Background

- ATN/IPS (Doc. 9896) is the ICAO solution for future safety-related ATM data communications
- FREQUENTIS is currently carrying out 2 projects in the Iris Programme:
  - Air Ground Router (AGR) for safety critical ATM
  - Mobility Testing Environment (MTE) for Safety critical ATM
- Air-Ground Router (AGR) is an essential part of the end-to-end mobile communication chain
  - ANTARES satellite link imposes specific challenges upon AGR
- Mobility Testing Environment (MTE) is required for verifying AGR compliance with ICAO Doc. 9896 and ANTARES requirements
Objectives

→ AGR Project
  - Build AGR for ANTARES link compliant to the global ICAO mobility concept described in ICAO Doc. 9896 (ATN/IPS)
  - Provide “standard” IPv6 routing features and ANTARES-specific functionalities for optimizing handover (HO) and Ground Earth Station (GES) switchover performance
    - Such functionalities are called REIL (Routing Enhancements for Iris Link)
  - Provide support for ATN/IPS header compression (HC) and Quality of Service (QoS) management

→ MTE Project
  - Provide testing environment for validating AGR functionality (different AGR implementations)
  - Allow for emulating User Terminal (UT) behaviour during HO with two independent channels
  - Allow for emulating GES switchovers
Design Drivers

- **AGR**
  - Reduce handover latency (L3 contribution during combined L2/L3 handover*)
  - Minimize packet losses during L3 handover
  - Support GES redundancy management (switchover) in case of GES failures/scheduled outages
  - Support header compression on FWL and RTL
  - Support QoS management (DiffServ)

- **MTE**
  - Provide environment for testing AGR functionality with ANTARES-specific enhancements (REIL)
  - Emulate SATCOM UT with two radio units
  - Allow for fine tuning of MIPv6 parameters
  - Verify BGP interoperability between LINUX (Quagga/Zebra) and COTS (CISCO) implementation

*) In the SATCOM context, handover at L2 (change of GES) induces handover at L3 (ATN/IPS network layer)
ATN/IPS Simulation Environment

→ MTE Project
  - Mobile Node (MN)
  - Home Agent (HA)
  - Correspondent Node (CN)
  - Ground-ground Router (GGR)

→ AGR Project
  - Air-ground Router (AGR)
  - Routing Enhancements for Iris Link (REIL)

→ Emulated components:
  - User Terminal (UT)
  - Ground Earth Station (GES)
  - Network Control Centre (NCC)
Mobile Test Environment

→ **COTS components**
  - Cisco Switches
  - Cisco 2911 Router
  - x86 Linux PCs (Ubuntu)

→ **Centralized Test Management**
  - Test Manager (TM) executes complex scenarios
  - Dedicated physical test management network
  - Remote-managed tests using Ansible/SSH
  - Reconfigurable within test scenarios for a wide range of test applications
Achievements

→ Pure IPv6 environment
  - Not a single IPv4 address in the system

→ Demonstration of Mobile IPv6 connectivity and interoperability across different COTS products

→ Flexible test bed allows evaluation of various kinds of IPv6 and MIPv6-related situations

→ Open to further extensions, e.g. investigating NEMO mobility solution

Further information:
http://telecom.esa.int/telecom/www/object/index.cfm?fobjectid=31676
http://telecom.esa.int/telecom/www/object/index.cfm?fobjectid=31943
Thank you!