

# ATC IP Network Users Conference

ATC IP Network Users Conference  
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# ATC over IP paradigm General Concepts



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# Agenda

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- **Informing the ATC community**
- Ab initio
- ATC over IP paradigm
- ANSP IP network infrastructure
- ANSP strategic decision
- Acknowledgements

# Disclaimer!

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- Any induced mental association between the concepts which will be mentioned further and other concepts currently circulated by different entities is not intentional
- Following is our vision of ATC over IP conceptual paradigm

# Informing the ATC community

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- ❑ Dissemination of a decade long experience from benefiting off successful exploiting the ATC over IP paradigm is considered our moral duty towards our community
- ❑ We admit we neither invent nor discovered anything but we are proud of the outcome itself
- ❑ ROMATSA just build a system for its own purpose using “bricks” currently available on the free market

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# Ab initio solid ground, common ground!

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- You need solid ground for anything you build
- But what if the ground is loose? Or even swampy?
- And what would this common ground be?

# Ab initio (continued)

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- Get solid ground. Freeze it! Or better build a raft to navigate this ever-changing environment
  
- Common denominator. IP (this was easy)

# Ab initio (continued)

## Why did IP won?

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- ❑ Initially prevailed packet switched over circuit switched networks
- ❑ Then the connectionless over the connection oriented protocols
- ❑ Among the finalists the IP showed the perfect balance between simplicity and flexibility

# Ab initio (continued)

## Why did IP won? (continued)

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- ❑ IP prevalence is in fact the victory of the distributed approach over the centralized approach
- ❑ The distributed approach is the driving vector of the ATC paradigm shift

# Ab initio (a bit of trivia)

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- Looking around for guidance in 1996 we have been told to take as model the concept of ATN
- At that time we were thinking that we were going to start building our part of the ATN and assumed other ANSPs is doing the same
- We still believe that the future ATN will be a fabric of autonomous ANSPs/FABs infrastructures governed by time-honoured peering principles

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# ATC over IP paradigm

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- Network-centric approach
- ANSP networking infrastructure as the foundation of ATM systems
- ANSP network shall be perceived as its main asset

# ATC over IP paradigm

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- This construction acts as an vertical adaptation layer between the service demands coming from up and the ever-changing real world from beneath
- Horizontally it connects and adapts ANSPs/FABs with different sets of CNS systems weaving so a global ATM system

# ATC over IP paradigm (continued)

- The ICAO CNS/ATM concept

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The three pillars of ATM systems:

- Communications
- Navigation
- Surveillance

**CNS/ATM**

# ATC over IP paradigm

## - The Big-C CNS/ATM perception

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- ANSP network as the glue between system's components
- The "C" is receiving new valences



**ATM**  
**C**  
**NS**

# ATC over IP paradigm

## - Legacy CNS/ATM vs ATC over IP

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- Application oriented communication channel provision

versus

- Application transparent. Communication channels provision from TELCO's is not correlated to anything in particular

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# ANSP IP network infrastructure

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- ❑ **ONE** consolidated network
- ❑ Universal communication system
- ❑ Autoadaptive, application transparent

# ANSP IP network infrastructure

## - Service point flexibility

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- Based on the owner's strategy this model makes possible different contingency scenarios and service point translations
- ROMATSA has proven its contingency procedures benefitting off this distributed model which allowed in March 2008 to shutdown for three hours the Bucharest ACC transparently for airspace users
- In March 2010 ROMATSA successfully relocated the Constanta ACC in Bucharest premises, this being the third relocation after Cluj and Bacau

# ANSP IP network infrastructure

## - Access strategy

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- The access to/from the network and from any point to any ATM resource connected to this network is practically possible.
- However, the ANSP strategy will dictate the rules of accessing this network or network connected resources.
- Applying it's own strategy is at the full discretion of the owner.

# ANSP IP network infrastructure

## - Interconnection strategy

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- ANSP to ANSP interconnection comes natural when all have their network designed with similar principles.
- Like in the case of access, each owner is formulating its strategy for interconnection.
- The 50 years long peer-to-peer principle used for AFTN matches perfectly the interconnecting needs of today's networks.

# ANSP IP network infrastructure

## - Reliability

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- Unprecedented levels of availability are attained by:
    - Duplicated, triplicated, multiplied architecture for core and access equipments.
    - A mix of low level communication channels, own assets or leased from different providers using different physical media and technologies.
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# ANSP IP network infrastructure

## - Security threats

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- Potential outside threats are easily circumvented
  
- Threats coming from inside shall be addressed extremely cautiously.
  
- Two flavours of inside threats:
  - Gaining unauthorised access
  - Denial of Service

# ANSP IP network infrastructure

## - Network security

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- ❑ Natively the IP based infrastructure offers total liberty
- ❑ One liberty is to add restrictions
- ❑ As a rule of thumb protect all the **Core** and at least system critical **Access**

# ANSP IP network infrastructure

## - Network security (contd.)

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- ❑ Inspect traffic transiting the **Core**
- ❑ Trace a baseline and let the network warn you when the traffic pattern crosses the line
- ❑ Optional let the Network to protect itself

# ANSP IP network infrastructure

## - Services security

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- The recommended level where to stop adding restrictions it's the point where the bare necessity only is provided.
- The reasonable level where to stop adding restrictions it's the point where no other services may be disrupted by a compromised application.

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# ANSP strategic decision

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- ❑ It's irrelevant what the generation of your CNS/ATM system is. You can adopt this paradigm NOW! Legacy systems are fully supported.
- ❑ You decide whether to build and maintain your own network infrastructure,
- ❑ or hand-over and outsource this strategic part of your ATM system

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# Acknowledgements

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- Our construction partners:
  - Cisco
  - Topex
  - Datanet Systems

# Acknowledgements

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- And thanks to you, our guests for listening