



## Evolution Strategy for the ATN Directory

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### **Fifth Meeting of the Aeronautical Telecommunication Network (ATN) Implementation Co-ordination Group (ATNICG/5)**

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**Agenda Item 9: Future use of Directory Service**



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# Overview

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Today



- Analysis of current situation
  - Offline management
  - Maintenance, distribution, and activation of information
  - AMHS address information already in use
  
- Future use of Directory service
  - Advantages of Directory service
  - Technical, organisational, and procedural aspects
  
- Development path from off- to online services
  
- Identification of future work on Directory service

# Starting Point – Management of AMHS Addresses

- Addresses in the AMHS
  - Identification of direct and indirect AMHS users
  - AFTN/AMHS Gateway: Transparent address translation
  - End-to-end communication between direct AMHS users
- Translation of AMHS addresses (ICAO Doc 9705)
  - AMHS Management Domain register
  - CAAS look-up table
  - User Address look-up table
- Main tasks of address management
  - Maintenance of information
  - Global synchronisation of changes





# AMC Offline Management

- Recurring steps
  - Adopted AIRAC procedure for global synchronisation
  - Centrally collect and consolidate information from States
  - ASIA/PAC States provide information through Aerothai
  - Distribute information from all States
  - States activate information on effective date








- Interface to AMC
  - Web application for maintenance of information
  - Manual download/distribution of information
  - Files in Comma-Separated Values (CSV) format
  - Import/incorporate into AMHS components
    - Manual action
    - System-dependent



# AMC Offline Procedure

Day in Cycle	Calendar date	Data Entry by CCC / Ext COM / AMC	Data Validation and Processing by AMC	ACK Phase by CCC	ACK Processing by AMC	Data Retrieval and Implementation (by CCC)  Data Publication (by AMC)
1	13/02					
2	14/02					
3	15/02					
4	16/02					
5	17/02					
6	18/02					
7	19/02					
8	20/02					
9	21/02					
10	22/02					
11	23/02					
12	24/02					
13	25/02					
14	26/02					
15	27/02					
16	28/02					
17	01/03					
18	02/03					
19	03/03					
20	04/03					
21	05/03					
22	06/03					
23	07/03					
24	08/03					
25	09/03					
26	10/03					
27	11/03					
28	12/03					

<b>LEGEND</b>		AMC Operator locks COM Centres		AMC Operator releases the routing matrix
		AMC Operator transfers to pre-operational area		AMC Operator moves data to operational area, unlocks COM Centres and makes official publications; CCC Operators use new data for operational service; AMC Operator sends export files to ICAO HQ
		Weekends		

- 28 days cycle
- Phases for
  - Modification
  - Consolidation
  - Reporting
  - Distribution
  - Activation

Figure 4  
ATS Messaging  
Management Manual



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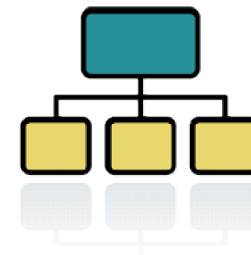
## Summary Offline Management

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- Deployed and in operation (status quo)
  
- Well-defined procedure
  - Centralised maintenance and consolidation of information
  - Predetermined flow of information
  - Global synchronisation
  
- Manual distribution and activation
  
- Information in table format

## ATN Directory – Why ?

- Goes beyond the management of AMHS addresses
- Prerequisite for AMHS security
  - ICAO Doc 9880 (expected to supersede ICAO Doc 9705)
  - Public Key Infrastructure (PKI)
- Ready to hold further information apart from AMHS
  - Organisations and users
  - Applications
  - Aircrafts (air-ground)
  - ...





## Characteristics of the ATN Directory (1)

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- Based on international standards
  - Use of commercial off-the-shelf software
  - Anticipated positive impact on costs and time
  
- Technical specification
  - Directory schema (structure of data)
  - Standardised protocol for access by (human and machine) users
  - Standardised protocols for exchange of data
  
- Built-in access rights on different levels
  - Fine-grained protection of sub-trees, entries and attributes
  - Access activities (e.g. search, read, write, delete, ...)



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## Characteristics of the ATN Directory (2)

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- Built-in authentication
  - Simple / strong authentication
  - Similar to and complements AMHS security
  
- Security
  - Use of certificates to provide security
  - Distribution and revocation of digital certificates
  - Deployment of Public Key Infrastructure (PKI)
  
- Distributed online service
  - Distributed information (different locations)
  - Modifications get immediately effective

# ATN Directory Considerations

- Technology is available
  - Specification for ATN Directory
  - COTS Products
  
- Considerations apart from technical aspects
  - Initiated by operational procedures and working arrangements
  
- Version handling
- Synchronisation
- Security



## ATN Directory Considerations – Version Handling

- Partially correlated, dependent information
  - Example: AMHS MD and CAAS tables
  - Set of data
  - Modifications have to ensure data integrity



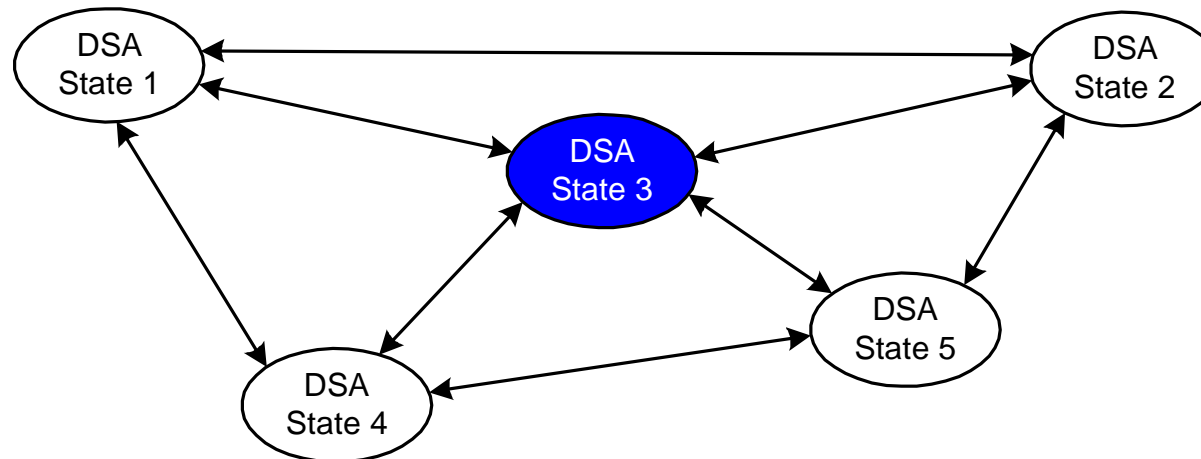
- Multiple sets of data
  - Identify version/validity of information
  - Current, operational data (e.g. cycle 1004)
  - Pre-operational data, valid in future (e.g. cycle 1005)



- Decouple maintenance and distribution from activation

## ATN Directory Considerations – Synchronisation (1)

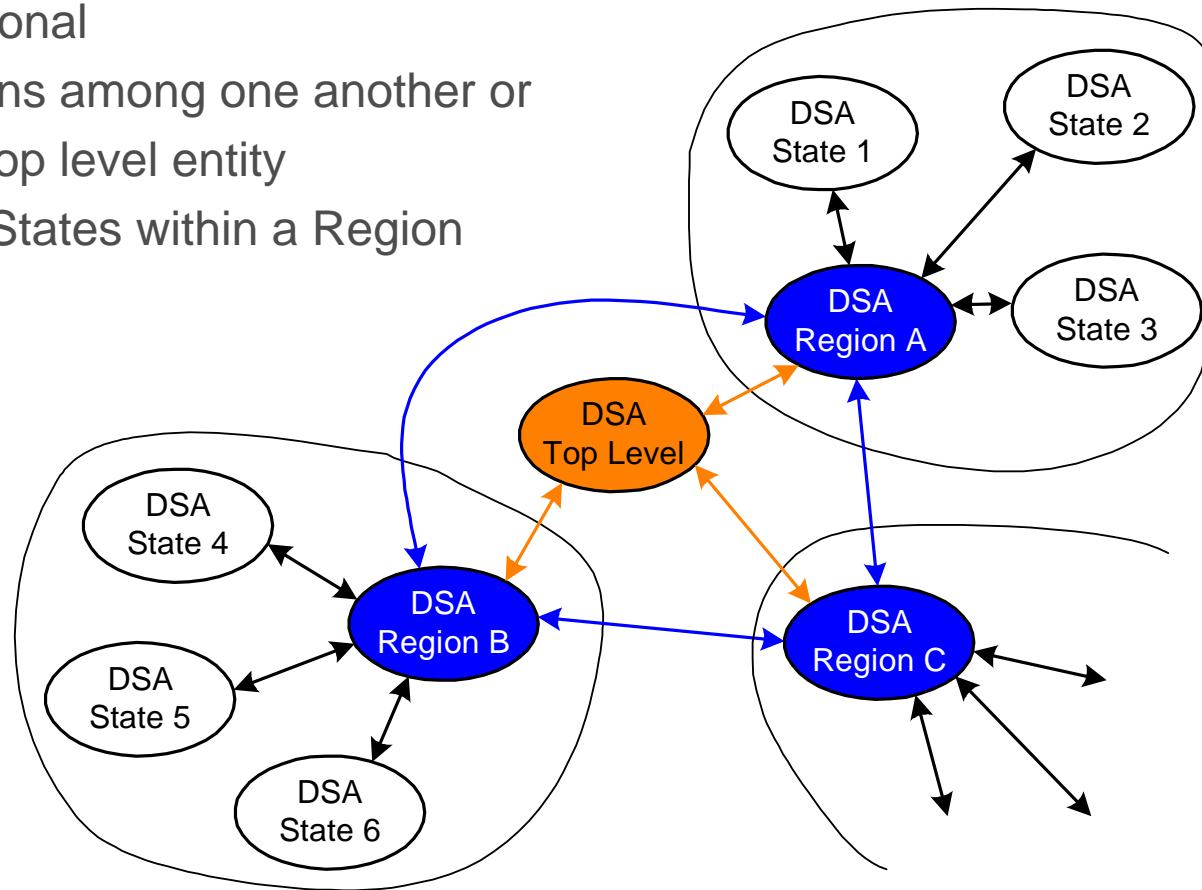
- Global synchronisation
  - Availability of identical information
  - On a global basis
  - Prerequisite for correct operation of the AMHS



- Difficult to achieve on a global basis

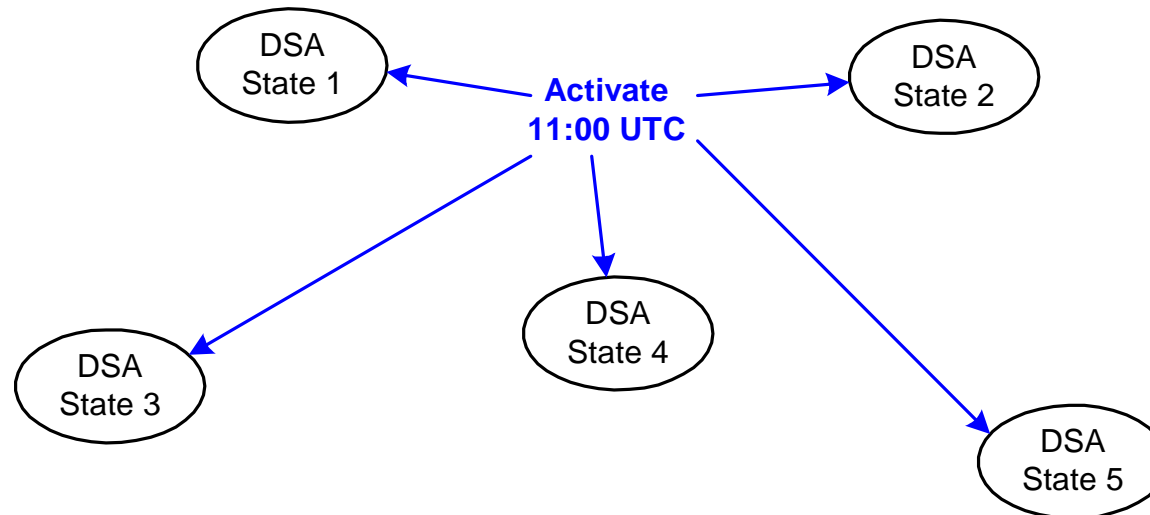
## ATN Directory Considerations – Synchronisation (2)

- Possible synchronisation paths
  - Inter-Regional
    - Regions among one another or
    - With top level entity
  - Between States within a Region



## ATN Directory Considerations – Synchronisation (3)

- Simultaneous and atomic activation
  - Changes must not become effective prior to activation
  - Globally coordinated activation (e.g. effective date 11:00 UTC)
  - Manual or automated process possible



## ATN Directory Considerations – Security

- Areas of application
  - AMHS security                      à AMHS Messages
  - Secure access to applications      à MTAs, UAs, DSAs, ...
  
- Establishment of Public Key Infrastructure (PKI)
  - Encryption and signature of communication and contents
  - Digital certificates
    - For users and applications
    - Limited validity, renewal required
  - Certification Authorities
  
- Additional effort for management of certificates





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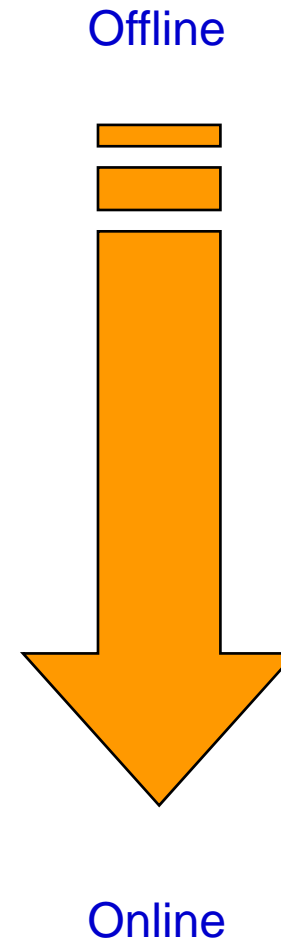
## Summary ATN Directory

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- Efficient technology is ready to use
  - Technical specification
  - COTS products
  
- Capability to meet further requirements
  - Security
  - New applications
  
- Organisational and procedural tasks to be addressed
  - Version handling
  - Structure for synchronisation
  - Maintenance of information

# From Off- to Online Management

- Operational environment demands for
  - Continuous operation
  - Smooth transition
- Transition period required for
  - Enhancement or replacement of legacy systems
  - Establishment of infrastructure
- Migration strategy needed
  - Support of table-based, legacy systems
  - Adoption of management procedures
  - Incremental approach allows evolution



## Initial Phase

- Initial phase benefits from strong points of both solutions
- Offline management
  - Centralised maintenance
  - Established procedures



- Online Directory service
  - Automated distribution of information
  - Online access to information by clients



## Evolution Strategy

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- Evolution towards online solution
- Stepwise introduction of service elements and functions
  - Centralised/regional online maintenance of information
  - Establishment of procedures for coordination and synchronisation
    - Between Regions and States
  - Implementation of new elements, e.g. security
- Provision of added value
  - Local address book
  - Meet requirements of new applications
  - ...



## Conclusion

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- Get best of both worlds!
  
- Benefits of initial phase
  - Established offline management functions
  - Online capabilities of Directory service
  
- Evolution strategy
  - Stepwise introduction of additional service elements
  - Further development of service as required
  - Final migration to full online services