

A circular airplane window showing a view of a blue sky with white clouds.

**IATA**  
**User Requirements for**  
**Air Traffic Services**  
**(URATS)**  
**“Communication-Surveillance”**

**MIDANPIRG CNS SG/7 Meeting**  
**Cairo, Egypt, 26-28 February 2018**

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## IATA at 30,000 ft



*Mission to represent,  
lead and serve  
the airline industry*

- Founded in Havana, Cuba on 1945
- 274 airline members
- Representing 84% of total air traffic
- 63 offices in 60 countries worldwide,
- 1420 employees
- Three major association roles:
  - Representation
  - Standard setting
  - Industry leadership
- Provider of aviation solution

# IATA User Requirements for Communication

- Airlines support a coordinated migration to data link as the **primary means of controller-pilot communication** while continuing the provision of **voice communications for tactical interventions** and **non-routine communications**. **Data Link standards** are, however, being implemented under various ATM programs, which are **not interoperable**.
- This results in airlines having to carry multiple systems, with increased costs and delayed realization of operational benefits and efficiencies.
- Airlines should be able to use current on-board equipment and have a return on their investment.
- Introduction of any new capability or operational improvement, should follow the principal of **Most Capable Best Served for service priority**.

# CNS Technology

Any technology will need to fulfil the following implementation requirements prior to actual funding or implementation:

- Enable a direct and measurable operational and/or safety improvement that is required for that specific service volume and identified in collaboration with airlines operating through that specific airspace;
- Follow a proper consultation process with the airlines and airspace users
- Be aligned with the ICAO GANP;
- Be supported by a **positive a cost-benefit analysis** during which the airlines were able to validate the benefits that off-set the costs; and
- Follow ICAO principles for user charges.

# Ground–Ground Communications

- Ground-ground communications refer to exchanges of ATM-related messages linking ground-based stakeholders concerning planning and movement of aircraft. Such communications are transitioning from analog to digital format and are becoming increasingly automated.
- Technologies and applications reviewed in this section include:
  - Aeronautical Fixed Telecommunications Network (AFTN) and ATS Message Handling Services (AMHS);
  - Very Small Aperture Terminal (VSAT); and
  - Air Traffic Services Inter-Facility Data Communications (AIDC)

# AFTN & AMHS

- The AFTN network existed for over 50 years.
- It is a closed network its users belong to ATS authorities and associated organizations such as airline operators, general aviation, and meteorological offices.
- The AFTN is character-based only and cannot carry bit-oriented applications.
- The aviation industry has adopted AMHS to replace the AFTN.
- The AMHS can carry digital information such as text, graphics, images, files, databases, audio and video.
- ICAO has specified standards to ensure interoperability between AMHS and AFTN during the migration period.
- **IATA Position on AFTN and AMHS:**
  - **Support a rapid transition from AFTN to AMHS. However, interoperability during transition must be ensured by interconnecting legacy AFTN terminals to the AMHS.**

# Very Small Aperture Terminal (VSAT)

- A VSAT ground station uses satellites to relay voice and data from small terminals to other terminals.
- VSATs are typically used for communications between ATC units in areas where line connections are unreliable or uneconomical.

## **IATA Position on VSAT:**

- Support deployment of VSAT ground terminals where operationally justified, as they offer a versatile, economical, and scalable solution for ground-to-ground aeronautical communications.
- A proliferation of new VSAT networks and satellites should be avoided, especially where the existing ones, both national and international, can be expanded to serve new areas.

## Air Traffic Services Interfacility Data Communication (AIDC)

- AIDC is data link communication service that provides the capability to automatically exchange data between ATS units for notification, coordination and transfer of aircraft between flight information regions (FIRs).
- AIDC greatly reduces the need for voice coordination between ATC facilities, resulting in fewer errors and reduced workload.

### **IATA Position on AIDC:**

Support AIDC deployment as the primary means of coordination between ATC facilities, while maintaining the capability for controllers to intervene via voice for non-routine communications.



# Air–Ground Communications

- Current controller-pilot communications use primarily voice links provided by analog radios operating in the VHF and HF bands.
- Aviation is moving towards a new communications infrastructure that provides superior quality through use of air-ground data link.
- A first generation of ATC applications was implemented using Aircraft Communications Addressing and Reporting System (ACARS) air ground data links. ACARS now needs to transition to modern communications protocols, such as VDL Mode 2 in order to support increasing user traffic and provide the performance needed for today and future air traffic management (ATM).
- Our objective is to adopt Controller Pilot Datalink Communications (CPDLC) as the primary means of routine communication while maintaining the requirement for **voice communications for non-routine, tactical communications** and as a backup.

# Overview of available Technologies

- Communication in the vicinity of aerodromes
  - Aeronautical Mobile Airport Communications System (AeroMACS)
  - Long Term Evolution (LTE)
- Voice Communication
  - Very High Frequency (VHF) Voice
  - High Frequency (HF) Voice
  - Voice Communications through Satellites (SATVOICE)
- Data and Network Communication
  - Controller Pilot Data Link Communications (CPDLC)
  - Aircraft Communications Addressing and Reporting System (ACARS)
  - VHF Data Link (VDL) Modes 2–4
  - High Frequency Data Link (HFDL)
  - L-Band Digital Aeronautical Communications System (LDACS)
  - Aeronautical Telecommunications Network over Internet Protocol Suites (ATN PS)

## Aeronautical Mobile Airport Communications System (AeroMACS)

- AeroMACS is a technology which has been standardized exclusively for aviation uses. A global frequency allocation for AeroMACS was introduced in the International Telecommunication Union (ITU) Radio Regulations for the frequency bands of 5000 – 5030 MHz and 5091 – 5150 MHz.
- ICAO SARPs for AeroMACS are currently applicable and ICAO Doc 10044: Manual on AeroMACS has been published
- The uses of AeroMACS are limited to aviation applications on the surface within the airport vicinity and can support three categories of users: **ATC/ATM and infrastructure, airline operations and airport authority operations.**
- IATA Position on AeroMACS: A positive business case for airlines, particularly regarding AOC applications, is not yet available. Relevant business cases should consider the unique technical features of AeroMACS and evaluate their necessity and incremental benefits as related to actual operational requirements. Airline  
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- Airline equipage decisions should be voluntary.
- A comparative evaluation with other wireless broadband technologies should also be conducted for non-safety related applications, such as aeronautical administrative communications (AAC) and aeronautical passenger communications (APC).

## Long Term Evolution (LTE)

- LTE is a technology for 4G mobile network, similar to that being used by mobile phones. The potential services and applications of LTE for aviation are airline operations, passenger in-flight communication and airport and/or port authority operations. Each LTE base station can cover up to 150 km distance between aircraft and a ground LTE antenna. The air-ground coverage can be extended via terrestrial cellular network
- **IATA Position on LTE:** A formal business case for airlines is not publicly available. As LTE is not originally designed to **support safety-critical applications**, airlines should conduct a proper **operational risk assessment** and develop appropriate contingency measures/procedures in case of interruptions of LTE services.

## Very High Frequency (VHF)

- Voice VHF voice communication systems, used in the International Aeronautical Mobile Service are amplitude modulated (AM) carriers. The channel spacing can be defined as 100 kHz, 50 kHz, 25 kHz or 8.33 kHz, depending on the saturation of channels in the region of interest.
- In March 2007, the ICAO European Region made the carriage and operation of 8.33 kHz radios mandatory above FL195.

### **IATA Position on VHF Voice:**

- Support 8.33 kHz channel spacing implantation in regions where 25 kHz channel spacing does not provide an adequate number of frequencies.
- Where implemented, carriage of 8.33 kHz-capable radios **should be mandatory** to ensure that all potential safety and capacity benefits are realized.

## High Frequency (HF)

- Voice HF voice is used for air-ground ATC communications in remote and oceanic areas outside the range of VHF frequencies.
- In most cases, an HF radio operator functions as an intermediary between controllers and pilots, transcribing and relaying the contents of HF voice communications.
- Controller Pilot Datalink Communications (CPDLC) can replace HF voice communication.

### **IATA Position on HF Voice:**

- Support CPDLC as the primary means of communication for oceanic and remote areas while continuing to provide HF voice service as a backup

# Voice Communication via Satellites (SATVOICE)

- SATVOICE is currently used to complement other forms of long range communications, such as CPDLC and HF Voice.
- SATVOICE does not yet directly link pilots and controllers .
- ICAO is developing Satellite Voice Guidance Material (SVGGM) with the aim to maximize the operational benefits of SATVOICE implementations by promoting seamless and interoperable SATVOICE operations throughout the world.

## **IATA Position SATVOICE:**

- Where justified, support SATVOICE as a current mean of providing direct controller-pilot communications and supporting air traffic separation in areas beyond VHF voice coverage.
- ANSPs should implement methods to link pilots to controllers without having to relay messages via an operator.
- For oceanic and remote regions, it is expected that the migration from HF to SATVOICE will take place.



# Controller Pilot Data Link Communications (CPDLC)

- CPDLC refers to communications between controllers and pilots using pre-defined message sets, with a free-text option for non-routine messages. CPDLC is a desirable form of controller-pilot communications, as it reduces voice errors and misinterpretations. It can be used for routine communications but is less suitable for tactical interventions as compared with VHF voice communications.

## **IATA Position on CPDLC:**

- Support CPDLC as the primary means of communication in oceanic and remote airspace where the quality of voice communications is often poor.
- CPDLC should be considered for implementation in appropriate en-route airspace in order to relieve congestion on voice channels.

## Aircraft Communications Addressing and Reporting System (ACARS)

- ACARS systems were originally used to exchange messages between aircraft and flight operations centers. Since the 1990s, the ACARS network and avionics have been used to support the exchange of pre-FANS and FANS 1/A messages (i.e. ADS-C and CPDLC) between aircraft and ATS units.
- Use of ACARS for ATS communications has reduced potential for error inherent in voice communications, and off-loaded congested ATS voice channels. ACARS is currently available via HF, VHF and satellite data links

### **IATA Position on ACARS:**

- Support the use of ACARS as a basis for transition to a full-bit oriented service. ACARS is a proven technology that still meets user requirements for aeronautical communications.

## VHF Data Link (VDL) Mode 2

- VDL Mode 2 is a bit-oriented air-ground digital data link that was introduced as an VHF Mode 0 (VHF ACARS)
- Being bit-oriented, it can transmit digital content rather than being limited to characters. VDL Mode 2 delivers data at 31.5 Kbps, which is over 13 times faster than the VHF ACARS 2.4 kbps rate
- VDL Mode 2 uses the Carrier Sense Multiple Access (CSMA) protocol to detect when a VHF channel is clear in order to avoid overlap with other transmissions.
- VDL Mode 2 has been accepted by the industry as the natural upgrade for VDL Mode 0 (VHF ACARS).

**IATA Position on VDL Mode 2:** Support upgrade of existing ACARS networks to a more efficient full-bit oriented service via VDL Mode 2.

## VHF Data Link (VDL) Mode 3 & Mode 4

- VDL Mode 3 data link was proposed to relieve VHF voice channel congestion in the U.S. It faced competition from 8.33 kHz channel spacing, in Europe. Because many airlines have already equipped to 8.33 kHz,

**IATA Position on VDL Mode 3:** Do not support VDL Mode 3 deployment for ATS communication.

- VDL Mode 4 VDL Mode 4 is a bit-oriented VHF data link capable of providing air-air and air-ground communications.
- VDL Mode 4 was a data link candidate for ADS-B. However, 1090 MHz Mode S Extended Squitter (ES) has been chosen as the standard for international aviation.

**IATA Position VDL Mode 4:** Do not support VDL Mode 4 deployment for ATS communications.

## High Frequency Data Link (HFDDL)

- HFDDL provides data-link coverage for polar operations, where geostationary satellites have no coverage.
- Many airlines use HFDDL for operational communications outside of the coverage of VHF and satellites.

### **IATA Position on HFDDL:**

- Support HFDDL service availability in **oceanic and remote areas**, especially in the Polar Regions, to augment or to serve as a backup to other data communication methods.

## L-band Digital Aeronautical Communications System (LDACS)

- LDACS is a ground-based data link system being developed for continental airspace for en-route and terminal area communications.
- The technology uses L-band frequency which is heavily utilized by legacy navigation and surveillance aviation systems.
- LDACS is predicted to be part of the ATN over IP (ATN/IP) and is mainly under development by the SESAR Programme
- LDACS covers both high-rate data and voice communication and will support ICAO security requirements.

**IATA Position on LDACS:** Taking into account on-going trials on electromagnetic spectrum compatibility, technical performance and use cases, **further evaluation is required before a final recommendation.**

## Aeronautical Telecommunication Network over Internet Protocol Suites (ATN IPS)

- ATN is an internetwork architecture that allows ground, air-ground and avionics data sub-networks to interoperate by adopting common interface services and protocols based on the International Organization for Standardization (ISO) Open Systems Interconnection (OSI) reference model.
- ICAO has specified use of Internet Protocol Suite (IPS).
- The relevant ICAO standards have been adopted by the ICAO Council and became applicable in November 2008.

**IATA Position on ATN IP:** Support the transition from FANS 1/A and ATN B1 to ATN IPS, as this will eliminate the current infrastructure of incompatible data networking.

## Digital Automatic Terminal Information Service (D-ATIS)

- ATIS is predominantly a **voice broadcast service** over a dedicated VHF frequency that provides operational information to aircraft operating in the vicinity of an airport, eliminating the need for a controller to transmit the information to each aircraft individually. It is normally accomplished through a voice recording, updated when conditions change.
- Data link is an alternative mean of transmitting ATIS to equipped aircraft. It reduces flight crew workload as D-ATIS information is printed on a cockpit printer or is recallable on a data link display.

**IATA Position on D-ATIS:** Support D-ATIS deployment at airports.



# Automated Weather Observing System (AWOS)

- AWOS is a suite of sensors that measure, collect, and disseminate weather data to help meteorologists, pilots, and flight dispatchers prepare and monitor weather forecasts. The sensors identify elements such as **wind velocity, ambient air and dew point temperatures, visibility, cloud height and sky condition, precipitation occurrence and type**, as well as **icing and freezing** conditions.
- In addition to safety benefits associated with weather, AWOS facilitates potential reduction in flight disruptions.

## IATA Position on AWOS:

- When it is cost-effective, **support AWOS** as a replacement for human observers.

# Communication Summary

| Technology / Application | Support          | Maintain | Neutral | Do not support |
|--------------------------|------------------|----------|---------|----------------|
| AFTN                     |                  | X        |         |                |
| AMHS                     | X                |          |         |                |
| VSAT                     | X                |          |         |                |
| AIDC                     | X                | X        |         |                |
| <u>AeroMACS</u>          | To be determined |          |         |                |
| LTE                      | X                |          |         |                |
| VHF VOICE                | X                |          |         |                |
| HF VOICE                 | X See note1      |          |         |                |
| SAT VOICE                | X                |          |         |                |
| CPDLC                    | X                |          |         |                |
| VDL Mode 0(ACARS)        |                  | X        |         |                |
| VDL Mode 2               | X                |          |         |                |
| VDL Mode 3               |                  |          |         | X              |

# Communication Summary

Cont.

| Technology / Application | Support          | Maintain | Neutral | Do not support |
|--------------------------|------------------|----------|---------|----------------|
| VDL Mode 4               |                  |          |         | X              |
| HFDLD                    | X See Note2      |          |         |                |
| LDACS                    | To be determined |          |         |                |
| ATN IPS                  | X                |          |         |                |
| Digital-ATIS             | X                |          |         |                |
| AWOS                     | X                |          |         |                |
|                          |                  |          |         |                |

Note 1: For oceanic and remote regions, migration from HF to SATCOM Voice will eventually occur. IATA thus supports the development of regulatory frameworks and separation standards allowing the use of SATVOICE capability in lieu of mandating HF Voice avionics.

Note 2: IATA supports HFDL service availability in oceanic and remote areas, especially in the Polar Regions. However, current deployment of HFDL may not meet RCP240/RSP180 requirements.

# Thank you

