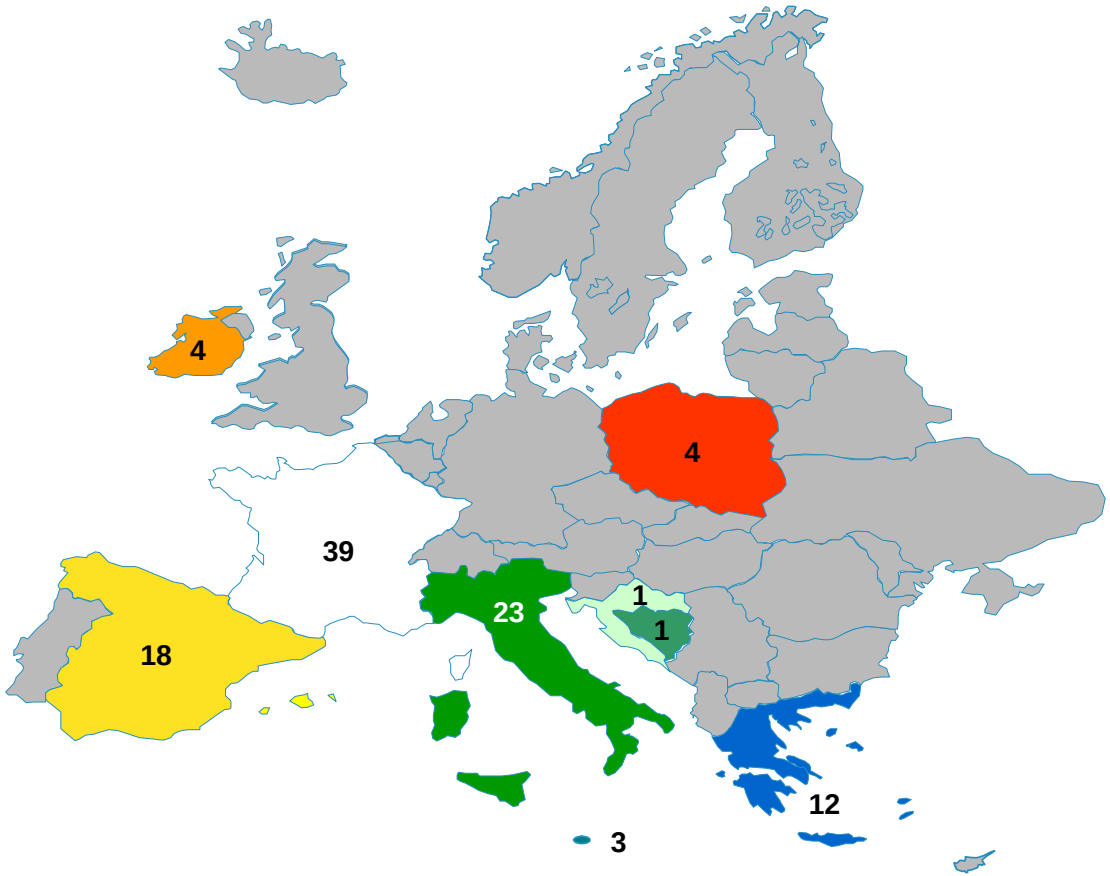
Key results of the TWISTER EC Project

TWISTER key elements

- Three-year programme started on 1 February 2004 and finalised on 30 april 2007
- Astrium coordinator of a consortium of 13 partners
- Overall budget of 8,5 M€, of which 5 M€ funded by the EC under the 6th Framework Programme
- TWISTER deployed and operated validation sites in rural areas throughout Europe combining bidirectional satellite broadband services with wireless local networks
- Target application areas: in the domains of agriculture, education, community services, health care and e-business

Hybrid network deployment



COUNTRY	SAP	LOCAL LOOPS	END USERS
France	39	15	249
Italy	23	23	161
Spain	18	18	346
Greece	12	2	81
Poland	4	4	25
Ireland	4	4	40
Malta	3	1	25
Bosnia	1	1	10
Croatia	1	1	1
Total	**105**	**69**	**938**

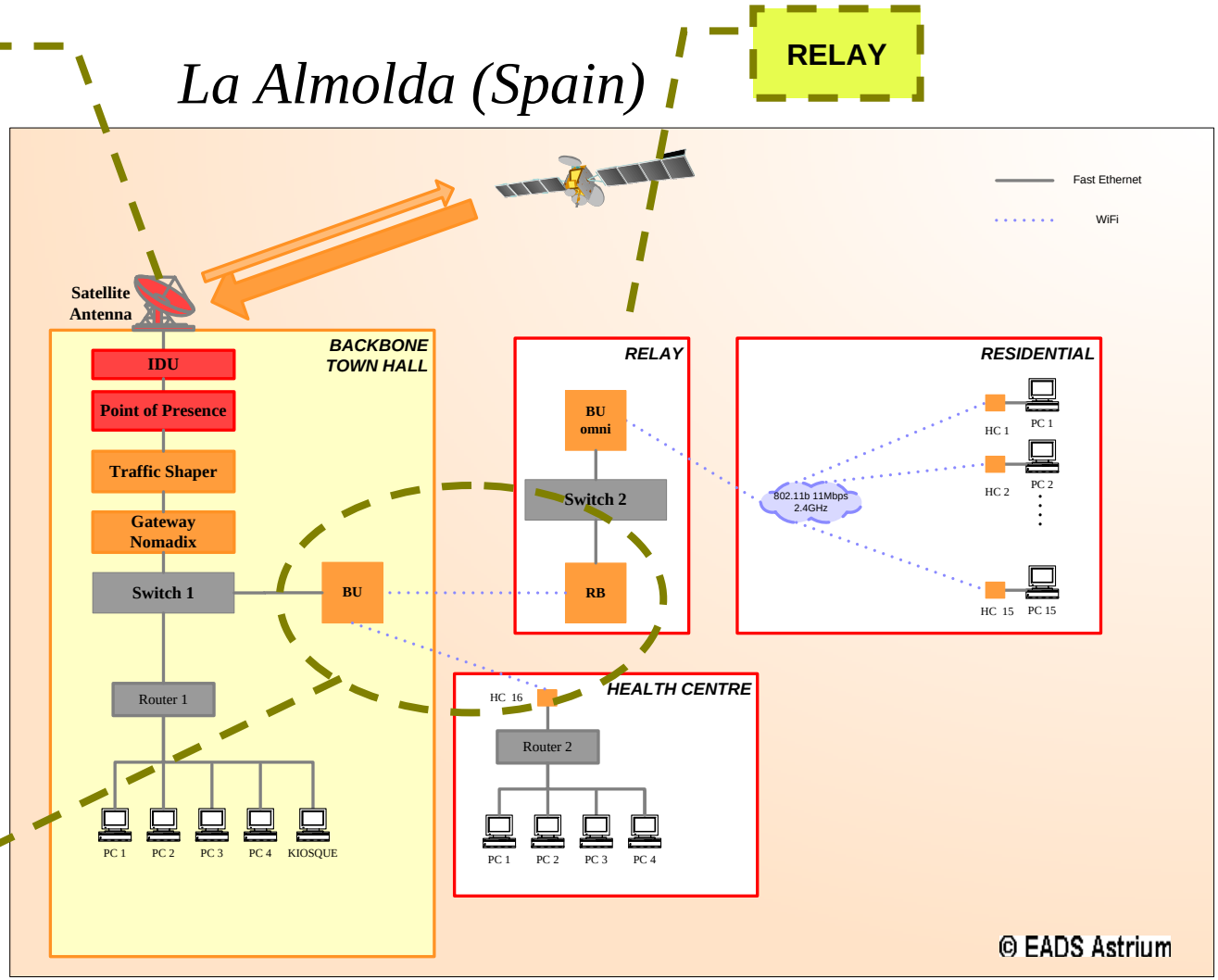
TWISTER Project has deployed 105 satellite access points in 9 countries which have been used by nearly 1000 users

Example satellite-wireless network

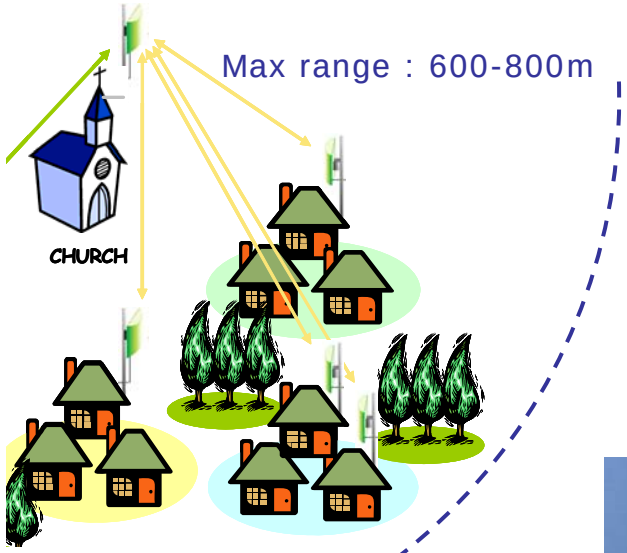
Two-way broadband satellite Internet access:

- Connection of local public institutions: town hall, library, cultural centre, etc.
- Connection of local SME or craftworkers
- Connection of a large number of residential users

Outdoor point to multipoint wireless connectivity

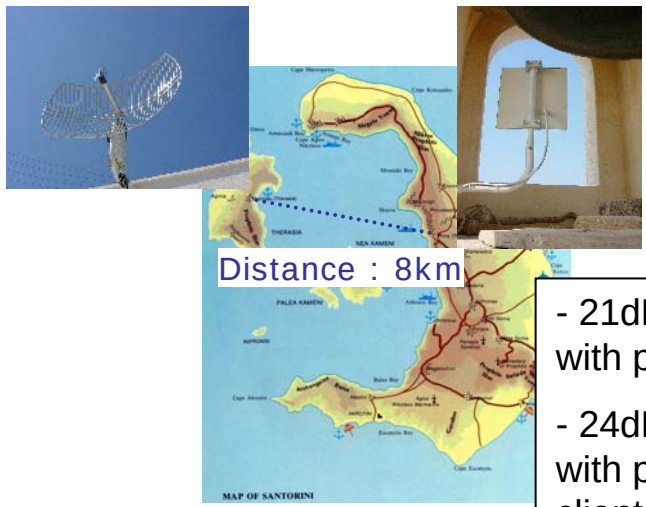


Typical Achieved Distances



- 8dBi omnidirectional antenna with professional wireless AP
- 6dBi outdoor patch antenna with home connect devices

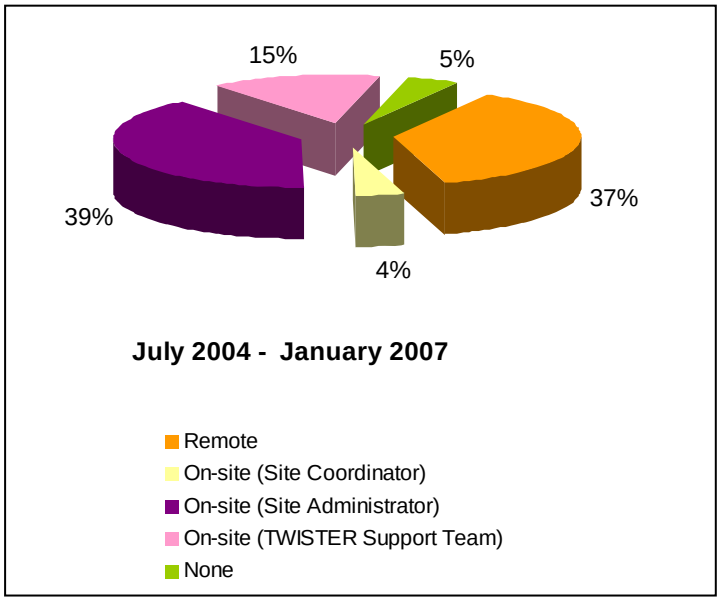
2 professional wireless bridge devices with 16dBi integrated directional antennas

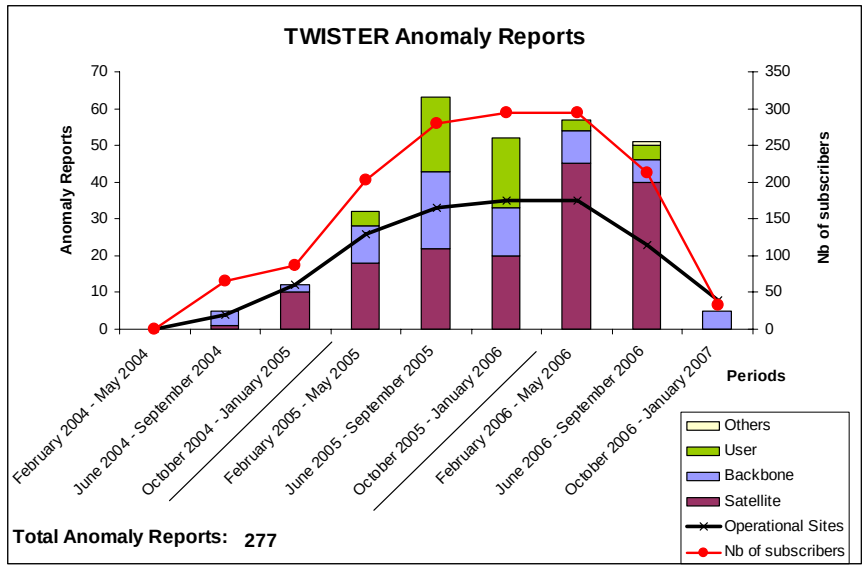


- 21dBi directional antenna with professional wireless AP
- 24dBi directional antenna with professional wireless client

Network reliability evaluation

- Overall hybrid network operations has reached maturity but critical points have been the reliability and stability of some satellite equipment components
- QoS is the cornerstone of hybrid solution operation
- Supervision is a mandatory tool





- 37% of problems have been resolved remotely through supervision system
- 39% of problems have been resolved by local intervention of trained administrator with basic IT knowledge ➔ importance of transfer of expertise to local organisation
- Only 15% of problems required on-site intervention of professional

Network usage evaluation: methodology

- Maximum and average **data rates** for incoming and outgoing traffic, globally and per IP address
- **Volume** of downloaded and uploaded data per month, globally and per IP address
- **Top users**: monthly connections and usage in Kbytes
- **Typical** daily / weekly **usage profiles**

Satellite service provider

- Total uploaded and downloaded data volume **per user** for a given month
- Total connection time and number of sessions **per user** for a given month

AAA service provider

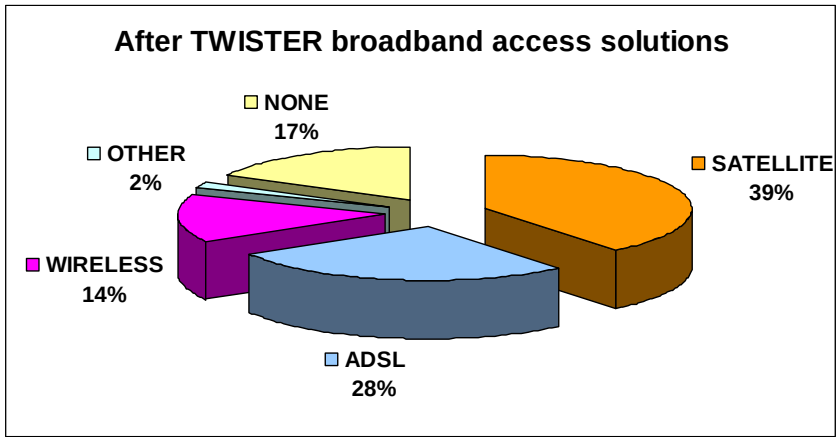
- The bandwidth data rate (in and out) per day
- The **bandwidth distribution** per user
- The **protocol distribution** per month

QoS Equipment

TWISTER project has acquired an extensive database on the usage and performance of the validation sites over a period of more than 2 years.

After-TWISTER

- 39% of sites continue with satellite broadband internet access
- In addition, 14% of sites have kept the wireless local loop which is now connected to the internet backbone via wireless backhauling



- Transfer of sites to a commercial operator
  - Design and installations included the necessary tools (supervision, accounting, etc.) to facilitate such a transfer
  - Partnerships have been made with regional and national operators in the different european countries
  - Integration of satellite into services offering of terrestrial wireless network providers

Conclusions & recommendations: a satellite solution directly to the residential user

- Twister Lessons Learned
  - Installation fee (1000 €), equipment cost (1800 €) and services costs (starting from 280 €/month for 512 kbps/256 kbps) considered too high by end-users
  - The individual user is not targeted as a market ➔ no marketing & commercialisation effort

- Recommendations
  - Study and validate auto-installation procedure to reduce installation costs
  - Define residential satellite offer i.e. with increased contention ratios on the satellite link
  - Partnerships with terrestrial operators for marketing & commercialisation
  - Improve web browsing performance
  - Study and validate a combined TV/internet offering (through twin LNB)

Conclusions & recommendations: an alternative solution to terrestrial networks

- Context
  - ADSL is deploying very fast in EU 27 although coverage in rural areas will be much lower than in urban areas
  - Wimax is an emerging technology strongly pushed by Local Authorities for covering rural areas
- Twister Lessons Learned
  - Deployment plans & performance upgrades by terrestrial operators make users & public authorities postpone decisions to deploy (alternative) broadband solutions
  - Hybrid satellite-wireless solution immediately available as transition until terrestrial broadband arrives
  - Transition period depends on attractiveness of the site
- Recommendations
  - Operations cost (OPEX): Availability of flexible services offer, for instance in terms of subscription duration i.e. x months minimum extendable per y months.
  - Investment cost (CAPEX) Anticipate migration from satellite backhauling to terrestrial backhauling

Conclusions & recommendations: how to obtain cost effective solutions ?

- Twister Lessons Learned
  - Cost of wireless infrastructure is important but is not considered as a barrier. New EU regional policy enable the use of Structural Funds to finance infrastructure
  - Cost of satellite terminal and service is considered too high
- Recommendations
  - Reduction of installation & maintenance costs through use of **local technicians**
  - Reduction of maintenance costs through improved reliability
  - Reduced cost per MHz for satellite bandwidth:DVB-S2, multi-beam, Ka
  - Foster satellite broadband initiatives to create real competition on the provisioning of bandwidth
  - Mix of professional/institutional (working hours) and residential (evening) users to optimise)
  - Public organisations to buy satellite ressources in bulk
  - Tax incentives for users i.e. reimbursement of cost of equipment/service
  - Requisition of non used bandwidth to be made available to socially disadvantaged groups in the context of public service obligation

Astrium's Objectives & Strategy

- Global objective: to increase the use of satellite with the best practices to push the creation of a new european satellite programme -the *offer* - in order to satisfy the *demand*
- Astrium actions
  - **Regional** Competitivity Pole in Midi-Pyrénées region on the use of satellite technology to improve broadband connectivity, security, GMES, navigation
  - **European**
    - FP6 (TWISTER, Rural Wings, Wisecom, TANGO)
    - Preparation of FP7: strategic axes of development, creation of partnerships
    - Participation to ISI, Contribution to ESOA
    - Aim to extend cooperation initiatives in Eastern European & Balkan countries
  - **International**
    - INCO: NetAdded
    - Aim to expand cooperation initiatives in Africa, South-America

RURAL WINGS PROJECT

- Four-year FP6 IP programme started in January 2006.
- The consortium gathers 24 partners from 15 countries. The coordinator of the project is the Institute of Communication and Computer Systems in Athens
- The project aims at providing broadband services for tele-education applications to rural and isolated areas. The e-learning system is based on a common access platform offering e-applications and e-tools.
- Astrium acts as technical coordinator providing technical support for the deployment of the 126 pilot sites in more than 10 countries.

TANGO « Telecommunications Advanced Networks for GMES Operations » project

- TANGO in brief :
  - EC FP6 IP project, 36 months programme, started 01/11/06
  - Project focussing on the use of SATCOM solutions to serve the needs of the GMES community
  - 24 partners from 12 European countries; 8.9 M€ budget co-funded by EC.
- TANGO objectives
  - **Enhance GMES services**: define, adapt, provide services of enhanced satellite telecommunications solutions for data collection, data transport, data dissemination (inc. early warning) and Adhoc networking
  - **Develop the Common Telecommunications Services Platform**: facilitate GMES service providers access to satellite telecommunications services
  - **Support GMES community through demonstrations integrating SATCOM** in maritime and emergency response core services including humanitarian aid and security and crisis

Visit www.teladnetgo.eu

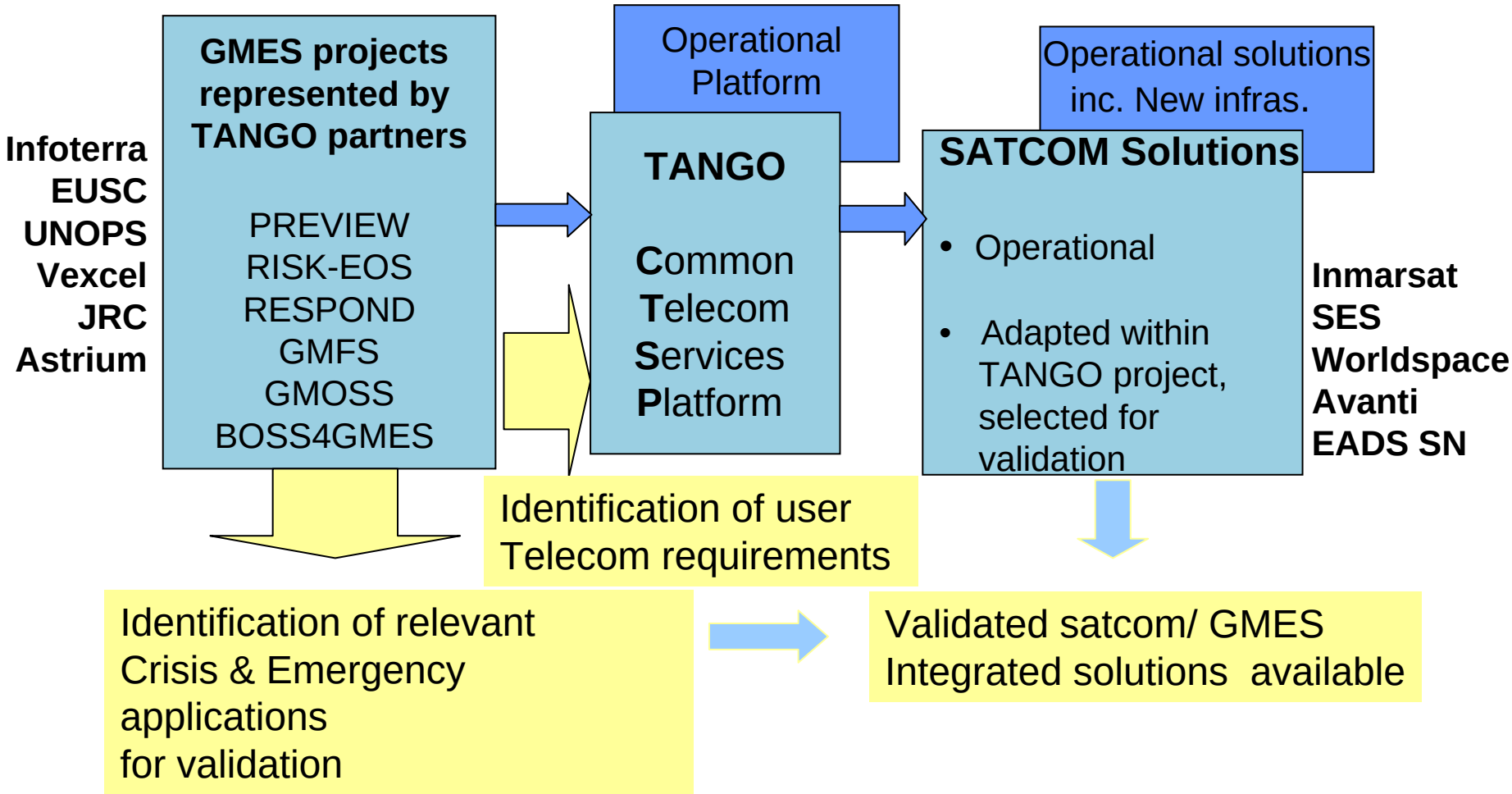
TANGO crosslinks with GMES and GSE projects

Crosslinks with GMES IP and GSE for integration of telecommunications services within GMES platforms through TANGO partners

Risks & crisis Management	Oceans	Fisheries Monitoring	Maritime Surveillance	Landcover	Atmosphere	Humanitarian Aid
PREVIEW RISK EOS ASTRO+	MERSEA MARCOAST	IMPAST DECLIMS SHEEL MARISS	EMSI LIMES MARISS	GEOLAND	GEMS	RESPOND GMFS GMOSS

Identified GMES and GMES Services Element projects for each Tango Thematic

TANGO contribution to emergency core services



TANGO contribution to emergency core services

TANGO provides adaptation, integration & validation of a combination of telecom means in particular for emergency response (risk & crisis and humanitarian aid)

- **Complements and close links to GMES projects**
  - Telecom integrated in GMES architecture (data dissimination to users)
  - Privileged access to these means (telecommunications platform)
- **Early warning service implementation**
  - Operational services (SES, Worldspace…) adapted to the GMES needs (return link for acknowledgement, alerting applications)
- **Complement GMES services with on-the-field interactive mapping (light mobile terminals)**
- **On-the field telecom solution deployment (adhoc networking)**
  - Local loop combined with satellite
  - Adapted to users needs through user integration (civil protections, NGOs) within the requirements and validation processes

TANGO contribution to Very Urgent Service implementation

TANGO telecommunications solutions contribute to the quasi-real time access to the information

- **Inclusion of the optical data relay telecom links in GMES architecture**
  - HAPS, UAVs & Earth Observation satellites (inc.Sentinel)
  - GMES data collection & broadcast (inc. Senson command)

- **Data relay supports to security applications** both on maritime surveillance & risk and crisis management (involved partners: Infoterra, EUSC, JRC)

- **Benefits of optical data relay** will be demonstrated in TANGO on GMES applications, including through activation of « International Charter on Space and Major Disasters ».

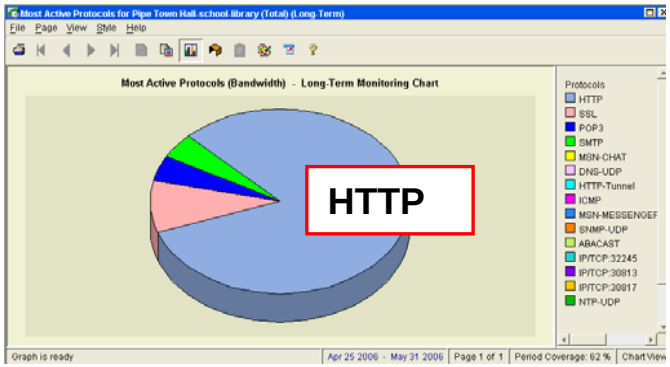
Conclusions

- Satellite Telecommunications will be a key component of future GMES architecture:
  - Faster and optimised data collection to enhance reactivity of GMES service providers
  - Dissemination of products wherever and whenever it is needed
  - Better service quality thanks to higher volume and data rates
- TANGO targets
  - Facilitate the GMES service providers access to operational telecommunications means
  - Prepare the definition of optimised infrastructure to serve also future GMES needs

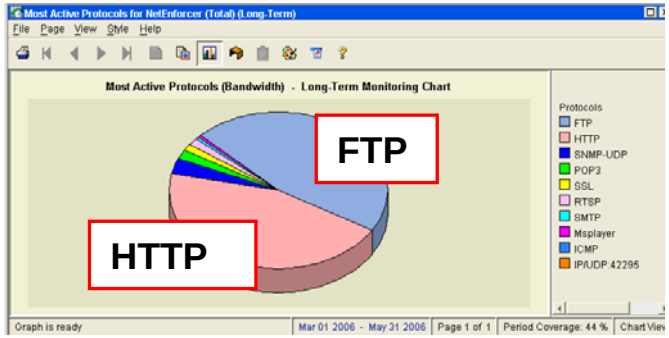
Thank you for your attention!

Network usage evaluation: protocols

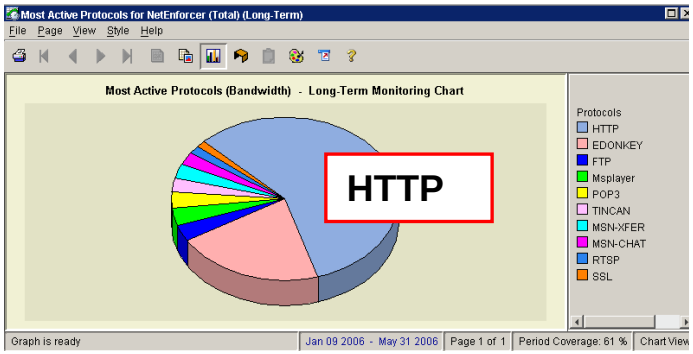
- **Institutional profile:** HTTP + SSL + POP3/SMTP



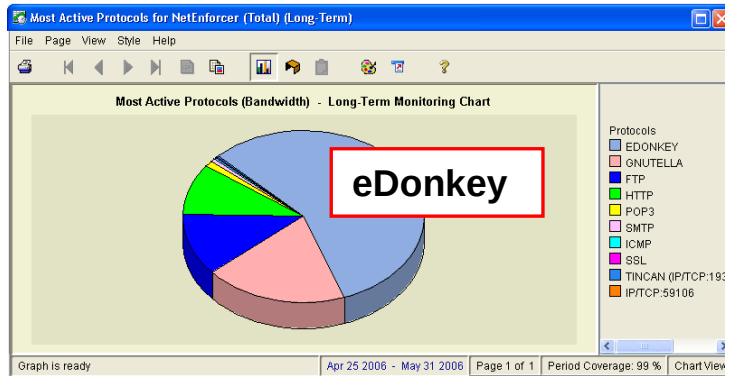
- **Professional profile:** HTTP + FTP



- **Standard residential profile:** HTTP + EDONKEY + FTP + RTSP + Msplayer

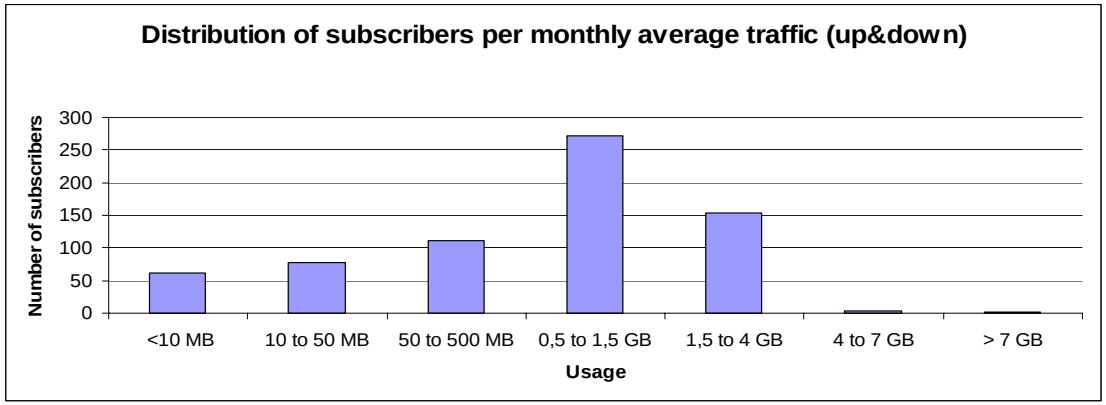


- **Peer to Peer residential profile:** EDONKEY + GNUTELLA + FTP + HTTP



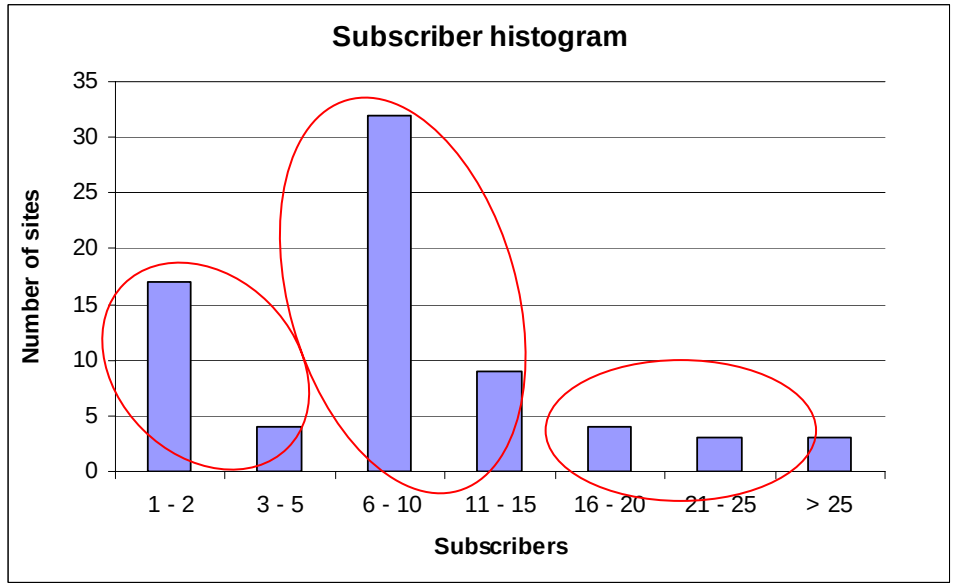
P2P should not be blocked but managed

Network usage evalution: subscriber profile



Average usage:
1 GB/month/subscriber

- TWISTER facts:
  - 1 SAP = 2 Mbps/512 kbps
  - between 1 and 50 subscribers per SAP
  - Average no of subscribers per SAP=8
- Recommendations
  - Upto 20 subscribers possible



TANGO consortium

A consortium of 24 partners representative of the entire value chain