

1. Record Nr.	UNINA9910830544203321
Autore	Matalgah Mustafa M
Titolo	Real-Time Ground-Based Flight Data and Cockpit Voice Recorder : Implementation Scenarios and Feasibility Analysis
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2024 ©2024
ISBN	1-119-98487-4 1-119-98488-2 1-119-98489-0
Edizione	[1st ed.]
Descrizione fisica	1 online resource (188 pages)
Altri autori (Persone)	AlqodahMohammed Ali
Soggetti	Flight recorders Cockpit voice recorders Aircraft accidents
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright -- Contents -- About the Authors -- Foreword -- Preface -- Acknowledgments -- Acronyms -- Chapter 1 Introduction -- 1.1 Motivation -- 1.2 Entities Involved in Air Crash Investigations -- 1.2.1 Federal Aviation Administration (FAA) -- 1.2.2 National Transportation Board (NTSB) -- 1.2.3 Operator (Airline) -- 1.2.4 Equipment Manufacturer -- 1.3 Existing Traditional FDR/CVR -- 1.3.1 Traditional FDR/CVR History -- 1.3.2 Flight Data Recorder (FDR) -- 1.3.3 The Cockpit Voice Recorder (CVR) -- 1.3.4 Other Types of Recorders -- 1.3.4.1 Deployable Recorders -- 1.3.4.2 Combined Recorders -- 1.3.4.3 Image Recorders -- 1.4 RealTime Data Transmission as a Solution -- 1.5 System Capacity Requirements -- 1.6 Summary -- References -- Chapter 2 State of the Art -- 2.1 Preceding Research -- 2.2 Wireless FDR/CVR Products in Market -- 2.2.1 Honeywell Connected Recorder -- 2.2.1.1 Honeywell Connected Recorder (HCR25) Specifications -- 2.2.2 FLYHTStream -- 2.2.2.1 FLYHT AFIRS 228 Family Specifications -- 2.3 Wireless FDR/CVR Challenges -- 2.3.1 The Cost Aspect -- 2.3.2 Industry Factors -- 2.3.3 Lack of Regulations -- 2.4 Summary -- References -- Chapter 3

Aviation Communication Overview -- 3.1 History -- 3.1.1 Wireless Telegraphy Era -- 3.1.2 Analog Radio Communication Era -- 3.1.3 Digital Radio Communication Era -- 3.1.4 Digital Data Link Era -- 3.2 Communication Traffic Classes -- 3.3 Main Actors and Organizations -- 3.3.1 Aviation Authorities -- 3.3.2 Air Transport Industry -- 3.3.3 Aviation Datalink Service Providers -- 3.3.4 Aviation Stakeholders -- 3.3.4.1 ANSPs -- 3.3.4.2 Airlines -- 3.3.4.3 Meteorological Centers -- 3.4 Spectrum Allocation to Aeronautical Services -- 3.5 AirtoAir Communications -- 3.5.1 TCAS Communications -- 3.5.2 VHF Communications -- 3.5.3 ADSB AirtoAir Communications. 3.6 AirtoGround Communications -- 3.6.1 HF AirtoGround Communications -- 3.6.2 Satellite Communications (SATCOM) -- 3.6.3 VHF Data Broadcast (VDB) Communications -- 3.6.4 ADSB/ADSR/TISB AirtoGround Communications -- 3.7 Summary -- References -- Chapter 4 Satellite Data Transfer Implementation -- 4.1 The Iridium Satellite System -- 4.2 Iridium First Generation -- 4.2.1 Technical Description -- 4.2.2 Channels -- 4.2.3 Channel Data Rate -- 4.3 Second Generation -- 4.3.1 Orbit -- 4.3.2 Spacecraft -- 4.3.3 Characteristics and Communication Links -- 4.3.3.1 The Subscriber Links -- 4.3.3.2 The Feeder Links -- 4.3.3.3 The InterSatellite Links -- 4.3.3.4 The Telemetry, Tracking, and Commanding (TT&C) Links -- 4.3.4 Band Frequency Reuse -- 4.3.4.1 TDMA Frame Structure -- 4.4 PSTNBased Data Transfer Implementation: One Channel per Aircraft -- 4.5 Alternative Satellite Transmission Implementations -- 4.5.1 Fixed Slot Allocation per Aircraft per Burst -- 4.5.1.1 Slots per Burst Data Transfer -- 4.5.2 Single Second Bursts with Variable Slot Assignment per Frame -- 4.5.2.1 Single Second Burst Data Transmission -- 4.6 Data Transfer - Internet Protocol over Satellite Link Data Transmission -- 4.6.1 The Iridium Data Channel -- 4.6.2 Packet and Frame Structure -- 4.6.3 Data Transfer with Internet Protocols -- 4.6.3.1 Setup and Control -- 4.6.3.2 Data Packet Transmissions -- 4.7 Number of Channels Needed to Support 5000 Planes -- 4.8 Expected Availability of Spectrum -- 4.9 Emerging LEO Satellite Constellations -- 4.9.1 Problem Formulation -- 4.9.2 Results -- 4.10 Discussion -- 4.11 Summary -- References -- Chapter 5 VHF Digital Link Implementation -- 5.1 VHF Communications System -- 5.2 VDL Modes -- 5.2.1 VDL Mode 0 -- 5.2.2 VDL Mode 2 -- 5.2.3 VDL Mode 3 -- 5.2.4 VDL Mode 4 -- 5.3 Data Transfer-VDL Mode 4 Implementation. 5.3.1 Consecutive Time Slot Bursts -- 5.3.2 Alternative VDL Mode 4 Transmission Scenarios -- 5.3.2.1 No Buffer and Burst -- 5.3.2.2 Two Second Buffer and Burst -- 5.3.2.3 Three Second Buffer and Burst -- 5.4 Data Transfer-Internet Protocol Over VDL Transmission -- 5.4.1 Data Transfer with Internet Protocols -- 5.4.1.1 Setup and Control -- 5.4.2 Packet and Frame Structure -- 5.4.3 Data Packet Transmissions -- 5.5 Number of Channels Needed to Support 5000 Planes -- 5.6 Expected Availability of Spectrum -- 5.7 Summary -- References -- Chapter 6 Cooperative Data Transmission Implementations -- 6.1 VDL SystemBased Relaying -- 6.2 VHF and Satellite System Cooperation -- 6.3 Aeronautical Adhoc Network (AANET) -- 6.4 SoftwareDefined Networking -- 6.5 Summary -- References -- Chapter 7 UAV Wireless Networks and Recorders -- 7.1 UAV Communication Networks -- 7.2 SpaceAirGround Integrated Network for 5G/B5G Wireless Communications -- 7.3 Integrating UAVs Into Aviation Communication -- 7.4 UAV Recorders -- 7.5 Summary -- References -- Chapter 8 Future Aviation Communication -- 8.1 System Wide Information Management (SWIM) -- 8.1.1 SWIM Definition -- 8.1.2 SWIM Principles -- 8.1.3 SWIM Layers -- 8.2 AirtoGround (A2G) Future Communication -- 8.3 Advancements in AirtoAir (A2A)

Communication for Aviation -- 8.3.1 Airborne Collision Avoidance System (ACAS) -- 8.3.2 Airborne Separation Assurance Systems (ASAS) -- 8.3.3 LDACS1 A2A Mode -- 8.3.4 FreeSpace Optical (FSO) Communications -- 8.4 Emerging Technologies Shaping Aviation Communication -- 8.4.1 SinglePilot Operations (SPOs) -- 8.4.2 Troposcatter Communications -- 8.4.3 Near Vertical Incidence Skywave (NVIS) Communications -- 8.5 Machine Learning in Future Communications -- 8.6 Summary -- References -- Appendix A -- A.1 Useful MATLAB Codes -- A.1.1 Iridium Satellite Constellation Viewer. A.1.2 Iridium Satellite Constellation Footprints -- A.1.3 Large Satellite Constellation Implementation for GroundBased FDR/CVR Recorders -- Index -- EULA.

Sommario/riassunto

"Aviation safety in air travel has always been a vital part of the aviation industry. Endless man-hours have gone into improving the safety standards of aircraft for civilian, commercial, and military aviation. Since the inception of commercial aviation, industry safety standards have improved dramatically, making flying one of the safest modes of transportation today. Even with a great record of safety today, measures are still undertaken to ensure that aviation accidents are not only well understood, but also that they may, in the future, be made avoidable. Studying and understanding the cause of aircraft incidents and crashes is one of the main methods that are used to ensure that transportation in the sky is as safe as possible. One of the main methods used by investigators and engineers to study the causes of aircraft accidents is by use of the Flight Data and Cockpit Voice Recorder (FDR/CVR), also known as the Black Box. However, FDR/CVR has not been efficiently useful in some catastrophic accidents such as the recent Aeroflot Flight 1492 (a Sukhoi Superjet 100) that was operating a domestic flight in Russia [Hradecky, 2019], the Lion Air Flight 610 (a Boeing 737 MAX 8) that crashed into the Java Sea shortly after takeoff from Soekarno-Hatta International Airport in Jakarta [National Transportation Safety, 2018], the EgyptAir flight 804 (an Airbus A320) that crashed into the Mediterranean Sea."
