ARINC Standard (December 2002)
 - Supplement 1 (November 2004)
 - Supplement 2 (December 2008)
 - Supplement 3 (July 2015)
 - Supplement 4 (In-Work)

ARINC Specification 628

Part 1: Cabin Management and Entertainment System – Peripherals

- Interchangeability standards for head end peripherals
 - Cameras
 - Audio/Video Sources
 - Projectors
 - Digital Overhead Monitors
 - Cabin Wireless Access Points
 - Digital Landscape Cameras
- General technical guidelines for cabin equipment such as environmental conditions, bonding, and grounding
- Mounting patterns for bulkhead-mounted video monitors
- Noise limits for head end cabin-mounted equipment
- Associated data sheets for sound power level measurements
- Video interchangeability standards
- Mechanical and network requirements for a Remote Control Center (RCC)

ARINC Specification 628

Part 1: Cabin Management and Entertainment System – Peripherals (Continued)

- Current Status
 - ARINC Standard (December 1993)
 - Supplement 1 (June 1996)
 - Supplement 2 (July 1999)
 - Supplement 3 (January 2001)
 - Supplement 4 (May 2009)
 - Supplement 5 (May 2010)
 - Supplement 6 (June 2012)
 - Supplement 7 (August 2015)
 - Supplement 8 (Due April 2019)

ARINC Specification 628

Part 2: Cabin Management and Entertainment System - Seat Interfaces

- Electrical and mechanical interfaces of the In-Flight Entertainment System (IFES) equipment associated with passenger seats
 - Headphones
 - Passenger Control Unit (PCU)
 - DC and AC Remote Power Outlet (RPO) and “PED in use” Indicator Light
 - Seat Video Display (SVD)
 - Personal Video Player (PVP)
 - Telephone Handset
 - Seat Electronics Box (SEB)
- Definition of Portable Electronic Device (PED) System Interface to in-seat data networks
- Definitions of other electrical devices associated with the seat contour/position mechanism, including Seat Control Unit (SCU), Seat Actuator Controller (SAC), and seat actuator motor(s)

ARINC Specification 628

Part 2: Cabin Management and Entertainment System - Seat Interfaces (Continued)

- Current Status
 - ARINC Standard (December 1996)
 - Supplement 1 (July 2002)
 - Supplement 2 (December 2002)
 - Supplement 3 (December 2003)
 - Supplement 4 (May 2005)
 - Supplement 5 (July 2006)
 - Supplement 6 (November 2007)
 - Supplement 7 (December 2013)
 - Supplement 8 (August 2015)
 - Supplement 9 (July 2017)

ARINC Specification 628

Part 3: In-Flight Entertainment System (IFES) to Aircraft System Interfaces

- Standard signaling protocol between the IFES and other airplane systems
 - Design interface provisions
 - Analog interface provisions
 - RS485 head end interface provisions
 - IFES zone RS485 interface provisions
 - ARINC 429 interface provisions
 - Ethernet interface provisions
- Current Status
 - ARINC Standard (December 1996)
 - Supplement 1 (May 1999)
 - Supplement 2 (November 2010)

ARINC Specification 628

Part 4A: Cabin Management and Entertainment System - Cabin Distribution System - Daisy Chain

- Defines aircraft IFE Cabin Distribution System (CDS) wiring, connectors, power, identification codes, space envelopes, and mounting principles
 - Seat related network
 - Overhead video network
 - Cabin management network
 - Cabin electronics compartment
 - Wiring and equipment identification
 - Technical data (diagrams, schematics, lists)
- Current Status
 - ARINC Standard (July 1999)
 - Supplement 1 (October 2002)
 - Supplement 2 (February 2004)
 - Supplement 3 (February 2005)

ARINC Specification 628

Part 4B: Cabin Management and Entertainment System - Cabin Distribution System – Star Wiring

- Defines a star-wired architecture and aircraft infrastructure for cabin related IFE equipment
 - Seat and overhead related network
 - Cabin management network
 - Cabin electronics compartment
 - Wiring and equipment identification
 - Technical data (diagrams, schematics, lists)
- Current Status
 - ARINC Standard (June 1999)

ARINC Specification 628

Part 4C: Cabin Management and Entertainment System - Cabin Distribution System (2nd Generation) - Daisy Chain

- Defines general architectural philosophy and aircraft infrastructure for 2nd-Generation IFE equipment
 - Data network
 - Power network
 - Cabin electronics compartment
 - Wiring and equipment identification
 - Technical data (diagrams, schematics, lists)
- Current Status
 - ARINC Standard (September 2005)

ARINC Specification 628

Part 5: Cabin Management and Entertainment System - Wire Design and Installation Practices

- Defines design and mounting guidelines for electrical installations, mainly for supplier of cabin furnishing equipment
 - Parts Selection
 - Electrical Wire Design Guidelines
 - Wire Installation Guidelines
 - Installation on Conductive Composite Structure
 - Documentation Guidelines
- Current Status
 - ARINC Standard (February 2002)
 - Supplement 1 (February 2005)
 - Supplement 2 (June 2011)
 - Supplement 3 (June 2013)

ARINC Specification 628

Part 6: Cabin Management and Entertainment System - Wire Design and Installation Practices

- Defines provisions for connectorized fiber optic cable assemblies used in permanently installed airframe wire bundles that are part of ARINC 628 compliant systems
 - General design provisions
 - Cable assembly design provisions
 - Cable assembly performance provisions
 - Connector design provisions
 - Connector performance provisions
 - Cable design provisions
 - Cable performance provisions
 - Quality assurance provisions
 - Packaging
 - Data provisions and design review
- Current Status
 - ARINC Standard (February 2002)

ARINC Specification 628

Part 7: Cabin Equipment Cooling General Specification

- Defines a standard set of guidelines and provisions for cooling of non-essential in-flight entertainment equipment
- Defines compatibility of this equipment with the airplane environment and operations
- Defines LRU form factors of IFE rack mounted equipment and its cooling interfaces
- Current Status
 - ARINC Standard (February 2001)
 - Supplement 1 (June 2011)
 - Supplement 2 (June 2013)

ARINC Specification 628

Part 8: In-Flight Entertainment (IFE) Equipment Standard Availability Measurement Guidelines

- Defines standard method for measuring IFE equipment availability
- Provides guidelines for determining total system availability
- Describes methods of data collection and minimum criteria of samples
- Describes methods for calculation of IFES degradation
- Describes concepts and methods for IFES health monitoring
- Current Status
 - ARINC Standard (February 2001)
 - Supplement 1 (December 2009)

ARINC Specification 628

Part 9: Cabin Information Network

- Defines standard for the aircraft CIN wiring, connectors, power, identification codes, space envelopes, and mounting principles
- Enables functional improvements without modification on the aircraft
- Provides protocols for web browser based control panels
- Defines SNMP MIB Object Identifiers
- Defines LAN IP address allocation
- Scalable to all commercial aircraft types
- Current Status
 - ARINC Standard (January 2004)
 - Supplement 1 (February 2005)
 - Supplement 2 (July 2008)
 - Supplement 3 (December 2009)
 - Supplement 4 (November 2015)
 - Supplement 5 (December 2017)

ARINC Characteristic 765

ARINC Characteristic 765: Ethernet Switch Unit

- Defines standard for an Ethernet Switch Unit that links together segments of networks to which various devices are connected
- Intended use is with ARINC 628 Part 9
- Consists of end-systems (devices), network components (e.g., switches, gateways or routers) as well as interconnecting wires
- Current Status
 - ARINC Standard (December 2003)

ARINC Characteristic 791 (Ku- and Ka-Band Satcom Subcommittee)

Part 1: Mark I Aviation Ku-Band and Ka-Band Satellite Communication System, Physical Installation and Aircraft Interfaces

- Defines desired characteristics of Aviation Ku-band Satellite Communication (Satcom) and Ka-band satcom systems intended for installation in all types of commercial air transport aircraft
- Provides an overview of Ku-band and Ka-band satcom systems
- Defines system provisions, including the following:
 - Line Replaceable Unit (LRU) form factors and requirements
 - Grounding and bonding
 - Installation and Calibration
 - Cooling
 - Interfaces and Inter-system wiring
- Current Status
 - ARINC Standard (June 2011)
 - Supplement 1 (December 2012)
 - Supplement 2 (August 2014)
 - Supplement 3 (Due October 2018)

ARINC Characteristic 791 (Ku- and Ka-Band Satcom Subcommittee)

Part 2: Mark I Aviation Ku-Band and Ka-Band Satellite Communication System, Electrical Interfaces and Functional Equipment Description

- Defines desired characteristics of Aviation Ku-band Satellite Communication (Satcom) and Ka-band satcom systems intended for installation in all types of commercial air transport aircraft
- Defines signals crossing into or out of the communication system
- Describes signals between the Modman and the Antenna Subsystem to permit interchangeability between any Modman and any Antenna Subsystem
- Defines the broadband network interface, including maintenance and control interface protocols, Ethernet interfaces, aircraft bus interfaces, network management and network security, antenna-modem interfaces, quality of service, control of radiated power, and aircraft blockage considerations
- Current Status
 - ARINC Standard (July 2013)
 - Supplement 1 (July 2014)
 - Supplement 2 (Due October 2018)

ARINC Specification 800

ARINC Specification 800 describes the characteristics and form factors of connectors and cables used for ARINC-specified cabin systems for commercial aircraft

Part 1: Cabin Connectors and Cables, Description and Overview

- Provides a general description of new development process for cables and connectors for cabin systems, component identification, objectives, and qualification guidelines
- Current Status
 - ARINC Standard (November 2012)

Part 2: Cabin Connectors and Cables, Specification of Connectors, Contacts, and Backshells

- Includes a listing of cabin connectors, contacts, and backshells, test specifications for connectors; test groups; and test requirements
- Current Status
 - ARINC Standard (October 2014)
 - Supplement 1 (Due April 2018)

ARINC Specification 800

ARINC Specification 800 describes the characteristics and form factors of connectors and cables used for ARINC-specified cabin systems for commercial aircraft

Part 3: Cabin Connectors and Cables, Specification of Cables

- Includes a listing of cable categories, test specifications, test groups, and test requirements
- Current Status
 - ARINC Standard (July 2014)
 - Supplement 1 (Due April 2018)

ARINC Specification 808

ARINC Specification 808: 3GCN Cabin Distribution System

- Defines standards for the aircraft 3rd generation cabin network
- Intended for use with ARINC 809
- Consists of IFE cabin distribution system, wiring, connectors, power, identification codes, space envelopes, and mounting principles
- Current Status
 - ARINC Standard (November 2006)
 - Supplement 1 (December 2008)
 - Supplement 2 (November 2010)
 - Supplement 3 (Due October 2019)

ARINC Specification 809

ARINC Specification 809: 3GCN Seat Distribution System

- Defines standard electrical and mechanical interfaces of the IFE equipment for 3rd generation cabin network associated with the seat
- Intended for use with ARINC 808
- Consists of Headphone Jacks (HPJ), Passenger Control Unit (PCU)/multi function handset (including the cord), Seat Video Display (SVD), Remote Data Outlet (RDO), Integrated Seat Box (ISB) which includes the Seat Power Box (SPB)/Seat Data Box (SDB), Remote Power Outlet (RPO), in-seat cables, and other electrical devices for seat control/position mechanism
- Current Status
 - ARINC Standard (November 2007)
 - Supplement 1 (December 2008)
 - Supplement 2 (June 2011)
 - Supplement 3 (August 2014)
 - Supplement 4 (Due October 2019)

ARINC Specification 810 (GAIN Subcommittee)

ARINC Specification 810: Definition of Standard Interfaces for Galley Insert (GAIN) Equipment, Physical Interfaces

- Defines the general GAIN standardization philosophy, provides comprehensive equipment interfaces, and disseminate the most current industry guidance
- Addresses all existing functional catering components, including beverage makers, ovens, refrigerators, and trash compactors
- Also provides interface definitions for carts and containers
- Defines galley insert resource connections
- Current Status
 - ARINC Standard (September 2005)
 - Supplement 1 (December 2006)
 - Supplement 2 (February 2008)
 - Supplement 3 (January 2011)
 - Supplement 4 (July 2014)
 - Supplement 5 (November 2015)

ARINC Specification 812A (GAIN Subcommittee)

Part 1: Standard Data Interface for Galley Insert (GAIN) Equipment, CAN Communications

- Defines the ARINC 825 Controller Area Network (CAN) data interface for galley equipment using a Galley Data Bus
- Describes commands and messages to implement the following GAIN functionalities:
 - Power Control
 - System Expanded Services
 - Diagnosis (Fault Monitoring)
 - Data Transfer
 - Network Monitoring
- Defines GAIN state transitions
- Includes XML version of protocol definitions as a resource file
- Current Status
 - ARINC Standard (November 2012)
 - Supplement 1 (August 2014)
 - Supplement 2 (due late 2018)

ARINC Specification 812A (GAIN Subcommittee)

Part 2: Standard Data Interface for Galley Insert (GAIN) Equipment, CAN Communications, Verification, and System Test Guidance

- Defines test methods to verify interface protocols to functional catering components
- Describes verification tests for commands and messages implemented for the following GAIN functionalities:
 - GAIN Power Control
 - GAIN Data Transfer (data upload/download)
 - GAIN Failure Monitoring (diagnosis)
 - Network Monitoring
 - Pin Programming
 - State Transitions
- Current Status
 - ARINC Standard (August 2014)
 - Supplement 1 (due late 2019)

ARINC Specification 824

ARINC Specification 824: Onboard Mobile Telephony System

- Describes the general Onboard Mobile Telephony System (OMTS) architecture and aircraft infrastructure for proper installation and interfacing to the various system related equipment
- Provides standards necessary to achieve interchangeability between equipment suppliers:
 - Physical interfaces, wiring, connectors, space envelopes, equipment chassis, unit co-location requirements, and power requirements
 - Basic functionality within each component
 - Design guidelines that affect the interfaces and installation
- Current Status
 - ARINC Standard (May 2009)

ARINC Specification 831

ARINC Specification 831: EMC Recommended Practice

- Provides general design rules and guidelines to ensure Electromagnetic Compatibility (EMC) for equipment to be installed in aircraft
- Addresses construction and layout of LRUs, especially cabin electronics and power electronics
- Standard includes:
 - Basic issues associated with EMC
 - Categorization according to device emissions and susceptibility
 - Description of different kinds of coupling and methods to identify coupling paths
 - EMC measures, including selected detailed examples
- Current Status
 - ARINC Standard (May 2009)

ARINC Specification 832

ARINC Specification 832: 4GCN Cabin Distribution System

- Defines standards for the aircraft 4th Generation Cabin Network (4GCN) Cabin Distribution System (CDS) wiring, connectors, power, identification codes, space envelopes, and mounting principles
- Defines general architectural philosophy and aircraft infrastructure
- Standard includes:
 - Head-End Distribution Network
 - Seat Distribution Network
 - In-Seat Architecture
 - Overhead Network
- Current Status
 - ARINC Standard (June 2013)
 - Supplement 1 (July 2016)

ARINC Specification 833

ARINC Specification 833: Cabin Universal Wireless Distribution System (UWDS)

- Defines a system which provides wireless communication channels in the cabin
- Specifies the interface between multiple wireless systems to the Universal Wireless Distribution System (UWDS)
- Addresses the interfaces to the UWDS, RF-Combiner Unit, and the broadband antenna
- Includes the physical interfaces, connectors, space envelopes, equipment mounting, component co-location requirements, antenna characteristics, frequency range, and power requirements
- Current Status
 - ARINC Standard (November 2011)

ARINC Specification 836

ARINC Specification 836: Cabin Standard Enclosures – Modular Rack Principle (MRP)

- Defines standard cabin equipment enclosures and provisions
- Enclosures are intended for mounting on standard rails or brackets
- The standard includes:
 - Definition of mounting principle
 - Equipment location
 - Design description
 - Standardized equipment dimensions
 - Connector selection and location
 - Environmental requirements
- Current Status
 - ARINC Standard (June 2012)

ARINC Project Paper 836A

ARINC Specification 836A: Cabin Standard Enclosures

- Defines next generation standard cabin equipment enclosures and provisions
- Enclosures are intended for mounting on standard rails or brackets
- The standard includes:
 - Definition of mounting principle
 - Equipment location
 - Design description
 - Standardized equipment dimensions
 - Connector selection and location
 - Environmental requirements
- Current Status
 - ARINC Standard (Due April 2018)

ARINC Report 837

ARINC Specification 837: Design Guidelines for Aircraft Cabin Human-Machine Interfaces

- Provide guidelines for the development of pixel-based and especially touch-screen-based Human Machine Interfaces (HMIs) for aircraft cabin system applications
- Applicable to individual system displays or to an integrated display shared among systems
- Cabin functions include:
 - Control of the cabin lighting
 - Control of the cabin air-conditioning
 - Monitoring of the door, lavatory, and smoke detector status
 - Operation of in-flight entertainment
 - Operation of in-flight communication equipment (e.g., GSM, WiFi)
- Current Status
 - ARINC Standard (June 2011)

Other Cabin-Related Standards

ARINC Specification 664: Aircraft Data Network

- Part 1: Systems Concepts and Overview
 - Supplement 1 (June 2006)
- Part 2: Ethernet Physical and Data Link Layer Specification
 - Supplement 2 (January 2009)
 - Supplement 3 (Due April 2018) – 10 Gbps Ethernet
- Part 3: Internet-Based Protocols and Services
 - Supplement 3 (February 2009)
- Part 4: Internet-Based Address Structure and Assigned Numbers
 - Supplement 2 (February 2007)
- Part 5: Network Domain Characteristics and Interconnection
 - ARINC Standard (April 2005)
- Part 7: Avionics Full-Duplex Switched Ethernet Network
 - Supplement 1 (September 2009)
- Part 8: Interoperation with Non-IP Protocols and Services
 - Supplement 1 (November 2010)

Other Cabin-Related Standards

ARINC Characteristic 746: Cabin Communications Systems (CCS)

- Current Status – Supplement 6 (November 2010)

ARINC Characteristic 759: Aircraft Interface Device (AID)

- Current Status – ARINC Standard (July 2014)

ARINC Characteristic 763: Network Server System

- Current Status – Supplement 3 (August 2005)

ARINC Characteristic 763A: Network Server System (NSS) Form and Fit Definition

- Current Status – ARINC Standard (December 2008)

ARINC Standards Summary for Cabin Application

Thank You for Supporting ARINC Industry Activities