AIR-TO-GROUND COMMUNICATIONS KNOW-HOW

SITA AIRCOM Service (VHF & Satellite)

Safety in the Air 2009
Montego Bay, Jamaica, January 28-29, 2009

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ATM Business Development Manager
Latin America and Caribbean
Agenda

- SITA Ground Network
- SITA AIRCOM Service
- VHF & Satellite coverage maps
- SITA AIRCOM Service Support and Monitoring
- AIRCOM Datalink Traffic Demand
- Conclusion
SITA Ground Network

Evolved over the past 50 years to provide network services to over 220 countries

Backbone of SITA business for communications and applications:
• airports
• airlines
• passengers
• government
AIRCOM Datalink

1984: VHF AIRCOM ACARS Service
AIRCOM Datalink

1984: VHF AIRCOM ACARS Service
1990s: Satellite AIRCOM
       ATC AIRCOM
       AOC Internetworking
       ATS Internetworking

ACARS-Based Air Traffic Services
("pre-FANS" (e.g. D-ATIS, DCL, OCL)
FANS-1/A-Based AFN, ADS, and CPDLC)

• AOC Internetworking with: AVICOM Japan, DECEA Brazil
  ATS Internetworking with: ARINC, AEROTHAI, ADCC China, AVICOM Japan, DECEA Brazil

Airline Operations

Satellite Ground Earth Stations (GESs)

Inmarsat Satellites

Remote Ground Station (RGS)
ACARS

Global SITA Ground Network Service

ACARS Processor
(Singapore)

ACARS Processor
(Montreal)

AIR-TO-GROUND COMMUNICATIONS KNOW-HOW

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AIRCOM Datalink

1984: VHF AIRCOM ACARS Service
1990s: Satellite AIRCOM
        ATC AIRCOM
        AOC Internetworking
        ATS Internetworking
2001: VDL AIRCOM

Airline Operations

ACARS-Based Air Traffic Services
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Air-to-Ground Communications Know-How
AIRCOM Datalink

1984: VHF AIRCOM ACARS Service
1990s: Satellite AIRCOM
   ATC AIRCOM
   AOC Internetworking
   ATS Internetworking
2001: VDL AIRCOM
2005: ATN AIRCOM

ACARS-Based Air Traffic Services
("pre-FANS" (e.g. D-ATIS, DCL, OCL)
FANS-1/A-Based AFN, ADS, and CPDLC)

ATN-Based Air Traffic Services
(ATN-Based CPDLC)

• AOC Internetworking with: AVICOM Japan, DECEA Brazil
• ATS Internetworking with: ARINC, AEROTHAI, ADCC China, AVICOM Japan, DECEA Brazil

AIR-TO-GROUND COMMUNICATIONS KNOW-HOW

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AIRCOM Datalink

1984: VHF AIRCOM ACARS Service
1990s: Satellite AIRCOM
ATC AIRCOM
AOC Internetworking
ATS Internetworking
2001: VDL AIRCOM
2005: ATN AIRCOM
2008: Iridium (Initially AOC only. ATS use subject to regulatory approval.)

Airline Operations

ACARS-Based Air Traffic Services
("pre-FANS" (e.g. D-ATIS, DCL, OCL) FANS-1/A-Based AFN, ADS, and CPDLC)

ATN-Based Air Traffic Services (ATN-Based CPDLC)

Global SITA Ground Network Service

Internetworking*

- AOC Internetworking with: AVICOM Japan, DECEA Brazil, and Japan Civil Aviation Bureau (JCAB) (in 2007).
- ATS Internetworking with: ARINC, AEROTHAI, ADCC China, AVICOM Japan, DECEA Brazil, and JCAB (in 2007).
VHF Coverage*

- World’s largest a/g VHF datalink network with over 1100 radios worldwide in over 150 countries as of Dec 30, 2008 and growing.
- 180+ airlines using AIRCOM Datalink service serving 8000+ aircraft.

* Maps as of March 2008. On-line in red, planned in blue.

VDL Mode 2 Coverage*

- 87 VDL Mode 2 radios on-line as of Dec 30, 2008 and growing.
Americas VHF AIRCOM ACARS Coverage

- VHF AIRCOM Coverage in North America as of Dec 30, 2008 and growing:
  - 375 Radios in US
  - 45 Radios in Canada
  - 20 Radios in Mexico
  - 9 North American airlines using SITA VHF in the US

* Map as of March 2008, Altitude 30,000 feet-On-line RGS** are in red, planned are in blue.

** Over 70 of the stations in the US are actually the SITA next generation VHF Ground Stations, referred to as VGSs, which are capable of supporting VDL Mode 2 and VHF ACARS in parallel. 11 of the US VGSs have a radio configured for VDL Mode 2.
SITA US VHF Coverage*

- SITA US VHF network is used for domestic ACARS service by 8 US airlines
- SITA as of Dec 30, 2008 is operating 375 VHF data link radios in US & still expanding
  - 70+ of the SITA VHF ground stations are capable of VDL Mode 2 and 11 have a radio configured to provide VDL Mode 2.
- SITA fills in coverage and redundancy to meet needs of each new customer signed

* Map as of March 2008, Altitude 30,000 feet-On-line RGS** are in red, planned are in blue.
SITA Europe, Africa, and Middle East Coverage*

Map as of March 2008, Altitude 30,000 feet-On-line RGS** are in red, planned are in blue.
SITA Asia Pacific Coverage*

* Map as of March 2008, Altitude 30,000 feet-On-line RGS** are in red, planned are in blue.
Worldwide Satellite* AIRCOM Coverage

* Map shows Inmarsat-Based Satellite AIRCOM Coverage. SITA also offers Iridium-based Satellite service.
SITA AIRCOM Service Support and Monitoring
AIRCOM Operations – “Follow the Sun” – First Level Support

- Symmetrical environment in Singapore and Montreal, transparent to internal & external customers
- Homogeneity between the two centers
  - Monitoring interfaces
  - Ticketing tool
  - E-mail database
  - Knowledge databases
  - Phone system
- Handover every 12 hours
- Identical expertise
AIRCOM Specialists-Second Level Support

- Customers are assigned an AIRCOM Specialist
  - Airlines and ANSPs (including the FAA)
  - They provide second-level support and act as sounding boards for all kinds of issues

- Provide Monthly Reports showing key parameters
  - Latency
  - Success Rate
  - Availability
AIRCOM Monitoring System (AMOS)

Has the capability to monitor all SITA systems
- Provides web-based access via the secure SITA network
- Is in a fully redundant configuration – hot Standby
- Fully scaleable – additional facilities not a problem
- Generates automatic Alarms and Advisories based on criticality
ACARS Benefits to All Groups: Dispatch, Operations, Maintenance, Engineering, Catering, Customer Service, and Air Traffic Services

<table>
<thead>
<tr>
<th>From Aircraft</th>
<th>Departure Airport</th>
<th>Park/Taxi</th>
<th>Take-Off</th>
<th>Depart/Climb</th>
<th>En Route</th>
<th>Approach</th>
<th>Land</th>
<th>Taxi/Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park/Taxi</td>
<td></td>
<td>D-ATIS Req OUT</td>
<td>OFF</td>
<td>Engine Data</td>
<td>CPDLC, ADS D-ATIS Req Position Repts Weather Repts Delay Info/ETA Voice Req Engine Info Maint Repts</td>
<td>D-ATIS Req Catering Reqs Gate Requests ETA Special Requests Engine Info Maint Repts</td>
<td>ON</td>
<td>Fuel Info Crew Information Fault Data from CMC</td>
</tr>
</tbody>
</table>
### AIRCOM datalink traffic: An Increasing Demand

#### Number of users

<table>
<thead>
<tr>
<th>Quarter</th>
<th>VHF ACARS</th>
<th>VDL AOA</th>
<th>Satellite ACARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>05Q1</td>
<td>6,377</td>
<td>112</td>
<td>1,795</td>
</tr>
<tr>
<td>06Q1</td>
<td>7,400</td>
<td>190</td>
<td>2,080</td>
</tr>
<tr>
<td>07Q1</td>
<td>8,343</td>
<td>146</td>
<td>2,215</td>
</tr>
<tr>
<td>08Q1</td>
<td>9,030</td>
<td>167</td>
<td>2,560</td>
</tr>
<tr>
<td><strong>Variance (07-08)</strong></td>
<td>+8%</td>
<td>+16%</td>
<td></td>
</tr>
</tbody>
</table>

#### Daily traffic (kb)

<table>
<thead>
<tr>
<th>Quarter</th>
<th>VHF ACARS</th>
<th>VDL AOA</th>
<th>Satellite ACARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>05Q1</td>
<td>527,000</td>
<td>13,000</td>
<td>125,000</td>
</tr>
<tr>
<td>06Q1</td>
<td>778,000</td>
<td>26,000</td>
<td>164,000</td>
</tr>
<tr>
<td>07Q1</td>
<td>891,000</td>
<td>8,300</td>
<td>165,000</td>
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<tr>
<td>08Q1</td>
<td>1,043,000</td>
<td>14,700</td>
<td>190,000</td>
</tr>
<tr>
<td><strong>Variance (07-08)</strong></td>
<td>+17%</td>
<td>+15%</td>
<td></td>
</tr>
</tbody>
</table>

#### Daily traffic per aircraft (kb)

<table>
<thead>
<tr>
<th>Quarter</th>
<th>VHF ACARS</th>
<th>VDL AOA</th>
<th>Satellite ACARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>05Q1</td>
<td>83</td>
<td>116</td>
<td>70</td>
</tr>
<tr>
<td>06Q1</td>
<td>105</td>
<td>137</td>
<td>79</td>
</tr>
<tr>
<td>07Q1</td>
<td>107</td>
<td>57</td>
<td>74</td>
</tr>
<tr>
<td>08Q1</td>
<td>116</td>
<td>88</td>
<td>74</td>
</tr>
<tr>
<td><strong>Variance (07-08)</strong></td>
<td>+8%</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

Aircom Datalink service is used by over 185 airlines and 50 ANSPs.
Conclusion

- SITA is a **key partner** for the aeronautical community in the region
- SITA network growth is driven by airlines requirements and now also by ATC
- SITA datalink services is enabling airlines and CAAs to improve their services, comply with ICAO recommendations, reduce costs and CO2 emissions
Thank you for your attention