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

January 2017

NICT Europe Center

General summary

This survey reports the R&D and business trends of satellite communication system using High radio frequencies as well as space communication ventures in Europe.

The first part : the R&D and business trends of satellite communication system using High radio frequencies in Europe

SES (Luxemburg)

- SES will launch three HTSs (High Throughput Satellite) using Ku band in 2017.
- SES has acquired O3B networks, which is operating Medium Earth Orbit satellites (MEO) using Ka band. O3B networks is now a completely SES's subsidiary.
- SES has released the launch of a HTS using Ka band, called *SES-17*, in 2020 (Thales Alenia Space manufactures it).
- SES will provide communication services to its clients by combining its geostationary orbit satellites (GEO), O3B's MEOs, HTSs using Ku band (launched in 2017) and SES-17 using Ka band.

Inmarsat (Britain)

- Inmarsat is providing global communication coverage by three fifth generation Global Express (GX) satellites. The third GX has started commercial communication service in December 2015. The forth GX will be launched at the end of 2016.
- Inmarsat has released the launch of two sixth generation GX. The first one will be launched in 2020. Airbus Defence & Space (Airbus D&S) has already started manufacturing them. These new GX will use Ka band and L band.
- Inmarsat, putting effort into IoT (Internet of Things) area, is a member of *LoRa alliance*, which standardizes technologies for LPWA (low power wide area) network.

Eutelsat (France)

- By its *Ka-sat* (Ka band HTS), Eutelsat is providing communication service for aviation in European areas using SurfBeam2 technologies developed by Viasat.
- Eutelsat will launch *Eutelsat 172B* to strengthen communication service for aviation. It will have three payloads, C band, Ku band, high throuput Ku band.
- Sigfox, the new french company for IoT, has adopted Eutelsat's *SmartLNB* service, which provides low power and low data capacity communication. Sigfox will complement its IoT backhaul networks by *SmartLNB* for ubiquitous IoT networks.

European satellite operator's R&D projects financed by the European Union

- Research grant provided by EU (European Union) and ESA (European Space agency) is one of the characteristics of the R&D policy for space communication in Europe. Satellite operators have participated into research projects financed by them.
- In Europe, satellite communication is considered as a technology supporting the fifth generation mobile technologies. Two research projects on the integration of satellite communication into terrestrial communication following European 5G vision, *BATS* project and *SANSA* project, are financed by EU's framework program.
- The objective of *BATS* project is to fuse satellite communication and terrestrial communication for ubiquitous broadband communication. For this purpose, *Bats* project developed an intelligent user gateway routing traffic flow according to demands. Project coordinator : Avanti communication, research period : october 2012 – December 2015 (36 months), budget (EU's part) : 11,983,846 euro (8,317,512 euro).
- The objective of *SANSA* project is to develop a hybrid satellite-terrestrial backhaul networks adapting to various situations for high capacity communication, effective use of spectrum and power, and network resilience. *SANSA* project extends the backhaul networks technologies developed by *BATS* project. Avanti communication is a member

of this project. Project coordinator : CTTC, research period : February 2015 – January 2018 (36 months), budget (EU's part) : 3,557,680 euro (2,983,930 euro).

The second part : the R&D and business trends of space communication ventures in Europe

- In ten years ago, space communication by Low Earth Orbit (LEO) satellites' megaconstellation was a dream. But, now, many people consider it possible to provide global communication service by Low Earth Orbit satellites thanks to the technological progress of space communication technologies. American companies are leading this *Newspace* area, but there are *Newspace* start-up companies in Europe too.

Kaskilo

- Founded in April 2015, *Kaskilo* is a german start-up company registerd in ITU (International Telecommunication Union) for LEO satellite communication. Its former name was *eithyLEO*. The name has just been changed in autumn 2016. Like *Oneweb*, *Kaskilo* will operate LEO satellite's megaconstellation, and it aims to establish a European brand against American companies. It is focused on industrial application, especially IoT. That's the difference between *Kaskilo* and companies like *Oneweb*, which focus in particular on global broadband internet access for people in remote areas. *Kaskilo*'s strategy follows a German industry policy, *Industry 4.0*.

Space data highway project, InLane project and InDrive project

- Venture capitals are less present in Europe than in the US. So, research grant by ESA, EU or national agency is also important for *Newspace*'s satellite communication system and application. Space data highway is a Public Private Partnership (PPP) project of ESA and Airbus D&S. Its objective is to develop the *European Data Relay System* (EDRS). *EDRS* provides data transfer relay service between LEO satellites, spacecraft, UAVs (Unmanned Aerial Vehicles) or ground stations by optical or Ka band communication. Moreover, EU's Horizon 2020 is supporting car autonomous driving technologies using

EGNSS (European Global Navigation Satellite System) like EGNOS (European Geostationary Navigation Overlay Service) and GALLILEO. *InLane* project is developing car lane navigation technologies, and *InDrive* project is developing semi-autopilot technologies' applications close to commercialization.