

**Report on the R&D situation of space communication
technologies in Europe (Summary)**

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NICT Europe Center

General Summary

Part 1 the satellite communication business using high frequency bands (especially Ka-band) and the trends of the satellite communication R&D of European satellite communication operators

SES (Luxemburg, founded in 1985)

- SES operates all in all 53 geostationary satellites .
- By the end of 2017, SES will launch 7 satellites, including three high throughput satellites (HTS), SES-12, SES-14 and SES-15. These HTS using Ku-band will provide the global coverage.
- SES owns 45% of O3b Networks.

O3b Networks (Jersey, The Channel Islands, UK, founded in 2007)

- In 2005, Greg Wyler, founder of OneWeb, conceived a project to provide a nationwide telephone service in Rwanda. In 2007, he and a small group of investors including Google founded O3b Networks. O3b and its industrial partners developed a Medium-Earth-Orbit (MEO) constellation to provide a high-speed broadband connectivity for remote, under-developed and unstable regions such as Rwanda.
- O3b operates twelve HTS using Ka-band.
- O3b's Medium-Earth-Orbit (MEO) satellites operate 8,062km away from Earth. As a result, data transmission time is reduced to less than 150 milliseconds.

EUTELSAT (France, founded in 1977)

- EUTELSAT operates all in all 38 communications satellites
- EUTELSAT operates KA-SAT (HTS using Ka-band, launched in December 2010), EUTELSAT 25B (using Ku and Ka-band, launched in August 2013. It's not HTS) and EUTELSAT 3B (HTS using C, Ku and Ka-band, launched in May 2014). It will launch EUTELSAT 36C (HTS using Ku-band) in December 2015, EUTELSAT 65W (HTS using Ku and C band) in 2016 and BB4A (BroadBand For Africa : HTS) in 2019.
- In July 2015, through the ARTES programme 33 of The European Space Agency (ESA), EUTELSAT enter into a public-private partnership (PPP) with ESA and Airbus Defence & Space, to implement the QUANTUM project. EUTELSAT QUANTUM is a new software-defined class of satellite which should offer once in orbit some flexibility in terms of coverage, bandwidth, power and frequency configurability. EUTELSAT QUANTUM will be launched in 2018 or 2019.
- In October 2015, EUTELSAT, Facebook and Spacecom have partenered together on the satellite initiative to get more Africans online (14 African countries).

INMARSAT (UK, founded in 1979)

- INMARSAT operates an HTS, called Global Xpress, using Ka-band.
- The first Global Xpress satellite, I-5 F1, was launched in December 2013, the second, I-5 F2, in February 2015 and the third, I-5 F2, on 28 August 2015. The Global Xpress satellite, I-5 F1, started commercial service in July 2014. The second and the third are to deliver commercial service by the end of 2015.

Part 2 The trends of space start-up companies in Europe

Oneweb

- Greg Wyler, founder of OneWeb, founded O3b (registered in The Channel Islands) with investment from several companies like Google in 2007, and then, he quit O3b to found Worldvu (Oneweb is the trade name of Worldvu) in 2012.
- OneWeb will launch 648 micro satellites (of less than 150 kilograms) by 2018. 900 satellites will be constructed, the rest of the spacecraft being spareparts. Each satellite will be produced for around \$500,000.
- OneWeb operates LEO (Low-Earth-Orbit) satellite instead of MEO (Medium-Earth-Orbit) satellite. LEO satellite orbits at approximately 1.200 kilometers, closer to the Earth than O3b's MEO satellites.
- In order to avoid interference with the geosynchronous (GEO) satellites, OneWeb developed a technology called "Progressive Pitch", which gradually and slightly tilts the satellites.
- OneWeb secures a right for using the Ku-band and operating the LEO satellites all over the world.
- OneWeb aims to provide broadband communication service to the rural areas, to the areas in emergency situation, man-made or natural disasters, and mobility services (airplanes etc.).
- OneWeb's small terminal can be mounted onto the top of any vehicle, providing a 200 m coverage.
- OneWeb has partnered with Airbus Defence and Space for designing and manufacturing the micro satellites.