



International Telecommunication Union

Future Technologies

Roberto Donadio
Principal Engineer - ESA

Workshop on Satellites in IP and Multimedia
Geneva, 9-11 December 2002



A snapshot of IP-related R&D at ESA

- o Networking
 - QoS, Security, IPv6, multicasting
- o Terminals
 - DVB-RCS, microterminals
- o On-board processing



IP Security -studies

- Two parallel studies on the use of IPSec in satellite environments
 - architectures and recommendations
- IPSec workshop held in April 2002 at ESTEC
 - conclusions:
 - multicast security required
 - operators struggle with PEP/IPSec
 - CA systems expensive, not for micro-broadcasters



IP Security -developments

- o IPsec testbed, contract being placed
 - development ready 3rd quarter 2003
 - star configuration B2B scenarios based on IP/DVB
 - PEP integration
 - focus on applications performance, unicast and multicast
 - handbook for practical use for micro-broadcasters, telemedicine users, etc.



Multicast

- o Secure multicast
 - support of second Group Key Management implementation within IETF framework
 - implementation of “light” GSAKMP
- o Reliable multicast
 - development sponsored (RRMP)
 - further work on standard reliable multicast following on-going IETF standardisation

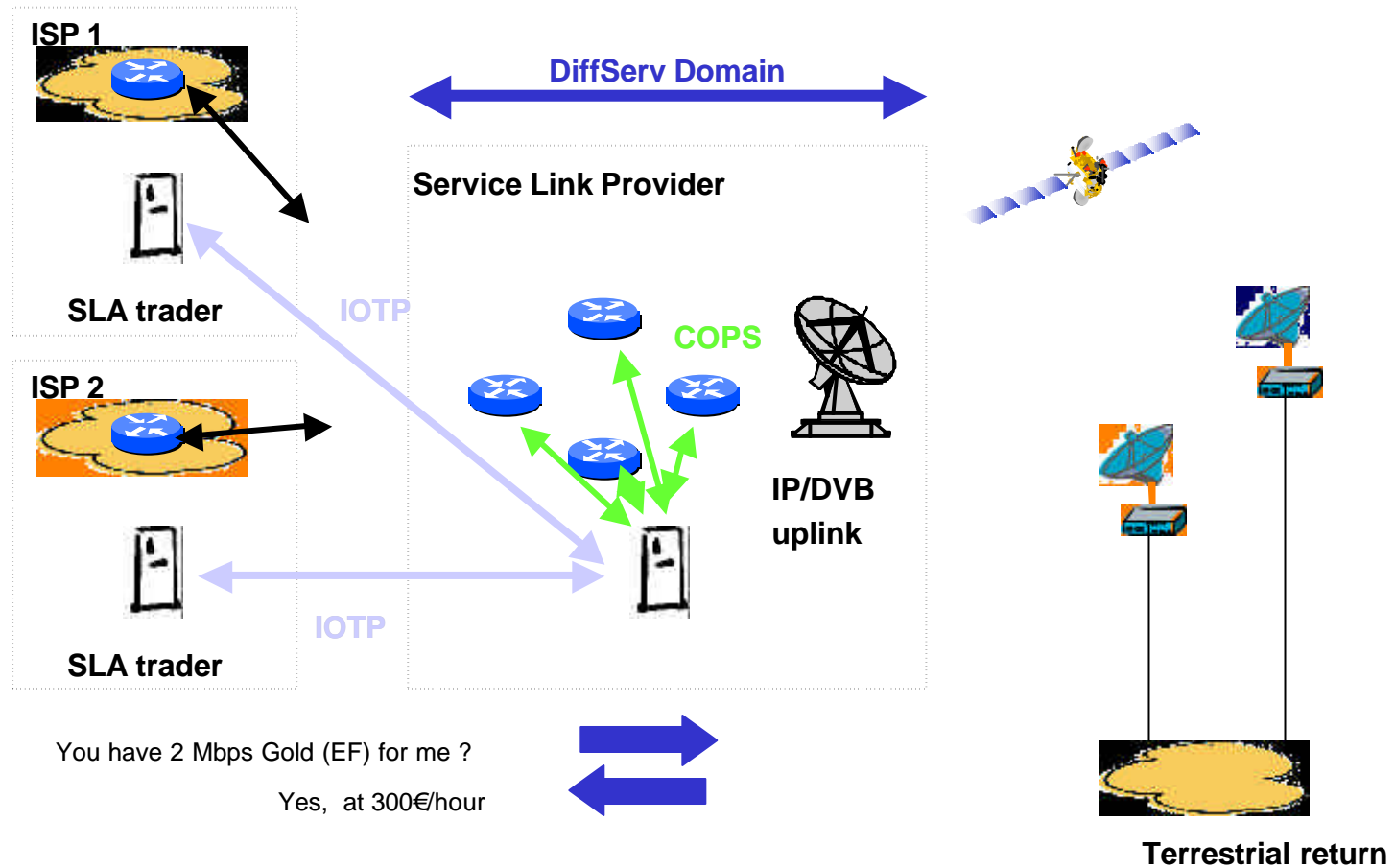


Protocols for QoS

- Study performed by VCS Engineering, Salzburg University, Critical Software
 - methods to provision QoS based on diffserv in DVB forward links, including IPsec, multiple IP/DVB gateways
 - dynamic SLA trading between ISPs and a Space Link Provider
 - Architecture based on scaled-down IOTP for trading and COPS-PR/DiffServ for provisioning
 - Simulation with modified ns-2 validated the concept
- Development on-going, ready end 2002
 - implementation with Linux DiffServ in a commercial IP/DVB gateway



QoS - architecture





QoS and bandwidth on demand

- ITT “Integrated resource and QoS management for DVB-RCS Networks”
 - contract being placed, running 2003
 - investigating needs for standardisation and further prototyping
 - study integration of terrestrial practices for provisioning QoS with satellite domain
 - recommending improvements in terrestrial and satellite access protocols
 - contribution to ETSI standardisation



IPv6

- Protocols aspects
 - new schemes for encapsulation
 - evolution of MPE
 - impacts on the architecture
- Participation to large scale trials
 - provision of a satellite component of a terrestrial IPv6 network
- Two activities to be launched in 2003



DVB-RCS

- o DVB-RCS Evolution
 - low-rate DVB-RCS terminals
 - interoperability
 - standard extensions for mesh configuration



MicroTerminals

- o Mobile K_u -band terminals for mobile broadcast applications
 - tracking antenna based on patch electronic
 - near real-time data casting dedicated to mobile users
 - take advantage of reduced price of bandwidth due to extension of satellite utilisation time
 - interleaving, coding and caching techniques to provide adequate service quality



MicroTerminals - Mobile Ku-Band Terminal

- o Two feasibility studies run 2002
 - ND Satcom
 - Alcatel Space Industries
- o Developments planned 2003/04
 - antenna for mobile rx terminals
 - terminal and gateway modules



Interference and Fading Mitigation Techniques

- Adaptive coding and modulation schemes
 - optimising the system capacity in the presence of location-dependent interference
 - fixed link margins are power inefficient
- Two parallel studies on-going
 - IFMT analysis and design
 - simulator definition, development + testing
- Development of an ACM modem demonstrator (2003)



On Board Processing

- ESA support for OBP payloads
 - initiatives from Alcatel, Alenia, Astrium
 - DVB -based
 - implementation of regenerative payloads
 - key components development (ASIC's)
 - Alcatel Espacio flight opportunity on AMHERIS
 - launch 2004
 - MPE switching payload (4 spot beams)