

# AMHS Product of MELCO

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### Introduction - What is ATN

- Aeronautical Telecommunication Network
  - Next generation of Aeronautical Communication
  - Global (worldwide) and Seamless Communication



# Introduction - Why ATN?

- International standards
- Enough capability and expandability
- Enough capacity for the increasing data in the 21st century
- Unique technology concept for both Air-Ground and Ground-Ground communication
- Global (worldwide) and seamless communication
- High capability, high quality and high reliability
- 4 communication on the same infrastructure
  - ATSC (Air Traffic Services Communications)
  - AOC (Aeronautical Operational Control)
  - AAC (Aeronautical Administrative Communication)
  - APC (Aeronautical Passenger Communication)



### Introduction - What is AMHS

• One of the ATN Ground-Ground Applications

NOTE: ATSMHS : ATS Message Handling Service
AMHS : ATS Message Handling System

- Functionality
  - Replacement of current AFTN system
  - Based on X. 400 Technology
- Two types of functions
  - AFTN/AMHS Gateway
  - ATS Message Service (mail service for ATS)
- Enhanced service will be introduced



# Introduction - Why AMHS?

- Demand
  - Increasing flights and communication data
  - More efficiency and safety
  - Shortage of current AFTN systems
- AFTN (Aeronautical Fixed Telecommunication Network)
  - Old fashi oned technology
  - Saturation of ability
  - Less reliability (system and architecture)
- AMHS
  - International standards (X. 400)
  - Enough capability and expandability
  - Reliability



# Introduction - Great Benefit by AMHS

#### • Reliable communication

- AMHS : Delivery Confirmation Function ensures the information reception at the final destination
- AFTN : There may be cases that information does not reach destination even no error indication

#### • Efficient communication

- AMHS realizes full automatic routing
- AMHS uses the same infrastructure (common communication line) as all the other ATN applications
- Future expandability
  - AMHS : character and/or bit oriented data
  - AFTN : only character data in limited size



### What MELCO did and will do

#### • Development of Standards

- Editor and Technical Advisor for Standards
  - SARPs at ICAO ATN Panel Working Group
  - Regional Planning at APANPIRG Groups
- ATN System development
  - Development of AMHS System for Japan CAB
  - Development of experimental ATN Router
- Specification Coordination
  - Coordination of AMHS Connection with FAA and the other States
  - Coordination of ATN Experimental connection with Eurocontrol, Australia and other States



### What MELCO did and will do

#### • Past ATN Activities

- Development and evaluation in ATN Test Bed in ENRI (1992-)
  - ENRI: Electronic Navigation Research Institute
- With Eurocontrol : ATN Router (1998)/ CPDLC (1999)/ ADS (2000)
- With Australia: ATN Router (1999)/ CPDLC (1999)/ ADS (2000)

#### AMHS Trial (2000)

- With the USA : AMHS Trial (2001-2002)
- With Hong Kong (China) : AMHS Trial (2001)
- Future ATN Activities
  - AMHS Trial/Operational Connections
  - Enhancement to ATS Message Server for AMHS of JCAB
  - Other ATN products



# AMHS Product of MELCO

- System Configuration Hardware
- System Configuration Software
- System Configuration Protocol
- System Features
- Functional Specification



#### System Configuration Hardware AMHS System Configuration - AMHS Host - Operational Terminal AMHS Host **ATN Router** AMHS in other State via **ATN Router** 8885 8888 **AFTN System Operational Terminal** 10



### System Configuration -Hardware

- AMHS Host
  - Fault tolerant architecture
  - Receives, Stores and Sends both AFTN messages and AMHS messages
  - Converts the messages from AFTN to AMHS, and from AMHS to AFTN
- Operational Terminal
  - Controls and Manages the messages, network, and traffic



#### System Configuration -Software • AMHS Software Configuration





### System Configuration -Software

- Lower Layer protocols comply with ICS SARPs (Doc9705)
- AFTN/AMHS Gateway functions comply with ATSMHS SARPs (Doc9705)
- Original functions for AMHS
  - Message Management functions, Statistics, etc
  - Well considered for the operation of the AFTN and AMHS



### System Configuration – Protocol

- Application Layer & Upper Layer
  - AMHS (complied with the ICAO Doc9705)
  - IPM(P2): ISO 10021-7
  - MTSE(P1) : ISO 10021-4
  - MTA (ISO/IEC 10021),
  - RTSE (ISO 9066-2), ACSE (ISO 8650),
  - Presentation (ISO 8823), Session (ISO 8327)
- Transport Layer & Network Layer
  - COTP (ISO 8073), ES-IS (ISO 9542), CLNP (ISO 8473)
- Subnetwork
  - LAN (IS08802), TCP/IP (option), X.25 (option)
- Network Management
  - SNMP



## System Configuration -Protocol

- Customized Specification
  - In order to comply with ICS SARPs (Doc9705), COTS products has been customized.
  - Addition of Configuration Function regarding COTP parameters
    - Priority
  - QOS Maintenance
  - Addition of Configuration Function regarding CLNS parameters
    - Security
    - Priority
    - Partial Route Recording
  - Addition of the Use of Selective Acknowledgment Option
  - Addition of ECHO Response Function of CLNS



#### System Features

- 24 hours/365 days operation by Fault-tolerant Computer
- Full functionality of AFTN/AMHS gateway
  - It realizes the combination of AFTNs and ATS Message Servers in the Region and smooth transition from AFTN world to AMHS world
- Enough ability/capacity
  - For the replacement of all the AFTN connections between the States even after 10 years
- Expandability
  - Adding connection is easily done by only changing parameters in the system
  - Upgrading to ATS Message Server will be easily done by only adding some software (Software is in modular configuration)



### System Features

- Maintainability
  - Based on International Standard
  - Support of Standard Network Management Function
  - Strong support including Remote Maintenance
- Scalability
  - The developing AMHS system is the maximum size to consider the future data amount in Japan
  - It is easy to adjust the system size according to the demand from Customer
  - COTS (Commercial Off-The-Shelf) products are used as much as possible



#### • Message Processing

- AMHS message Switch
  - AMHS message Reception Function
  - AMHS message Sending Function
- AFTN message Analysis and Routing
  - AFTN message Reception Function
  - AFTN message Sending Function
- AFTN/AMHS message Transfer and Control Unit
  - Message Analysis Function
  - Address Conversion Function
  - Priority Conversion Function
  - Message Conversion Function
  - Message Splitting Function
- Message Generating
  - Message Generating Function



#### • Operation Management

- Message Management
  - Message Journal Function
  - Message Processing Function
  - Status Display Function
  - Message Display Function
- Statistics
  - Statistics Editing Function
  - Statistics Archiving Function
- AMHS Network Management
  - Network Management Function
  - Network Agent Function
  - Event Processing Function
  - Switch Message for Management
  - Generating Message for Management



#### • Operation Management

- Configuration management
  - Configuration Function of AMHS parameters
  - Configuration Function of AFTN parameters
  - Configuration Function of Address Conversion
  - Configuration Function of Printer
- System Terminal Control
- Display Control
- Print Control



#### • Monitoring and Management

- System Management
  - Monitoring Function of System Status
- Traffic Management
  - Message Constraint Function
  - Line Constraint Function
- System Control
  - System Control Function
  - Time Control Function
  - Log Function
  - Trace Function
- File management



#### Connection Control

- AFTN Connection Control
- AMHS system Connection Control
- ATN Router Connection Control
- Operational Terminal Connection Control
- X.25 Connection Control
- LAN Connection Control



#### Case Study

• CASE -1: How do you manage?

Normal Data







#### Case Study

• CASE -1: MELCO's solution

#### Message Constraint





#### Case Study

• CASE -2: How do you manage?

#### Normal Data Exchange



Abnormal Case – But normal in data exchange outside of State AMHS AFTN AFTN AMHS Conversi on



#### Case Study

• CASE -2: MELCO's solution





### Why MELCO?

- MELCO has been closely involved in the ATN activities
  - ICAO ATN Panel
  - Regional Planning Group
- MELCO provides Total Solution
  - Planning & Coordination
    - Intimate knowledge of ICAO Standards
    - Direct experience on the realization of AMHS system
    - Coordination with CAB/States
  - System Development
    - Successful experience on AMHS system
    - Profound understanding of operation (current AFTN and future)
  - Maintenance & Support
    - Worldwide network/ relationship
    - Effective training



#### **CONCLUSI ONS**

- ATN is the next generation of Aeronautical Communications
- AMHS is a ground-ground communication of the ATN
- MELCO has been involved in ATN since the genesis of ATN
- AMHS developed by MELCO:
  - Reliable, Capable and Easily Expansible
  - Fully complied with ICAO SARPs and Regional AMHS ICD
  - Well designed for actual operation with Original Functions
  - Well evaluated by International Trials
  - Key for future Ground-Ground communication