HMA at EUSC

Network requirements

Requirements are separated in four categories which are related to these four main issues of the system:

- Traffic characteristics and performance requirements.
- Space segment (coverage, commercial frequency bands, etc.).
- Terrestrial segment and networking requirements.
- Other relevant considerations.

Traffic characteristics and performance requirements

Image features

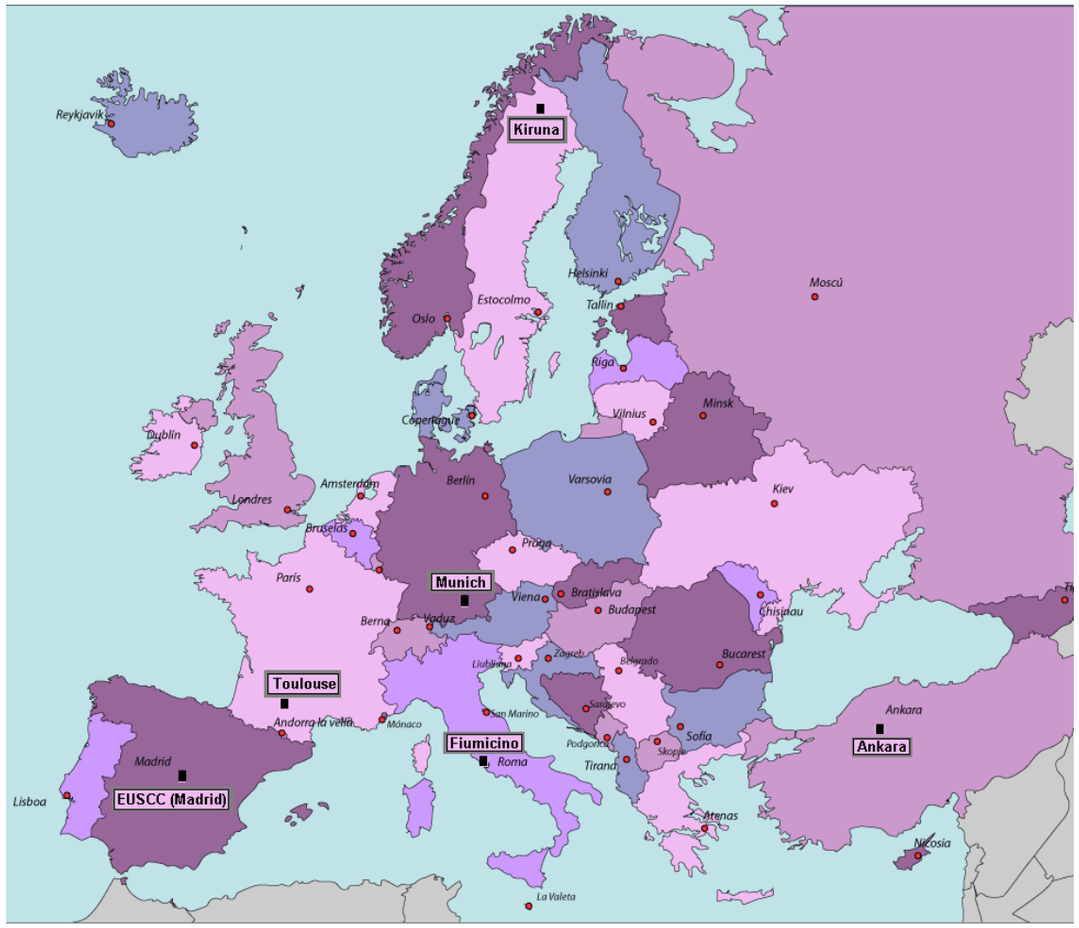
The system will work with high quality images (high resolution images) so it will suppose high weight files. Estimates for weight of the files are:

a. Minimum: 512 Mbytes
b. Maximum: 1,2 – 1.5 GBytes
c. Average size: 700 Mbytes

Transmission requirements

1. Number of images per year: 600 (*average value*)
2. Number of images per day:
   a. Average traffic: 2 images per day (2,5 - 3 GBytes per day)
   b. Maximum traffic: 5 images per day or 5 GBytes per day.
3. Time for transmission:
   a. Maximum time for complete operation: 4 hours (*from the request of the image*)
   b. Maximum delay for transmission from start to end of it: 2 hours
   c. Urgent transmission: 45 minutes (*30% of images are requested under urgent conditions*)
4. Security of the transmission:
   a. It is not necessary additional encryption for the images, although it could be an added value for the satellite communications network
5. The system should be able to exchange images from any point of the network to any other point, sharing the space segment. Currently there are 6 points within this network, however the bidder may provide solutions for a and f only and a multiplicity of combinations with the rest of sites, which are:
   a. Kiruna (Sweden)
   b. Toulouse (France)
   c. Fucino (Italy)
   d. Munich (Germany)
   e. Ankara (Turkey)
   f. EUSC (Spain)

6 Centers involved



Capacity requirements preliminary analysis

- **Scenario 1**: In this scenario we should consider the worst situation that would suppose the weightier image (1,2 – 1.5 GB), being transmitted urgently (<45 minutes), the **minimum bit rate** to meet these requirements in this situation would be of **≈ 4,5 Mbps**.
- **Scenario 2**: Average situation can be defined as the transmission of the average image size (700 MB), in average time (≈ 80 minutes). The bit rate to meet these requirements in this scenario would be of **≈ 1,2 Mbps**.
- **Scenario 3**. Smaller image size (512 MB) transmitted in the maximum time permitted for transmission (120 minutes), will offer the lower bit rate valid for the system, which is **≈ 560 kbps.**

Consequently, the bit rate requirements for the communications network should vary from a minimum of 560 Kbps to a maximum of 4.5 Mbps

Space segment

The most important point when deciding about space segment is the earth coverage (geographical footprint). As can be seen in previous map, there are strong requirements to cover West-East Europe (Spain, Turkey), and North-South Europe (North Sweden, Italy).

This brings to the nominal scenario, where the space segment would require a pan-European satellite system, or alternatively, the use of two national-regional satellite systems.

Ground segment

The requirements for the ground segment are very crucial elements as they impact on the cost of the overall satellite communications network. There are no a-priori requirements or legacy earth stations which would imply any added compatibility requirement. There are some earth stations already working in fixed point-to-point transmissions (EUSC, ESRIN), which could be reused partially at the time of implementing the overall network.

In principle, both options:

- point to point connections in a meshed network with an ad-hoc management system under the EUSC control, and
- star network supported by a Hub station, managing the access to the space segment (ex: DVB-RCS based network)

are studied.