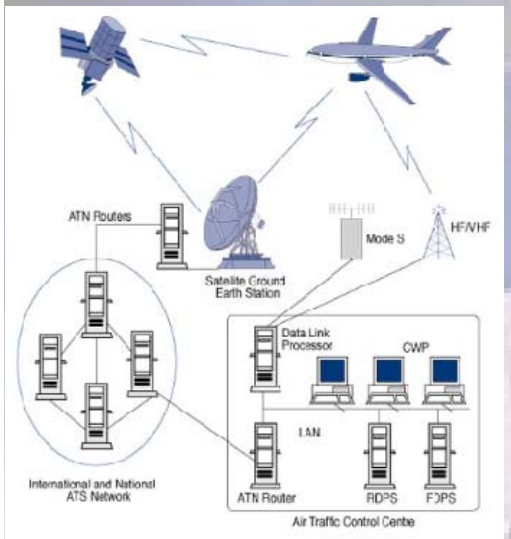
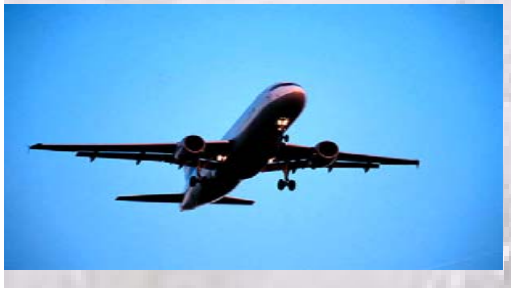
MID Region Global ATM Operational Concept Training Seminar

Cairo, 28 Nov. – 1 Dec. 2005





Status of implementation of CNS/ATM Systems in the MID Region

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- CNS/ATM activities in the MID Region
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Introduction

- For many years, States in all ICAO Regions embarked on ATM implementation programmes intended to improve aviation operations by making use of CNS/ATM technologies
- Technology is not an end in itself
- An integrated and global ATM system based on clearly established operational requirements is needed.
- Such a concept would form the basis for the coordinated implementation of CNS/ATM technologies.
- The operational concept is intended to guide the implementation of CNS/ATM technologies by providing a description of how the emerging and future ATM system should operate.

Introduction (cntd)

- **Although implementation of CNS/ATM systems is well under way, the major challenge for ICAO now is the evolutionary development and implementation of a seamless, global ATM system that will enable A/C operators to meet their planned times of departure and arrival and adhere to their preferred flight profiles with minimum constraints.**

- **Transition and implementation of CNS/ATM systems continue to be a challenge, which pose many difficult and complex issues for those involved in the overall planning and implementation process.**

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CNS/ATM activities in the MID Region

- **The regional planning process is the principal engine of ICAO's planning and implementation work.**
- **At the first meeting of MIDANPIRG (Cairo, November 1994) it was decided that a CNS/ATM SG be formed to inter-alia develop the MID regional implementation plan aimed at ensuring a timely, efficient, orderly and coordinated transition to the new CNS/ATM system.**
- **CNS/ATM SG/1 (Cairo, 17-20 January 1995)**
- **CNS/ATM SG/2 (Cairo, 9-11 June 1997)**
- **CNS/ATM SG/3 (Cairo, 9-12 November 1998)**
- **CNS/ATM SG/4 (Cairo, 6-10 March 2000)**

CNS/ATM activities in the MID Region (cntd)

CNS/ATM/IC SG established pursuant to MIDANPIRG/6 Decision/27 *"New title and revised TOR for CNS/ATM SG"*

- **The objective was to move from planning to implementation of CNS/ATM systems in the MID Region**
- **TOR of the CNS/ATM/IC SG**
  - ✓ **CNS/ATM/IC SG/1 (Cairo, 5-9 November 2001)**
  - ✓ **CNS/ATM/IC SG/2 (Cairo, 16-18 March 2005)**
- **The CNS/ATM/IC SG/2, inter-alia, reviewed and updated the CNS/ATM systems implementation timelines contained in part II of the MID regional Air Navigation Plan for CNS/ATM systems .**

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Air Traffic Management

- **Revision of ATS route structure/Dynamic and flexible route management:** ***"The establishment of structured but flexible route systems, on the basis of RNAV and RNP capability, aimed at accommodating preferred flight trajectories".***

  The Middle East ATS route network has been reviewed/updated further to the implementation of RVSM. A major review of the ATS route network has also been carried out within Baghdad FIR with the creation of parallel unidirectional trunk routes. The proposal for amendment to the MID Basic Air Navigation Plan-Serial No. MID 05/01-ATS was approved on 5 June 2005.

- **RVSM: Middle East Region – Implemented RVSM on 27 Nov.2003 (except for Baghdad and Kabul Firs).**

- **Establishment of Regional airspace safety system performance monitoring structure: MID RMA established in Bahrain and operational since November 2005.**

Air Traffic Management (cntd)

- **Reduced longitudinal separation:** implementation 1998
- **Reduced lateral separation:** implementation 2001
- **ACAS II :** Mandated from 1 Jan. 2000.
- **RNAV/RNP Capability - based horizontal navigation:**

"Implementation of the concept of required navigation performance (RNP) so that horizontal separation can be reduced and benefits achieved by aircraft operators that equip to meet RNP requirements".

RNP 5/B-RNAV Phase I – Implemented 14 June 2001.

RNP 5/RNAV Phase 2 – Implementation started effective 28 Nov. 2002 as ongoing process.

T-RNAV to be implemented within some busy TMAs

Air Traffic Management (cntd)

- **Flexible use of airspace:** ***"optimization and equitable balance in the use of airspace between civil and military users, facilitated through both strategic coordination and dynamic interaction".***

  Ongoing process. Timeline agreed for the region: 2001

- **Enhancement of terminal operations through SIDs/STARs, etc. :**

  "The implementation of optimized standard instrument departures (SIDs), standard instrument arrivals (STARs), instrument flight procedures, holding, approach and associated procedures, taking into account improved aircraft capabilities, along with ATM decision support systems".

  Action taken by MIDANPIRG/9 (Conc 9/10) / Implementation ongoing.

- **Adoption of ICAO flight-level scheme to harmonize level systems:** **Implemented in the MID Region.**

Air Traffic Management (cntd)

- **Implementation of decision support systems:**

  "Make optimum use of currently available automation functions (e.g., automated FDPS, MSAW, STCA, URET, CTAS, MAESTRO and on-line data interchange systems "OLDI") in the near and medium terms".

  Ongoing

  Timelines for the MID Region

  MSAW: 2000

  Conflict prediction:19 99

  Conflict alert: 2001

  Conflict resolution advice: 2006

- **AIDC:** **timeline for the MID Region: 2007**

Air Traffic Management (cntd)

- **Data Link Applications :**

  "The implementation of ACARS and VDL-Mode 2 based data link services for pre-departure clearance, oceanic clearance, D-ATIS and other flight information and routine messages in the near term, as well as automatic position reporting on the part of the aircraft. Over the medium term, more complex safety related information can be exchanged, including ATC clearances. The long term use of data link will include down linking of aircraft flight parameters for use by the ATM system, and uplink of traffic data for improved situational awareness in the cockpit ".

  Action taken by MIDANPIRG/9 Conc 9/42

  D-ATIS and PDC implemented in Bahrain, Egypt and UAE.

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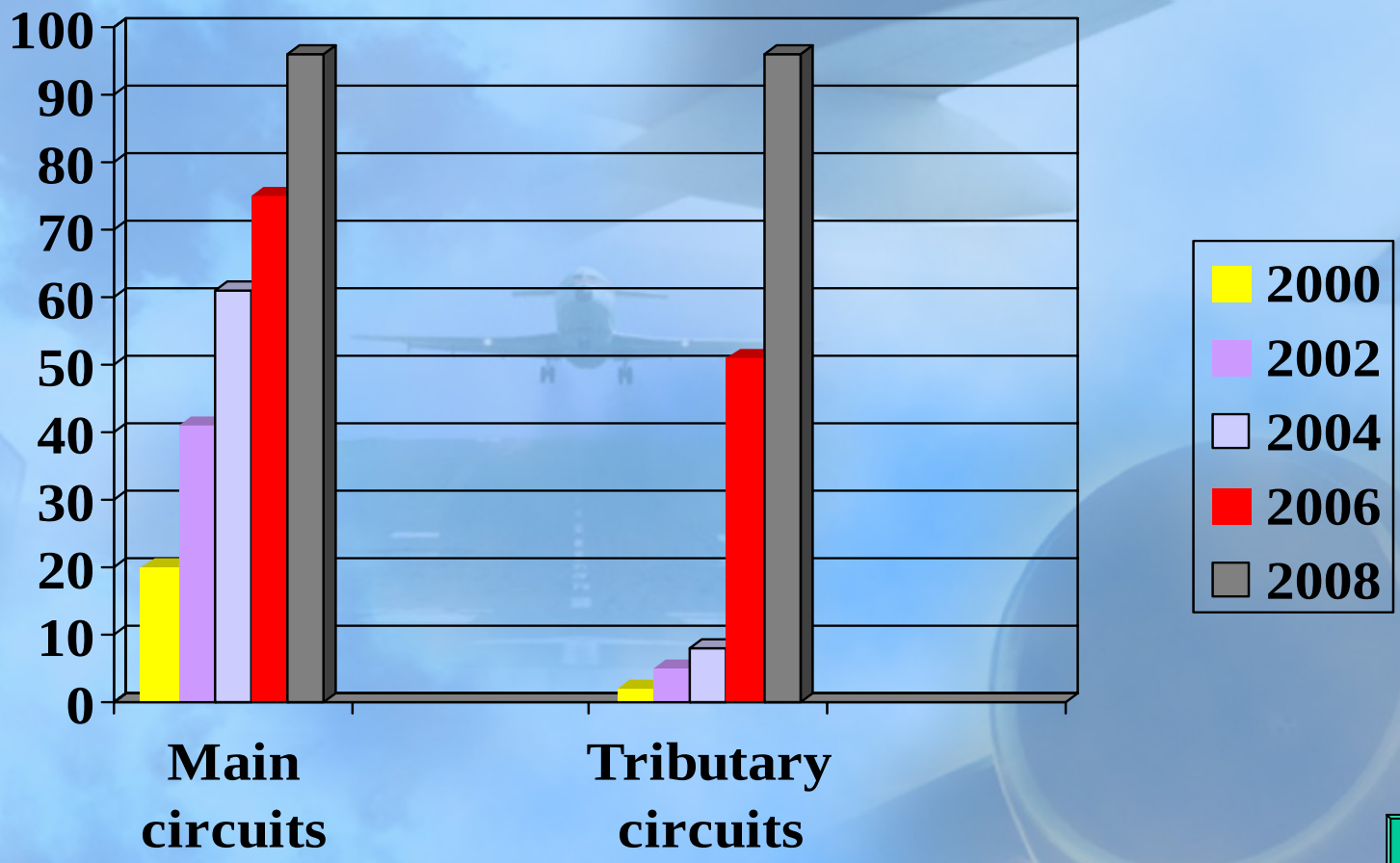
Communications

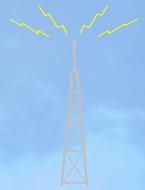
AFTN - Implementation of High Speed Digital Circuits



Communications (cntd)

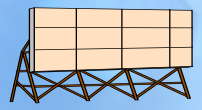
Transition to ATN

ATN Sub networks

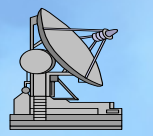


HFDL

VDL

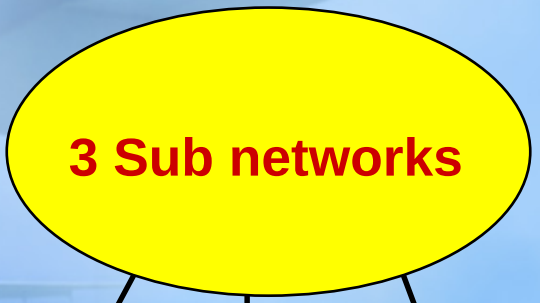


Mode S Radar



Satellite

Gate Link



Fixed

Mobile

Onboard

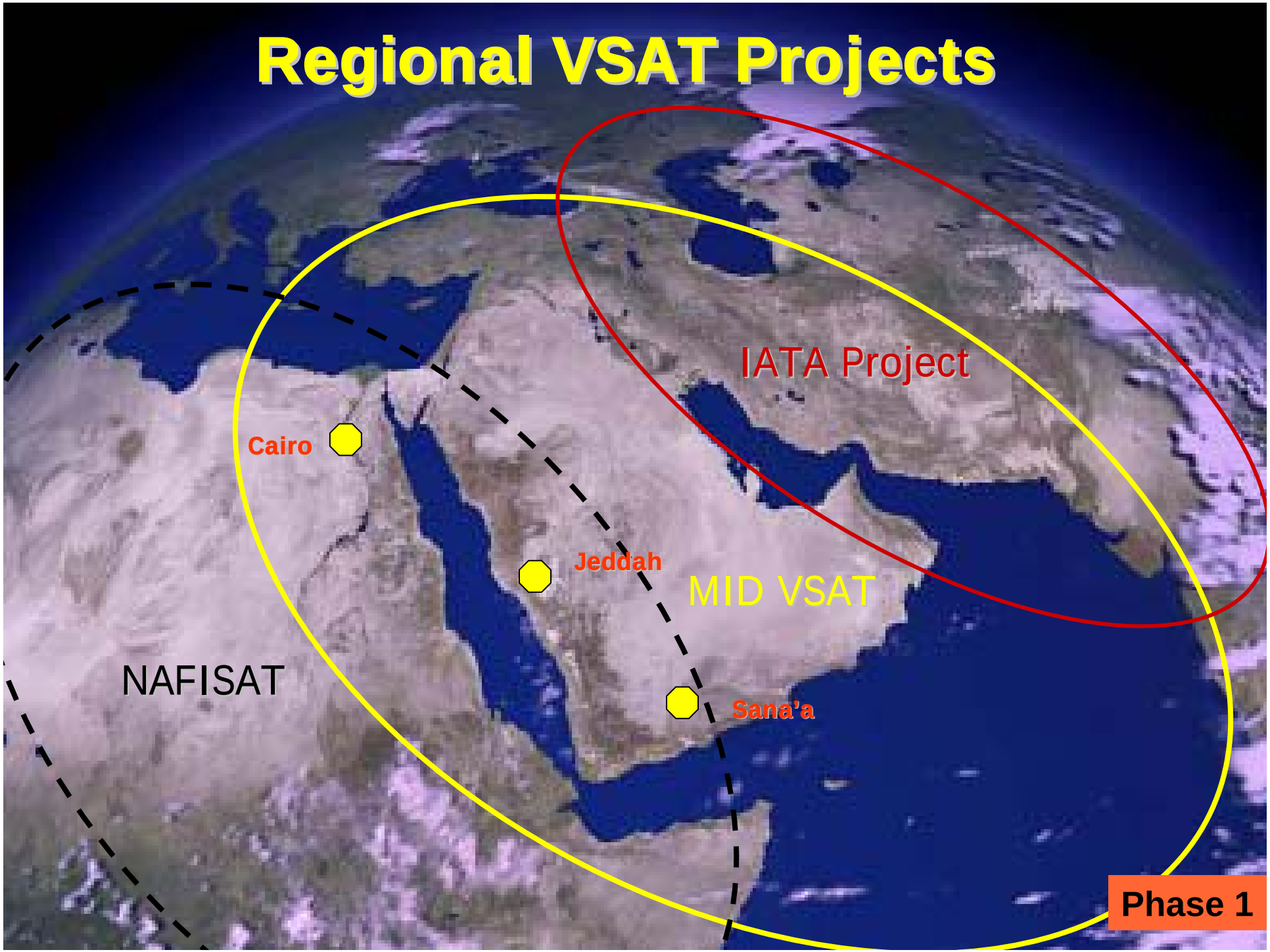
Communications (cntd)

Transition to ATN

- **Phase 1** : Considering present and future requirements, improve current infrastructure by implementing modern circuits and networks. This would facilitate interconnection of future routers in the region.

- **Phase 2** : Implement **AMHS** and **AIDC**. AFTN and CIDIN would still be in use and need to be interfaced (AFTN/AMHS and CIDIN/AMHS **gateways)**. Use progressively VDL mode 2 and ADS.

- **Phase 3** : Deploy full ATN using ground and air/ground sub-networks interconnected by **routers.**


Regional VSAT Projects
IATA Project
Cairo
Jeddah
MID VSAT
NAFISAT
Sana'a
Phase 1

Communications (cntd)

Migration to AMHS

- Until the ATN becomes available, number of MID States are planning to use AMHS over TCP/IP (conform to Doc 9705, except clauses relating to interfacing with ICS)

- There are drawbacks when implementing different architectures (performance requirements, reduce of performance and availability, cost of used gateway)

- In view of the above the ATNP offered the following:
  - ✓ AMHS over TCP/IP implementation not yet fully SARPs-compliant ATN (but document will be ready in 2006 to be included in the SARPs)
  - ✓ Security measures to be taken when using IP network

Communications (cntd)

OLDI meanwhile AIDC

- Considering the slowness in the implementation of AIDC, some States planned OLDI as a temporary system.
- Concerned States are now concentrating on operational issues and whether the perceived benefits justify the costs.
- States need, if justified, to develop a kind of regional SARPs (ICD), similar to what was done in APAC:
  - Notification
  - Coordination
  - Transfer of Control
  - General Information Interchange
  - Surveillance Data Transfer; and
  - Application Management

Arrangement between concerned States

Communications (cntd)

VHF Data Link

- Air space users require global communications architecture to guarantee: capacity, cost effectiveness and best use of radio spectrum

- VDL Mode 2 when supported by VHF/HF voice capacities, offers the best short to medium term communications infrastructure for CPDLC

- ICAO refers to ANC recommendations

Communications (cntd)

VHF Data Link (cntd)

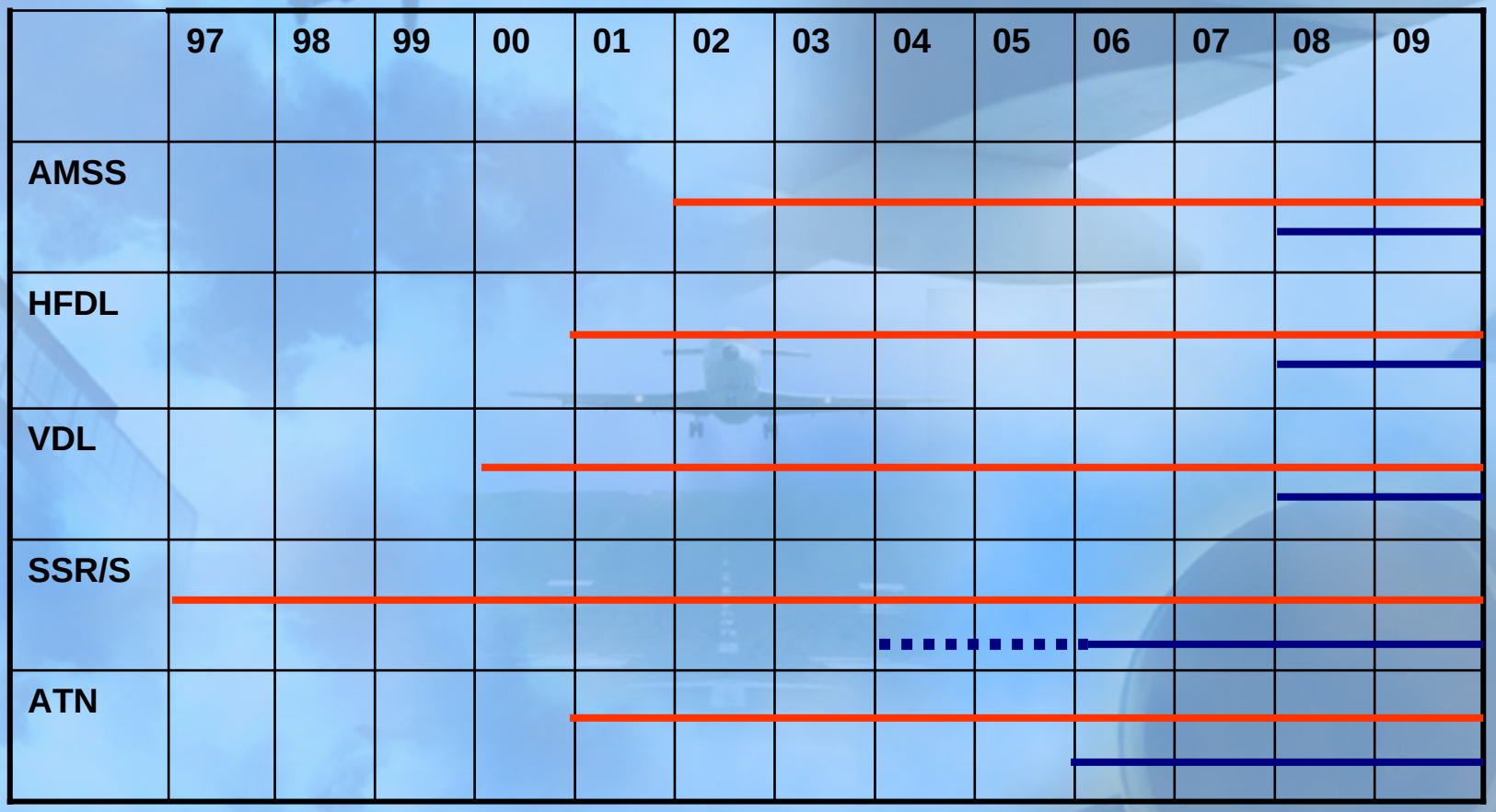
- Current VOLMET: inherent capacity limitations
- D-VOLMET and equipped aircraft: SIGMET + OPMET
- D-ATIS

Different parties concerned

- Manufacturers → charge fair price
- Airspace users → equip their aircraft
- Com. Service Providers → equitable service
- Air Navigation Service Providers → open/fair charging

Communications (cntd)

Communication System Implementation



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Navigation

- Transition to WGS-84 is almost completed except for some States who have not yet implemented GUND.
- Strategy for implementation of GNSS adopted.
- Evolutionary introduction of GNSS consistent with the Global Air Navigation Plan for CNS/ATM systems
- SBAS test bed in co-operation with EGNOS, carried out.
- SBAS test bed based on WAAS planned.
- GNSS used for continental En-Route and NPA.
- States work cooperatively on multinational basis to implement GNSS augmentation system in order to facilitate seamless and inter-operable systems.
- Use of GNSS with appropriate augmentation systems, as required, for approaches with vertical guidance is planned (APV BaroVNAV, APV I and APV II).

Navigation (cntd)

ESTB Demonstrations

Objectives and Conclusions

- To demonstrate that APV1 (100%) and APV2 (90%) based on guidance with alarm of 20m, are achievable over the MID Region using SBAS concept.
- As a result, the performance level met both ICAO horizontal and vertical requirements for APV 1 in all the cases, and APV 2 vertical requirements for most of them.
- The next step will use pre-operational hardware and software in order to confirm the above performances.

Navigation (cntd)

Navigation Implementation timescale

	97	98	99	00	01	02	03	04	05	06	07	08	09
En-route	GL	GL	GL	GL	GL	GL	GL	GL	GL	GL	GL	GL	GL
						REG	REG	REG	REG	REG	REG	REG	REG
Terminal NPA		GL	GL	GL	GL	GL	GL	GL	GL	GL	GL	GL	GL
								REG	REG	REG	REG	REG	REG
Precision Approach							GL	GL	GL	GL	GL	GL	GL
													REG

GL

REG

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Surveillance

TYPES OF SURVEILLANCE

- **Independent surveillance :**
  - **PSR (Primary Surveillance Radar)**
- **Cooperative independent surveillance :**
  - **SSR (Secondary Surveillance Radar)**
    - ✓ **SSR Mode A/C**
    - ✓ **SSR Mode S**
- **Automatic Dependent Surveillance :**
  - **ADS-B**
  - **ADS-C**

Surveillance (cntd)

SURVEILLANCE IN THE MID REGION

- Region well covered by radars (PSR/SSR Mode A/C).
- SSR Mode S planned for some terminal and high-density En-Route areas in 2006.
- It is planned that ADS will be used initially for oceanic airspace and, later, in remote areas and as backup to SSR in high-density traffic areas.
- MIDANPIRG/9 encouraged States to implement ADS-B taking into account studies/ experiences carried out in other ICAO Regions.
- Progressive replacement of Secondary Radar with ADS-B which provides cost effective solution, is planned.

Surveillance (cntd)

Outcome of AN-CONF/11

Recommendation 7/1 – Strategy for the near-term implementation of ADS-B

That States:

a) note that a common element in most of the approaches currently adopted for the early implementation of ADS-B is the selection of the SSR Mode S extended squitter as the initial data link; and

b) take into account this common element to the extent possible in their national and regional implementation choices in order to facilitate global interoperability for the initial introduction of ADS-B

Surveillance (cntd)

Outcome of AN-CONF/11 (cntd)

Recommendation 7/2 – Support of long-term ADS-B requirements

That :

a) States recognize that in the longer term the current SSR Mode S extended squitter technology may not be able to fully satisfy all of the requirements for ADS-B services in all airspaces; and

b) ICAO continue development of technical standards for ADS-B link technologies, including SSR Mode S extended squitter, VDL Mode 4 and UAT, with special attention being paid to ICAO ADS-B operational requirements, frequency spectrum availability and aircraft integration issues.

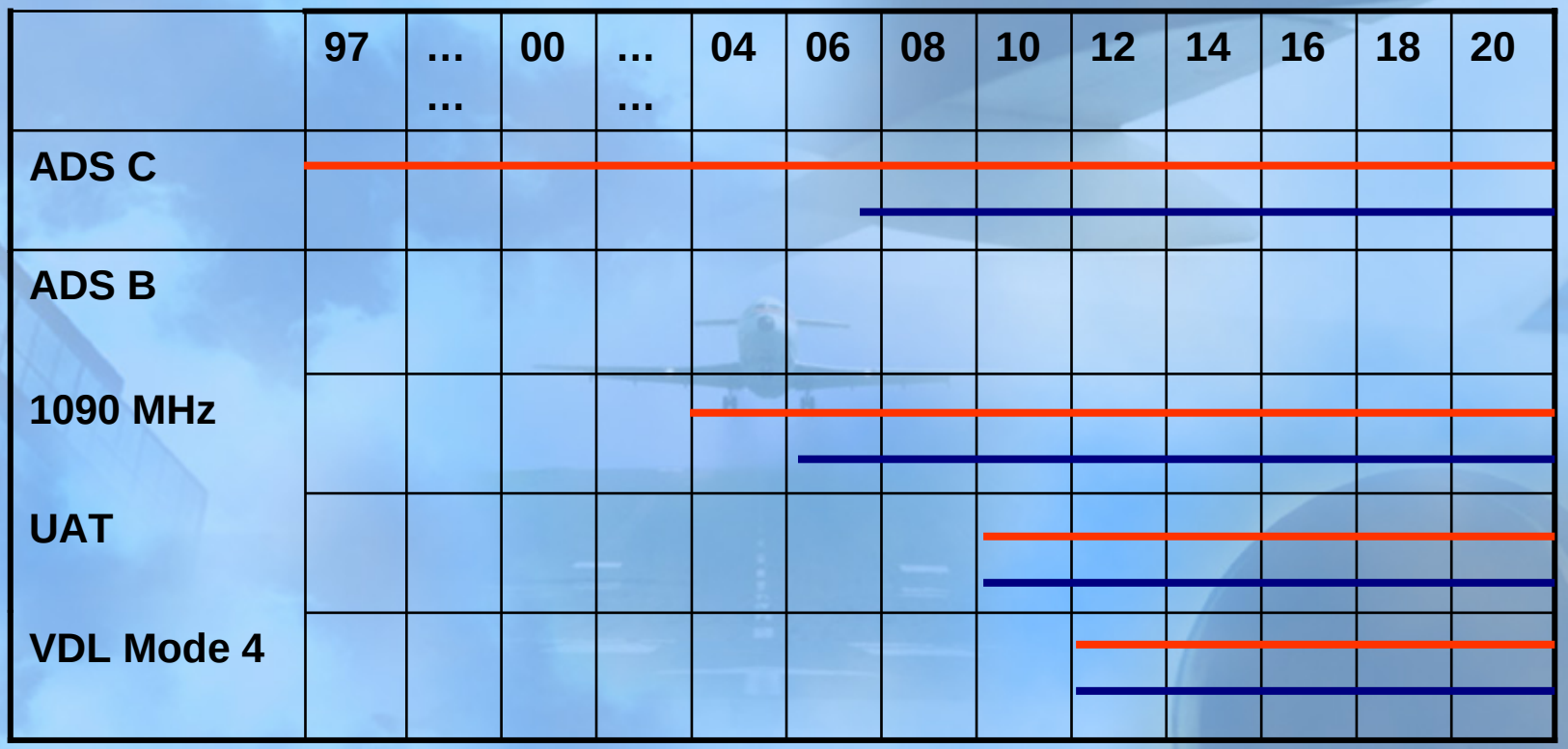
Surveillance (cntd)

LINK SOLUTIONS PROPOSED BY ANC/11

- 1090 MHz Mode S Extended Squitter = primary medium for Commercial aircraft (Near-term implementation: 3 coming years)
- Universal Access Transceiver (UAT) = primary medium for general aviation (Mid-term implementation: within 4 to 8 years).
- VDL Mode 4 (Long-term implementation: 2012 and beyond).

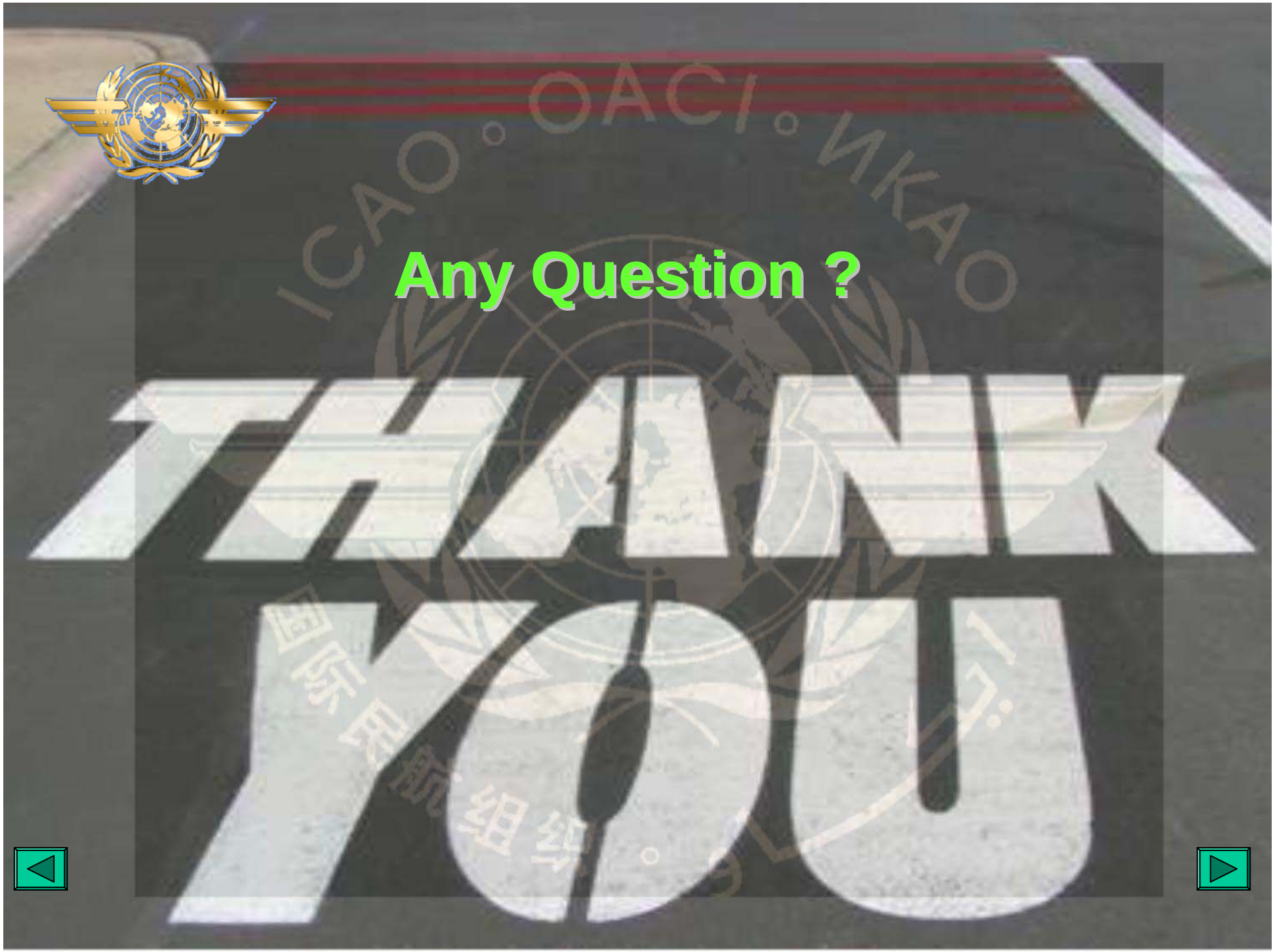
Surveillance (cntd)

Implementation Timescale



Conclusion

- MID Region is considered an important link/bridge between other neighboring Regions: APAC, Europe and Africa.
- The MID Region has developed its plans for the implementation of most of its Air Navigation Plan and major parts of the CNS/ATM systems.
- We are still in a transition period.
- Continued commitments and collaboration is necessary to further improve the status of implementation of the CNS/ATM systems in the MID Region.
- The complete transition to the new CNS/ATM systems continue to be a challenge, but the major challenge now is the evolutionary development and implementation of a seamless, global ATM system based on clearly established operational requirements.


Any Question ?
THANK YOU