ADS-CPDLC live commissioning at Lagos ACC
Agenda

- Overview of SITA Air/Ground datalink
- ATC Datalink Infrastructure Technologies
- ATM Datalink Services and Solutions
- FANS 1/A Datalink ATM Solutions
- SITA Global datalink service footprint
- Datalink Regional context - AFI
- Datalink performance reports
- Wrap up
Overview of Air/Ground Datalink Services
AIRCOM overview

- VHF AIRCOM was launched more than 25 years ago as SITA’s first step beyond ground network services into radio communications.

- AIRCOM also provides data and voice service via the Inmarsat satellites with coverage around the world between 80 deg N/S (since 2009, using I4 constellation) and benefits from the Japanese MTSAT satellite as well.

- In 2008 AIRCOM service has extended to provide data and voices services to cover polar areas via the Iridium constellation.

- Finally in 2008 SITA embarked on the new generation VDLm2 stations by becoming Eurocontrol’s CSP of choice.
A/G Data Link for AOC Purpose

Airline Operations depend on ACARS

Aircraft Maintenance
Engine reports via ACARS enable preventive maintenance avoiding costly in-flight breakdowns

Operations Control
Aircraft movement reports via ACARS key to synchronize operations through airports

Flight Planning
Flight plans & weather transmission to cockpit enable efficient operation of modern aircraft

Airline Operations have already made the transition to Data Link
ADS-C/CPDLC Data Link for ATC

Purpose

Long Haul: ATC in oceanic & remote airspace previously used only HF voice so data link equipage revolutionized operations

1991: original ICAO FANS Committee definition of CPDLC & ADS

1992: Boeing use RTCA & AEEC work to define FANS-1 ADS & CPDLC package using ACARS

Today: Boeing FANS-1, AIRBUS FANS-A avionics installed on over 2000 aircraft (mostly long haul)

Short Haul: Continental airspace has reliable VHF voice & radar so data link target is to off load the routine communications

1996: ICAO adopts VHF Digital Link Mode 2 standard

1998: ICAO adopts standard covering ATN & CPDLC

Today: SES regulation calls for system validated by Eurocontrol Link 2000+ program
Block 0 Modules (18)

Performance Improvement Areas (PIA):

- **Airport Operations**
  - 5 Modules

- **Globally Interoperable Systems and Data**
  - 3 Modules

- **Optimum Capacity and Flexible Flights**
  - 7 Modules

- **Efficient Flight Path**
  - 3 Modules

---

1. Optimised Approach Procedures including Vertical Guidance
2. Increased Runway Throughput through Optimised Wake Turbulence Separation
3. Safety and Efficiency of Surface Operations (A-SMGCS level 1-2)
4. Improved Airport Operations through Airport-CDM
5. Improve Traffic Flow through Sequencing (AMAN/DMAN)

---

1. Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration
2. Service Improvement through Digital Aeronautical Information Management
3. Meteorological Information Supporting Enhanced Operational Efficiency and Safety

---

1. Improved Operations through Enhanced En-route Trajectories
2. Improved Flow Performance through Planning based on a Network-wide view
3. Initial Capability for Ground Surveillance
4. Air Traffic Situational Awareness (ATSA)
5. Improved Access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B
6. Airborne Collision Avoidance Systems (ACAS) Improvements
7. Increased Effectiveness of Ground-Based Safety Nets

---

1. Improved Flexibility and Efficiency in Descent Profiles using Continuous Descent Operations (CDO)
2. Improved Safety and Efficiency through the Initial Application of Data Link En-route
3. Improved Flexibility and Efficiency Departure Profiles — Continuous Climb Operations (CCO)

---

Source: ICAO
Performance Improvement Area (PIA) | Block No. | Module | Elements | ANSP datalink technology requirements
--- | --- | --- | --- | ---
Optimum capacity and flexible flights | 0 | B0-FRTO: Improved Operations through Enhanced En-Route Trajectories | 1. Airspace planning 2. Flexible Use of airspace 3. Flexible Routing | CPDLC
Efficient flight path | 0 | B0-TBO: Improved Safety and Efficiency through the initial application of Data Link En-Route | 1. ADS-C over oceanic and remote areas 2. Continental CPDLC | ADS-C VDL mode2 Continental CPDLC
Datalink Infrastructure
Components and Technologies
Overall Datalink Architecture: High-level schematics

- **VDL2-compliant VHF Ground Station**
- **Datalink capable ATC Working Positions**
- **Datalink Front End Processor**
- **Ground ATN Router**
- **AMOS**
- **Ground ATN Router**
- **ATN VDLm2 Infrastructure**
- **ACARS DSP System**
- **SITA G/G Network**
- **IP Router**
- **Local Area Network Infrastructure**
- **Flight Data Processing System**
- **Datalink capable ATC Working Positions**
1. ACARS

- Uses Analogue VHF datalink radios
- Supports Air/Ground communication of FANS 1/A and Pre-FANS ATC application

**Strength**
- Globally available
- Large fleet of equipped aircraft, standard equipage in new airframes
- Strong support for AOC application

**Weaknesses**
- Low data rate: Max throughput is 300 bps
- Near capacity saturation
- Quality of Service less suitable for ATM applications

**New data link technology required for ATS: VDLm2**
ACARS-based Data Link

- VHF
- ACARS MU
- RGS
- Ground Data Network
- GES
- ACC
- SITA’s DSP
- Airline’s Operations Centre
VHF ACARS Coverage - worldwide
VHF ACARS Coverage - Africa
2. VDL Mode 2

• Standardised
  - ICAO SARPs
  - Originally proposed in May 1994
  - Adopted in March 1996
  - Published in Nov 1997
  - Supports FANS and Pre-FANS applications

• Provides 31.5 kbps data rate
  - Uses Differential 8-Phase Shift Keying

• Mandatory requirement for ATN based ATC applications
  - e.g. Continental CPDLC
The SITA ATN Service – Architecture
VDL World-Wide Coverage
VDL Coverage – Europe (85% done by SITA)
SITA’s Current ATN/VDLm2 Provision in Europe

NATS/IAA FAB: ATN/VDLm2 Service

Maastricht UAC: ATN/VDLm2 Service

FABEC (France, Benelux, Switzerland): VHF Partnership

AENA (Spain): VHF Partnership

DFS (Germany): VHF Partnership

NAV Portugal: VHF Partnership
3. Satcom Services

Inmarsat

Classic Aero services (*high-quality voice, low-speed data and safety communications*)

Swift64 (*64kbps-per-channel*)

SwiftBroadband (*Simultaneous voice and broadband data, Contended IP data at up to 432kbps*)

Iridium (*for customers with lower cost/weight avionics*)

Voice

Data – *(Datalink)*
Inmarsat Classic Aero coverage

AIRCOM Satellite Classic Aero Inmarsat coverage
Inmarsat Swiftbroadband Coverage
Iridium Coverage

Polar-type constellation of low earth-orbiting (LEO) satellites
6 orbital planes with 11 satellites (+1 spare) per plane
4. AMOS Network Monitoring System

Intranet/LAN

Remote Client

Local Client

Telnet, SNMP & FTP

IP Network

VHF Network

CDG_S1

CDG_S2

BRU_S1

GVA_S1

GB2PP

OpenView
ATN Routers Monitoring

- Maps animation
- ProATN Processes status monitoring
- ProATN Alarms browsing & filtering
5. SITA as A/G Data Link Integrator

SITA Ground Network

SITA Integrates:
- ACARS Processors
- ATN Routing

En-Route Systems:
- DLFEP
- FANS Gateway
- CPDLC Trial Station

Tower Systems:
- AIRCOM EVATIS
- AIRCOM CLever
- CATS Server

AMOS (Monitoring)

A/G Data Communications

G/G Data Communications

ATN Routing

En-Route Systems

Tower Systems
HOW DOES IT WORK IN SITA?

- **Satellite**
- **Global SITA Network Service**
  - PRIMARY
  - BACK-UP
  - ACARS Processor (Singapore)
  - ACARS Processor (Rio)
  - ACARS Processor (Montréal)
  - TCP/IP
  - SITA Managed Service
  - GES
  - VGS
  - Airline Application System
  - ATS Application System
    - DCL, ATIS, OCL
    - ARINC 623
    - FANS1/A
    - ARINC 622
  - AVICOM
  - ARINC
ATS Internetworking
2 Datalink ATM Solutions
Overall Datalink Architecture: High-level schematics
### ATS AIRCOM portfolio – Classic services and Solutions

<table>
<thead>
<tr>
<th>Pre-FANS services</th>
<th>Description</th>
</tr>
</thead>
</table>
| • Departure Clearance | ➢ Mainly at Airport Towers  
| • Digital ATIS | ➢ Includes AIRCOM connectivity to End System, SLA, Helpdesk 24/7 access and Customer Support  
| • Oceanic Clearance | ➢ Can be bundled with turn-key solutions  
| • Digital VOLMET | |

<table>
<thead>
<tr>
<th>FANS services</th>
<th>Description</th>
</tr>
</thead>
</table>
| • ADS-C | ➢ Mainly at Oceanic ACCs  
| • CPDLC | ➢ Includes AIRCOM connectivity to End System, SLA, Helpdesk 24/7 access and Customer Support  
| • Context Management (AFN) | |

<table>
<thead>
<tr>
<th>ATN services</th>
<th>Description</th>
</tr>
</thead>
</table>
| • ATN Continental CPDLC | ➢ Currently in Europe area only  
| • ATN Backbone Service | ➢ Includes AIRCOM connectivity to End System, SLA, Helpdesk 24/7 access and Customer Support  
| • ATN Test Service | ➢ Test service to airlines, airframers, avionic vendors |
3 FANS 1/A Datalink ATM Solutions
FANS 1/A applications

• **AFN** (ATS Facilities Notification)
  - Allows aircraft to logon to ATC facility & the transfer of control

• **CPDLC** (Controller Pilot Data Link Communications)
  - Replaces verbal ATC instructions and pilots readbacks
  - Automates ATC processes

• **ADS** (Automatic Dependent Surveillance)
  - Gives accurate position reporting
  - Allows additional data reporting (wind, temperature etc)
  - Provides reporting in regions out of radar coverage
  - Significantly increases traffic that can be handled in remote areas
The AFN application

- AFN stands for ATS Facility Notification.
- AFN is the FANS equivalent service for what ICAO defines as Context Management (CM).
- Referred to as Data link Initiation Capability (DLIC) Service in Link2000+ terminology.
- AFN process is made of several steps.
  - The aircraft “logs on” to a Facility (CM logon request)
  - The Facility Ground System checks if the aircraft is entitled to logon, and responds either positively or negatively.
  - When necessary, the Facility Ground System will request the aircraft to logon to the next sector.
  - The aircraft will notify when the next logon is completed.
FANS applications – Context Management

CM Logon Request

CM Logon Response
FANS applications - CM forward

1 - CM Logon Forward
2 - CM Logon Request
3 - CM Logon Response
4 - CM Logon Complete
The CPDLC application

• CPDLC stands for Controller Pilot Data Link Communication.
• Referred to as Air Traffic Clearance (ACL) Service in the Link2000+ terminology
• CPDLC application enables the controller and the pilot the exchange ATC requests and instructions over datalink rather than the VHF or HF radio.
• CPDLC enables the automation of routine communication (e.g transfer of control).
• CPLDC programs on going in the NAT and SoPAC (FANS), as well as USA and Europe (ATN).
FANS applications - CPDLC

CLIMB TO FL370

WILCO
The ADS application

• ADS stands for Automatic Dependant Surveillance.
• ADS application enables the aircraft to transmit its GPS position (and other data) via datalink
• ADS enables aircraft situation awareness were radar is not available (e.g oceanic and remote regions).
• ADS enables “periodic” contracts, “demand” contract, “event” contract
• ADS situation display usually reproduces radar display
FANS applications - ADS

ADS contract

Position Reports

Create success. Together
4 Implementation and operational challenges of ADS-C/CPDLC service
Overall Datalink Architecture: High-level schematics

1. **CSP segment**
   - ATN equipped aircraft
   - VDL2-compliant VHF Ground Station
   - Air/Ground ATN Router
   - Datalink Front End Processor
   - ATN Infrastructure
   - ACARS DSP System
   - ACARS Infrastructure

2. **ANSP segment**
   - IP Router
   - Ground ATN Router
   - Local Area Network Infrastructure
   - Flight Data Processing System
   - Datalink capable ATC Working Positions
     - FANS
     - PRE-FANS
     - ATN

3. **Airborne segment**
   - FANS equipped aircraft
   - ATN equipped aircraft
Components of operational ADS-C/CPDLC datalink ATC service

1. Air/Ground datalink infrastructure (ACARS or VDLm2)
   - Through Service Provider
   - Through VGS Partnership

2. Access to Air/Ground datalink service provider
   - IP link to the equipment room

3. ATM Automation System
   - Existing FDPS capable of FANS 1/A (ADS-C/CPDLC) or
   - Stand-alone ADS-C/CPDLC Workposition
1. Air/Ground Datalink Infrastructure

- Deploying VHF datalink system by ANSPs would not be cost effective and interoperable globally
- SITA and ARINC are global providers of A/G datalink infrastructure
- SITA has unparalleled VHF ACARS coverage globally as well as in the AFI region
- SITA provides A/G datalink support for ADS-CPDLC through FANS 1/A Managed Services offering at a reasonable monthly fee
2. Access to A/G datalink infrastructure

• SITA provides an IP network connection between the ACC and nearest SITA node to access the SITA AIRCOM network

• SITA provides single or dual redundant local IP leased lines through local Telecom network providers

• The biggest implementation and later on operational challenge comes from this component

• Delivery of local leased lines take very long lead time and has totally unpredictable lead time
Current efforts to overcome connectivity problems

• SITA migrated all ANSPs to IP from legacy connections

• SITA engaged in discussions with both ATNS and ASECNA for possible integration of AFISNET and NAFISAT with SITA AIRCOM Network

• ASECNA is planning to implement gateways at Dakar and France to connect to SITA

• ATNS has already implemented gateways at JNB and CPT to connect to SITA AIRCOM network (2 FANS and 3 pre-FANS sites already connected)

• Further in-depth discussions needs to take place in terms of the capability of the networks to carry FANS traffic
Current VSAT based Networks in AFI region

- AFISNET
- NAFISAT
- SADC

Dual redundant gateways

SITA A/G and G/G Network
SITA’s vision for AFI future ATM environment

Pan-African ATM Network
(AFISNET + NAFISAT)
Allows ATS/DS, ADS-B, AFTN/AMHS, AFI CAD exchanges between ATMnet members

SITA A/G + G/G Network

Site 1
AMHS, AFI CAD, ATFM, FANS, Pre-FANS, AIDC

Site 2
AMHS, AFI CAD, ATFM, FANS, Pre-FANS, AIDC

ACC 1
National Network

ACC 2
National Network

ACC 3
National Network

ACC 4
National Network

ACC 5
National Network

ACC 6
National Network

ACC 7
National Network

ACC 8
National Network
3. ATM Automation System

• If ANSP’s current ATM system supports FANS 1/A ADS-C/CPDLC then SITA will only implement the IPVPN network, interface with the ATM system and configure for operation

• If ANSP current ATM system does not support FANS 1/A then they have two choices
  I. Request an upgrade from current supplier to enable FANS 1/A services
  II. SITA can provide stand-alone FANS 1/A workstation at reasonable price
• Huge Safety and efficiency benefits by replacing the unreliable HF communication by CPDLC and non-existent surveillance by ADS-C.
5
SITA Global Datalink ATC Services Footprint
NOTE: Date Aug 2015  Flight Information Region (FIR) boundaries are approximate. Shaded FIRs are FIRs for which we are contracted or aware that Rockwell Collins-ARINC is contracted, but, not all are operational and it is possible not all will implement in the end. However, most shown are operational.
ATS – Pre-FANS Services footprint – Oct 2015

SITA pre-FANS PDC
• Seeking airline customers
• 81 airports

SITA pre-FANS DCL
• 19 Customers
• 82 airports

SITA pre-FANS ATIS
• 35 Customers
• 273 airports

SITA pre-FANS VOLMET
• 9 Customers
• 26 airports and 5 FIRs

SITA pre-FANS OCL
• 3 Customers
• 3 FIRs

Note: Map show SITA Contracted pre-FANS Services (not all are operational yet)
Regional context - Africa
AFI Region – SITA contracted FIRs for FANS

Source ICAO
<table>
<thead>
<tr>
<th>Country</th>
<th>FIR</th>
<th>ANSP</th>
<th>Status</th>
<th>Service Provider</th>
<th>Ground System Provider</th>
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<td>Thales</td>
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</tbody>
</table>
Datalink Traffic & Performance
AIRCOM ATS-622 Traffic & Performance report

• 1. FANS Service Executive Summary
  - 1.1 Global FANS Datalink Traffic
  - 1.2 FANS Systems Performances
  - 1.3 FANS Reliability Performance
  - 1.4 FANS Service Performances

• 2. FANS Traffic Statistics
  - 2.1 FANS Global Datalink Traffic
  - 2.2 FANS Traffic by Media and Airlines

• 3. FANS Service Performance
  - 3.1 AIRCOM FANS Service Availability
  - 3.2 FANS RGS Availability
  - 3.3 FANS GES Availability
  - 3.4 Uplink Success Rate
  - 3.5 Uplink Reject Rate per FANS Service
  - 3.6 Uplink Reject Rate per Airline
FANS Traffic in AFI region (1)

### Type of message
- **AFN (Log-On)**: 10%
- **CPDLC**: 25%
- **ADS**: 65%

### Type of media
- **VHF UP & DOWNLINK**: 25%
- **Satellite UP & DOWNLINK**: 62%
- **InterNetworking Co-DSP**: 13%

### Ground Traffic in Messages

<table>
<thead>
<tr>
<th>Ground Traffic in Messages</th>
<th>(Uplink + Downlink)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ATS Provider</strong></td>
<td>12-month average</td>
<td></td>
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<tr>
<td>AT3 Provider</td>
<td>925,682.42</td>
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<tr>
<td>AFN (Log-On)</td>
<td>95,707.58</td>
<td>10%</td>
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<tr>
<td>CPDLC</td>
<td>227,765.83</td>
<td>25%</td>
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<tr>
<td>ADS</td>
<td>601,208.00</td>
<td>65%</td>
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</table>

### FANS BY MEDIA

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<tr>
<th>FANS BY MEDIA</th>
<th>%</th>
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<tr>
<td><strong>ATS Provider</strong></td>
<td></td>
</tr>
<tr>
<td>VHF UP &amp; DOWNLINK</td>
<td>118,891</td>
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<tr>
<td>Satellite UP &amp; DOWNLINK</td>
<td>571,580</td>
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<tr>
<td>InterNetworking Co-DSP</td>
<td>235,211</td>
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<tr>
<td><strong>Total FANS Traffic</strong></td>
<td>925,682</td>
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</tbody>
</table>
FANS Traffic in AFI region (2)

Evolution of Ground Traffic Messages (Uplink + Downlink) – 12 month average
FANS Traffic in AFI region (3)

Evolution of Ground Traffic in Messages (Uplink + Downlink) – 12 month average
# FANS Traffic in AFI Region (4)

<table>
<thead>
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<th>Customer</th>
<th>Ground Traffic (Uplink + Downlink)</th>
<th>Air-Ground Traffic (Uplink + Downlink)</th>
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<td>Ghana</td>
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<td>Ivory Coast</td>
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<td>Madagascar</td>
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<td>Mauritius</td>
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<td>Niger</td>
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<td>Senegal</td>
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<td>Seychelles</td>
<td>44,724</td>
<td>28,996</td>
</tr>
<tr>
<td>South Africa</td>
<td>16,410</td>
<td>7,336</td>
</tr>
</tbody>
</table>
Major source of VHF service failure is associated with leased line break downs
Most of the aircraft are Satellite equipped and the FANS messages are exchanged via Satellite when the VHF stations are not available.
### 1.3 FANS RELIABILITY PERFORMANCE

<table>
<thead>
<tr>
<th>FANS Services</th>
<th>AFN (Log-on)</th>
<th></th>
<th></th>
<th>CPDLC</th>
<th></th>
<th></th>
<th></th>
<th>ADS</th>
<th></th>
<th></th>
<th>TOTAL</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Apr-15</td>
<td>Last 3 Months</td>
<td>Last 12 Months</td>
<td>Apr-15</td>
<td>Last 3 Months</td>
<td>Last 12 Months</td>
<td>Apr-15</td>
<td>Last 3 Months</td>
<td>Last 12 Months</td>
<td>Apr-15</td>
<td>Last 3 Months</td>
<td>Last 12 Months</td>
</tr>
<tr>
<td>Messages Delivered</td>
<td>98.97%</td>
<td>99.21%</td>
<td>99.09%</td>
<td>99.41%</td>
<td>99.53%</td>
<td>99.37%</td>
<td>99.30%</td>
<td>99.38%</td>
<td>99.41%</td>
<td>99.30%</td>
<td>99.41%</td>
<td>99.35%</td>
</tr>
<tr>
<td>No Ack + NAK</td>
<td>0.09%</td>
<td>0.07%</td>
<td>0.08%</td>
<td>0.06%</td>
<td>0.05%</td>
<td>0.05%</td>
<td>0.06%</td>
<td>0.05%</td>
<td>0.04%</td>
<td>0.06%</td>
<td>0.05%</td>
<td>0.05%</td>
</tr>
<tr>
<td>No Ack</td>
<td>0.09%</td>
<td>0.07%</td>
<td>0.08%</td>
<td>0.06%</td>
<td>0.05%</td>
<td>0.05%</td>
<td>0.06%</td>
<td>0.05%</td>
<td>0.04%</td>
<td>0.06%</td>
<td>0.05%</td>
<td>0.05%</td>
</tr>
<tr>
<td>NAK</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>No Station To</td>
<td>0.10%</td>
<td>0.04%</td>
<td>0.01%</td>
<td>0.05%</td>
<td>0.02%</td>
<td>0.01%</td>
<td>0.02%</td>
<td>0.01%</td>
<td>0.00%</td>
<td>0.04%</td>
<td>0.01%</td>
<td>0.01%</td>
</tr>
<tr>
<td>Not Logged On</td>
<td>0.34%</td>
<td>0.26%</td>
<td>0.35%</td>
<td>0.21%</td>
<td>0.17%</td>
<td>0.27%</td>
<td>0.29%</td>
<td>0.23%</td>
<td>0.27%</td>
<td>0.26%</td>
<td>0.21%</td>
<td>0.28%</td>
</tr>
<tr>
<td>Message Too Old</td>
<td>0.13%</td>
<td>0.06%</td>
<td>0.06%</td>
<td>0.01%</td>
<td>0.01%</td>
<td>0.02%</td>
<td>0.04%</td>
<td>0.03%</td>
<td>0.05%</td>
<td>0.04%</td>
<td>0.03%</td>
<td>0.04%</td>
</tr>
<tr>
<td>Other SITA Rejects</td>
<td>0.23%</td>
<td>0.17%</td>
<td>0.22%</td>
<td>0.13%</td>
<td>0.10%</td>
<td>0.11%</td>
<td>0.15%</td>
<td>0.14%</td>
<td>0.10%</td>
<td>0.15%</td>
<td>0.13%</td>
<td>0.12%</td>
</tr>
<tr>
<td>Internetworking Rejects</td>
<td>0.14%</td>
<td>0.19%</td>
<td>0.20%</td>
<td>0.15%</td>
<td>0.12%</td>
<td>0.18%</td>
<td>0.15%</td>
<td>0.16%</td>
<td>0.13%</td>
<td>0.15%</td>
<td>0.15%</td>
<td>0.15%</td>
</tr>
</tbody>
</table>

- **TOTAL TRAFFIC**:
  - **Messages Delivered**: 100%
  - **No Ack**: 0%
  - **No Station NAR**: 0%
  - **Message Too Old**: 0%
  - **Other SITA Rejects**: 0%
  - **Internetworking Rejects**: 0%
1.4 FANS SERVICE PERFORMANCE (VHF+SAT)

### Uplink Message Delivery Time

<table>
<thead>
<tr>
<th></th>
<th>10 s</th>
<th>20 s</th>
<th>30 s</th>
<th>40 s</th>
<th>60 s</th>
<th>120 s</th>
<th>180 s</th>
<th>360 s</th>
<th>&gt;360 s</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ATS Provider</strong></td>
<td>56.37%</td>
<td>82.95%</td>
<td>89.85%</td>
<td>90.24%</td>
<td>95.63%</td>
<td>99.09%</td>
<td>99.75%</td>
<td>99.99%</td>
<td>100.00%</td>
</tr>
<tr>
<td><strong>AFN (Log-on)</strong></td>
<td>67.36%</td>
<td>89.67%</td>
<td>93.98%</td>
<td>94.04%</td>
<td>97.42%</td>
<td>99.74%</td>
<td>99.83%</td>
<td>99.98%</td>
<td>100.00%</td>
</tr>
<tr>
<td><strong>CPDLC</strong></td>
<td>61.96%</td>
<td>86.98%</td>
<td>91.98%</td>
<td>92.21%</td>
<td>96.03%</td>
<td>99.51%</td>
<td>99.66%</td>
<td>99.99%</td>
<td>100.00%</td>
</tr>
<tr>
<td><strong>ADS</strong></td>
<td>49.14%</td>
<td>78.06%</td>
<td>87.11%</td>
<td>87.71%</td>
<td>94.84%</td>
<td>98.60%</td>
<td>99.64%</td>
<td>99.99%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

### Downlink Message Delivery Time

<table>
<thead>
<tr>
<th></th>
<th>10 s</th>
<th>20 s</th>
<th>30 s</th>
<th>40 s</th>
<th>60 s</th>
<th>120 s</th>
<th>180 s</th>
<th>360 s</th>
<th>&gt;360 s</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ATS Provider</strong></td>
<td>42.23%</td>
<td>76.72%</td>
<td>86.51%</td>
<td>92.68%</td>
<td>96.44%</td>
<td>96.84%</td>
<td>99.23%</td>
<td>99.71%</td>
<td>100.00%</td>
</tr>
<tr>
<td><strong>AFN (Log-on)</strong></td>
<td>35.17%</td>
<td>69.36%</td>
<td>86.11%</td>
<td>93.34%</td>
<td>97.09%</td>
<td>98.30%</td>
<td>99.33%</td>
<td>99.65%</td>
<td>100.00%</td>
</tr>
<tr>
<td><strong>CPDLC</strong></td>
<td>45.62%</td>
<td>81.38%</td>
<td>90.23%</td>
<td>93.51%</td>
<td>97.05%</td>
<td>98.86%</td>
<td>99.17%</td>
<td>99.47%</td>
<td>100.00%</td>
</tr>
<tr>
<td><strong>ADS</strong></td>
<td>42.25%</td>
<td>76.23%</td>
<td>86.26%</td>
<td>92.15%</td>
<td>96.03%</td>
<td>96.83%</td>
<td>99.23%</td>
<td>99.82%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
AIRCOM customer Support process

- 3 levels of support
  - Level 1: Aircom support, H24/7
  - Level 2: Regional aircom specialists
  - Level 3: Expert teams on ATS and airline applications
Level 1 : AIRCOM Support - Helpdesk H24/7

- AIRCOM Service Desk 24/7
  - Follow the sun operation
    - Staffed 12 hours from Montreal and then 12 hours from Singapore
    - Completely seamless transition for our customers
  - First level support
    - System operation and service supervision
    - Centralized problem reporting (Trillium)
    - Routine problem investigation and resolution

SITATEX : HDQASXS
E-mail : aircom.support@sita.aero
Tel : +65 65 48 28 28 or +1 514 282 7899
Toll Free (NA): 1 866 AIRCOM1 (247-2661)
Level 2: AIRCOM Customer Support

- AIRCOM Specialists
  - Second level support
    - Problem analysis, investigation, testing
    - Provide assistance to AIRCOM Service Desk
    - Inform customer on new products and services that may be suitable
  - Performance reports
    - Monthly or quarterly reports
    - Performances review meeting
  - Adhoc Customer training
  - Reachable globally aircom.customer.support@sita.aero
    - Regionally at:
      - aircom.customer.support.europe@sita.aero
      - aircom.customer.support.americas@sita.aero
      - aircom.customer.support.asiapacific@sita.aero
Level 3 - AIRCOM ATS Applications Support

- AIRCOM ATS systems Technical Specialists
  - Third level support
    - Engineers dedicated to the development, implementation, support, training of the FANS, Pre-FANS and ATN SITA ground applications
    - SW and HW Problem analysis, investigation, testing
    - Remote software correction/upgrade during warranty/maintenance period (tel/e-mail/remote access)

- Adhoc Customer training eg on configuration/maintenance in Paris in SITA ATS Lab or at customer premises

- Reachable globally aircom.systems.support@sita.aero
Thank you

Questions?
Emnet Meheret
ATM Business Development
Senior Manager
SITA OnAir
Johannesburg, South Africa

Simply connect to
www.sitaonair.aero