Internet Traffic Evaluation for Satellite Networks

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The Broadband Integrated Satellite Network Traffic Evaluation (BISANTE) is a European ESPRIT project. The objective is to develop a simulation methodology and framework with a prototype workbench. This paper focuses on the network modelling aspects of BISANTE.
Integration of BISANTE Traffic Models

OPNET Traffic Model
- Interface: TPAL
- Process Model: 3
- Library: 0
- External Files: 4

BISANTE Traffic Model
- Interface: TPAL
- Process Model: 1
- Library: 1
- External Files: 0
GEO Satellite Network – NASA’s ACTS

GEO Satellite (ACTS)

768Kbps

768Kbps

Client
10M Ethernet Hub
Cisco 2514
Packet Capture

Server
10M Ethernet Hub
Cisco 2514
GEO Satellite Network – NASA's ACTS
GEO Satellite Model Validation

FTP - Measurement vs. Simulation

Compare with NASA’s Measurements

File Size (KBytes)

Throughput (KBytes)

NASA
SURREY
HTTP over GEO Satellites

Client HTTP Page Response Time (sec)

- Satellite
- Terrestrial
LEO Satellite Networks
LEO Satellite Model Validation

Compare with Published Simulation Results
LEO Satellite Model Validation

Further Validated by STK

Integration of Satellite & Terrestrial Models

SIU- Satellite Interface Unit

Statistics from Integrated Network Models

FTP Response Time

Scenario-1: by Satellites
Scenario-2: by PPP Link
Scenario-3: by LAN

Delay Variation of the LEO Satellite Networks
Conclusions

- This paper focuses on the networking aspect, where satellite network modelling includes satellite constellations, network modules and protocol architectures.
- The simulation validation scenarios and results are presented.
- The results produced at the network level show the performance of FTP and HTTP over GEO and LEO satellite constellations.
- Simulation scenarios can be useful for network dimensioning and traffic management.