

# EUMETSAT EXPERIENCE WITH MULTICAST ACROSS GÉANT



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# OVERVIEW

- **EUMETSAT**
- **Background**
- **WAN links**
- **Multicast accross GÉANT infrastructure**
- **Summary of Experience**

# EUMETSAT is an intergovernmental organisation with 29 Member and 2 Cooperating States

## Member States



AUSTRIA



BELGIUM



CROATIA



CZECH REPUBLIC



DENMARK



ESTONIA



FINLAND



FRANCE



GERMANY



GREECE



HUNGARY



ICELAND



IRELAND



ITALY



LATVIA



LITHUANIA



LUXEMBOURG



NETHERLANDS



NORWAY



POLAND



PORTUGAL



ROMANIA



SLOVAK  
REPUBLIC



SLOVENIA



SPAIN



SWEDEN



SWISS



TURKEY



UNITED KINGDOM

## Cooperating States



BULGARIA



SERBIA



# EUMETSAT's mission

- The primary objective is to establish, maintain and exploit European operational meteorological satellite systems, taking into account as far as possible the recommendations of WMO
- A further objective is to contribute to operational climate monitoring and detection of global climatic changes
- Through fulfilling these objectives, contribute to environmental monitoring, where interactions with the ocean and the atmosphere are involved

# EUMETSAT's mission

- Deliver cost effective operational satellite data and products that satisfy the meteorological and climate data requirements of its Member States
- 24 hours a day, 365 days a year, over decades
- Encourage the maximum use of EUMETSAT data and products



# EUMETSAT strategy: the vision

- Be the leading user-governed operational agency for European Earth observation satellite programmes that are consistent with the objectives of the Convention
- In this area, be a trusted global partner for the provision of satellite data from geostationary and low-Earth orbits

EUMETSAT mission statement represents a commitment to actively deliver data to users, 24/7, 365 days a year.



## **EUMETSAT requires terrestrial WAN links for:**

- Data acquisition from EUMETSAT Ground stations
- Exchange of data with world wide distributed bi-lateral partners



# EUMETSAT PERSPECTIVES ON THE USE OF GÉANT

- Using existing European Infrastructure in a cost efficient way
- Buildup of a strong relationship with a European Infrastructure provider
- Enhance existing connectivity by the addition of GÉANT based links
- Exploring and enhancing knowledge in the area of multicast accross terrestrial links

# DATA ACQUISITION FROM GROUND STATIONS

## Operational implementation of redundant links between:

- Svalbard and EUMETSAT HQ (2011)
- Fucino and EUMETSAT HQ (2011)

Operational usage of GÉANT based network links as backup to the prime connections



Meteosat antenna  
Usingen, Germany



Meteosat antenna  
Fucino, Italy



Metop antenna  
Spitzbergen, Norway



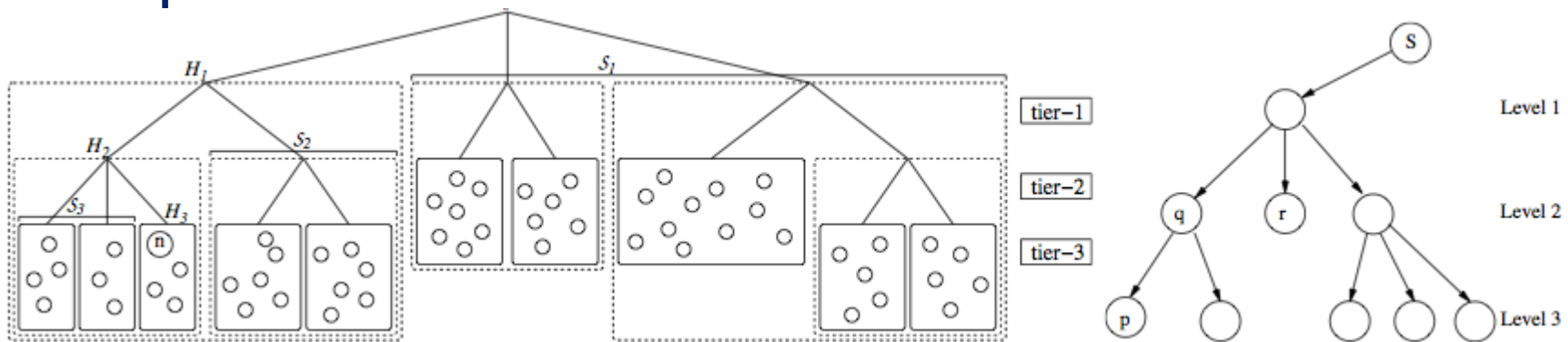
Jason antenna  
Usingen, Germany

# DATA EXCHANGE WITH BI-LATERAL PARTNERS

- Data exchange in the context of bi-lateral agreements
- In support to WMO and CGMS activities
- Partners are located world wide
  - Europe
  - Asia Pacific
  - United States
  - South America
- Typically the same set of initial data is required by each, therefore the need to explore terrestrial multicast

# MULTICAST AS THE SOLUTION TO SCALABLE DISSEMINATION

- Same data to many users
- Highly scalable solution for data providers as well as data recipients
- All users receive the same service
- Avoids unnecessary data duplication or replication
- Terrestrial multicast is based on a client initiated subscription



- EUMETSAT has many years of experience in multicast

# MULTICAST ACCROSS GÉANT and NREN INFRASTRUCTURE

**Exploring the multicast usage on GÉANT infrastructure in Europe and their connectivity worldwide;**

- 2011 Proof of concept on terrestrial multicast on GÉANT testbed
- 2012 3 month feasibility study on terrestrial multicast via GÉANT
- 2013 Multicast test to Korea via GÉANT
- 2014 Two year prototype emulating operational scenarios of multicast accross GÉANT and NREN infrastructure (contract setup in final steps).
- 2014 Multicast test to US via GÉANT

# TWO YEAR PROTOTYPE

- It is important to gather the relevant expertise of multicast via terrestrial networks in order to make qualified recommendations for the future;
- The use of multicast is considered beneficial for a harmonisation of existing data delivery mechanisms;
- Based on the positive experiences gathered during the 2012 feasibility study an extended prototype of a terrestrial multicast component based on GÉANT was initiated;
- Datasets that need to reach many (more than 10) users but do not require a full broadcast;
- Users in this context are organisations or institutes that would otherwise obtain the data via Internet-kind services;
- Datasets that are to be transported outside Europe for the purpose of data provision to EUMETSAT partners.

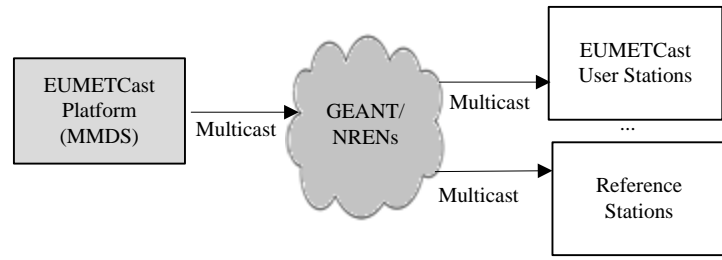
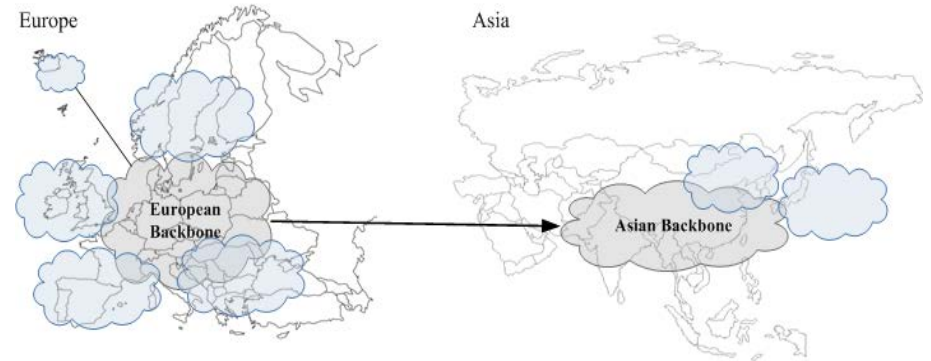
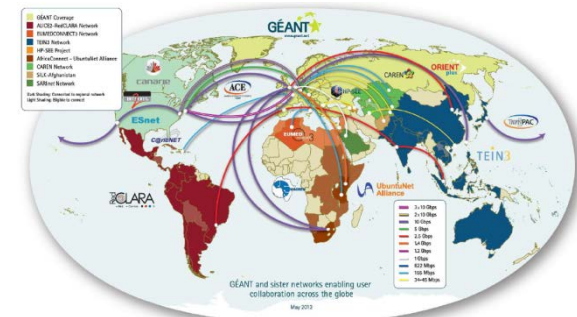
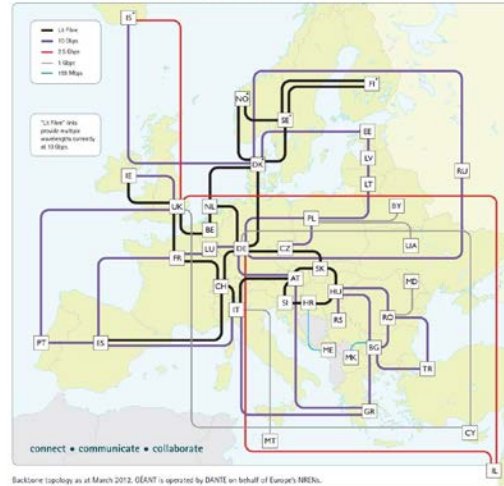
# TWO YEAR PROTOTYPE II

- Re-cap: What is terrestrial multicast via GÉANT intended for?
- Typically large volume datasets that do not require a stringent SLA;
- The prototype operation over a time frame of two years will allow an in depth analysis of terrestrial multicast and the related user needs;
- It is planned to connect app. 5-7 European sites to the prototype including a multicast connection to Asia (Korea) and the US;



# Concept I

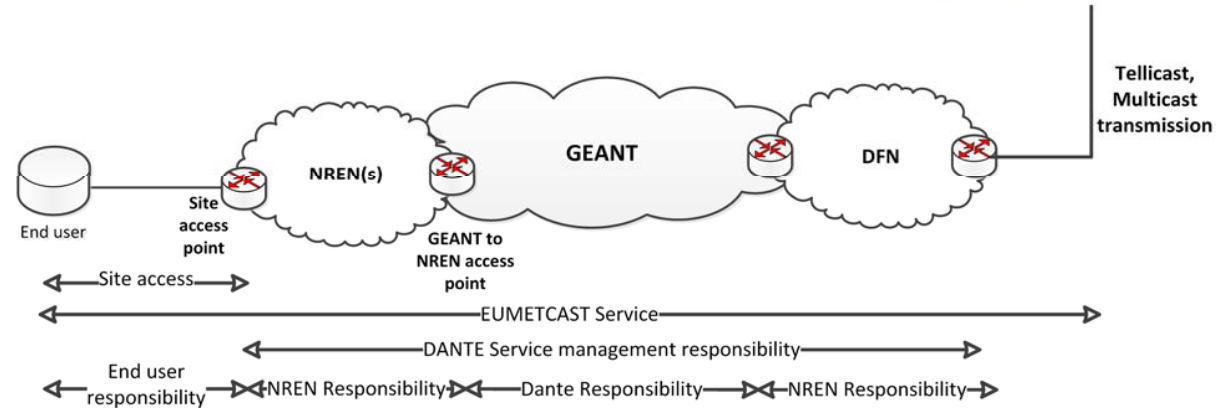
- Usage of GÉANT infrastructure in Europe and their connectivity worldwide;
- To setup a network infrastructure that enables test sites to connect to the terrestrial multicast dissemination;
- The terrestrial multicast is still considered a prototype;
- The central multicast platform will multicast via the connected NRENs and the GÉANT infrastructure to standard EUMETCast reception stations.





# Concept II

- The key element of the concept is to **enable access** to terrestrial prototype dissemination using **a Service Contract with DANTE**;
- DANTE will perform the necessary management tasks in the cooperation between NRENs and DANTE covering:
  - A) Technical aspects
    - **Enabling** of multicast in the NRENs;
    - Networklevel monitoring;
    - Support during acceptance testing;



B) Service interactions between EUMETSAT, DANTE and NREN Network Operations Centres;

C) Anomalies and Enhancements coordination.

# Concept III

## Characteristics

- European wide multicast dissemination of data volumes of up to 100 Mbit/s per logical service. Multiple services are possible;
- SSM Multicast Mode with IGMP V3
- Usage of standard EUMETCast reception station;
- Monitoring of the multicast capability of each NREN using dbeacons;
- Monitoring of the availability of the EUMETCast announcement channel up to each Site access point;
- Usage of several reference stations (ideally one per country) for a closed-loop monitoring of the overall service;
- Monitoring of data completeness;
- Escalation scheme in case of outages.

## Management

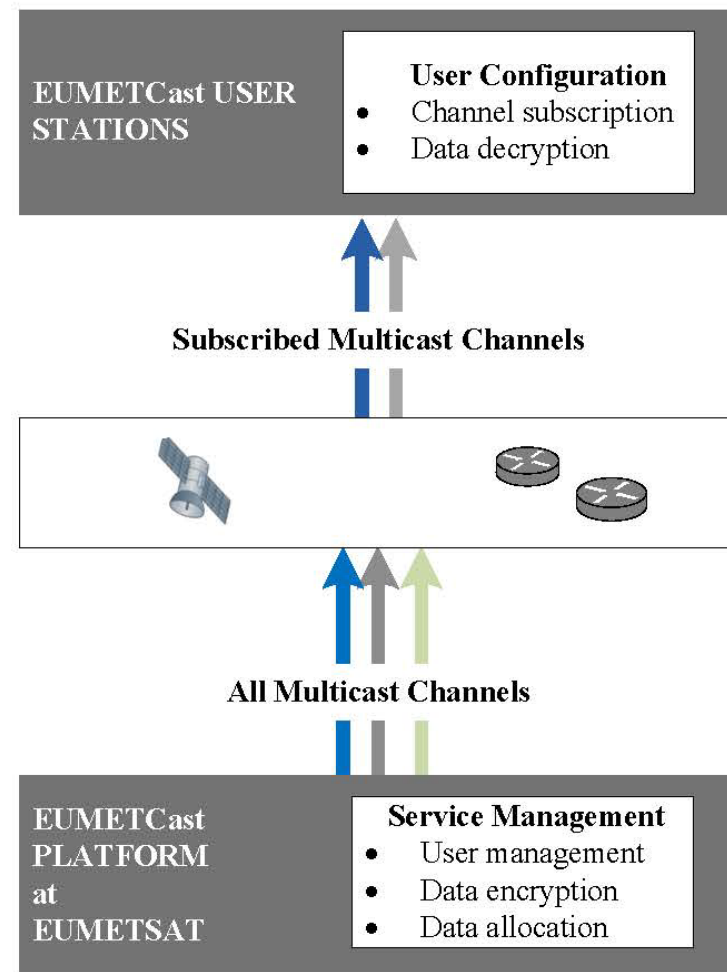
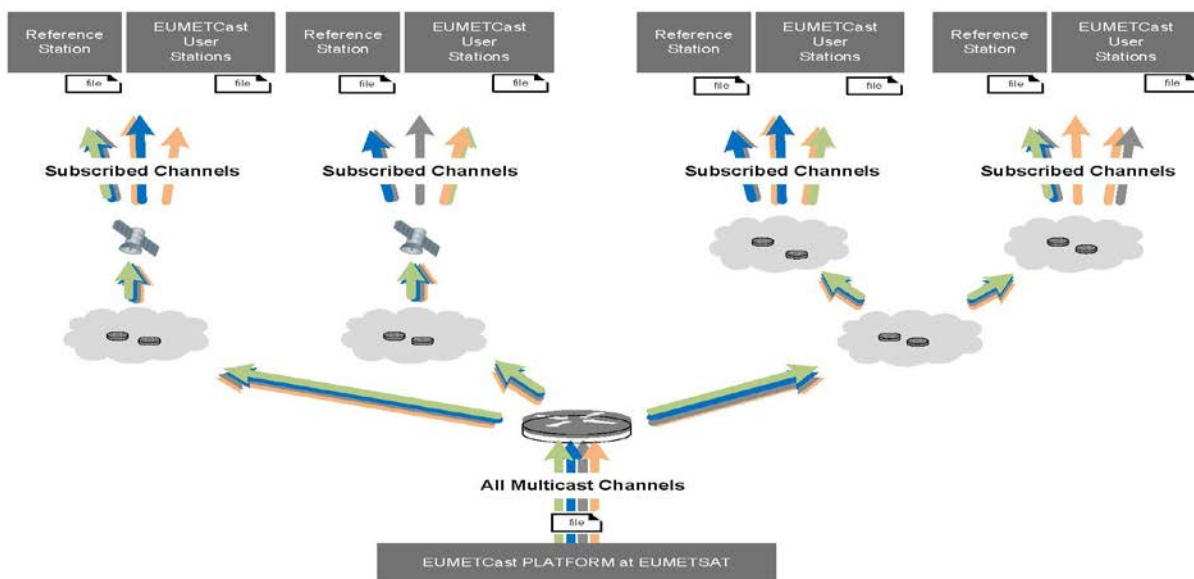
- Standard user management;
- Data contents as currently typically requested by the bi-lateral and cooperation partners.

## Constraints

- Access for public-sector non-profit sites only;
- Not all NRENs might support multicast;
- No guaranteed service level;
- Timeliness cannot be guaranteed;
- It is a realistic goal to achieve data completeness (via multicast configuration parameters) but it cannot be formally guaranteed;
- Volumes beyond 100Mbit/s have not been tested yet.

# OPPORTUNITY FOR HARMONISED DISSEMINATION MEANS AND USER INTERFACE

- Dissemination means are transparent to the user
  - Same reception station
  - Same transport software
  - Same level of data security
- Same user management
- Same data management
- Harmonised subscription model



# Implementation plan and schedule

- Service contract was signed March 2014 with an initial duration of 2 years, several options and extensions can be exercised if required;
- The implementation will have 4 phases:
  - Phase I: Ready all NRENs for multicast; Start: Q2 2014;
  - Phase II: Setup an “initial core network” with the help of the volunteering prototype sites; Start: Q3 2014;
  - Phase III: Perform tuning activities on network and also on application level until a satisfactory overall service has been reached within the initial core network; Start: Q4 2014;
  - Phase IV: Debrief on prototype dissemination to EUMETSAT Member States Spring 2015 delegate bodies;
- There is no commitment as yet whether to operate this terrestrial multicast operationally.

# TIMELINE SUMMARY

- **2009:** Analysis of GÉANT portfolio and high level meeting with EC
- **2011:** Prove of concept using GÉANT testbed
- **2011-2012:** Operational implementation of GÉANT based Ground Station links
- **2012:** Feasibility study of multicast accross GÉANT and NREN infrastructure
- **2013:** Multicast test via GÉANT to Korea
- **2014 (Q3):** Multicast test via GÉANT to United States
- **2014 (Q4):** Two year prototype emulating operational scenarios of multicast accross GÉANT and NREN infrastructure

# SUMMARY OF EXPERIENCE

- **Highly positive overall experience**
- **Scalable GÉANT infrastructure**
- **Positive experience of multicast dissemination across WAN**
- **Single point of contact for interaction**
- **Strong partner and with strong expertise to support wider-scale prototyping activities**
- **Allows seamless integration of solutions in addition to existing capabilities**

## Q & A