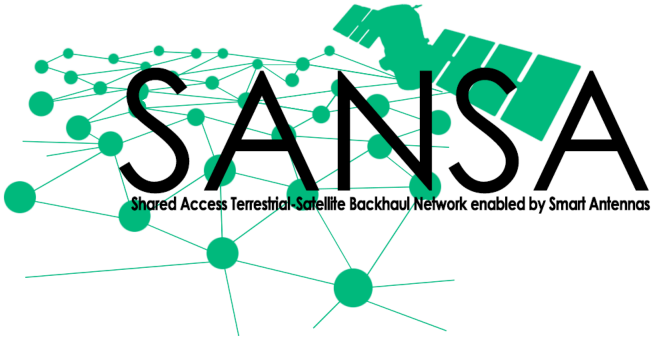
European Commission



SANSA

SANSA will set the basis for a self-organizing hybrid terrestrial-satellite mobile backhaul network capable of improving network coverage, capacity and resilience against link failures or congestion, while allowing an energy consumption reduction and a more efficient spectrum usage.

AT A GLANCE

Project title:
Shared **A**ccess Terrestrial-Satellite Backhaul **N**etwork Enabled by **S**mart **A**ntennas

Project Coordinator
Ana Isabel Pérez-Neira

Centre Tecnològic de Telecomunicacions de Catalunya (ES)

ana.perez@cttc.es

Partners from:
Centre Tecnològic de Telecomunicacions de Catalunya (ES) ; Thales Alenia Space España (ES); University of Luxembourg (LU); Athens Information Technology (GR); Avanti Communications (UK); Hellenic Telecommunications Organisation (GR); Fraunhofer Institute for Integrated Circuits (DE); ViaSat (CH)

Duration:
02/2015 - 01/2018

Total cost:
3,6m€

Programme:
H2020-ICT-2014-1

Further information:
www.sansa-h2020.eu

Context and motivation

The mobile data traffic is being doubled each year due to the appearance of new devices and applications. The predictions estimate that a 1000x network capacity increase will be required by 2020. Several technologies such as small cells or mm-waves have been proposed in order to increase the capacity of access networks. However, new solutions are needed in order to avoid backhaul networks becoming the bottleneck of future systems, which is just the aim of SANSA project.

Challenge

Future backhaul networks will not only need to deal with these huge capacities but also will have to provide full coverage and resilience against link failures or congestion. Traditionally, the improvements on any of these three features implied the use of more spectrum, which is a very scarce resource, especially at the microwave region; or the increase on the network energy consumption, which yielded to a prohibiting ICT carbon footprint; or the increase of costs for mobile operators, which in turn contributed to the digital divide. SANSA will take all these factors in consideration in order to provide a powerful and efficient solution at the same time.

Solution

The solution envisaged in SANSA is a spectrum efficient self-organizing hybrid terrestrial-satellite backhaul network based on three key principles: (i) a seamless integration of the satellite segment into terrestrial backhaul networks; (ii) a terrestrial wireless network capable of reconfiguring its topology according to traffic demands; (iii) a shared spectrum between satellite and terrestrial segments. This solution is enabled by two key components: (i) smart antennas deployed in terrestrial nodes for allowing network topology reconfiguration and spatial interference management; and (ii) a hybrid network manager capable of controlling all resources of the hybrid network.

On one hand, the integration of the satellite component with the terrestrial backhaul network not only provides the evident benefits in terms of easy and cost efficient network deployment in rural or remote areas, but it also enables data off-loading from terrestrial network hot spots, which in turn can result in overall capacity increase or in an improved resilience against failures.

On the other hand, the adaptation of the terrestrial network topology to the traffic needs allows routing the traffic to less congested links which results in a net capacity increase. It also provides the capability of skipping failed links for an improved network resilience. In addition, it enables the use of energy aware routing algorithms capable of reducing the overall energy consumption by setting different network nodes in sleep mode during low demand traffic periods. Moreover, it reduces the need of an exhaustive radio planning of the whole network, which in turn reduces the operator CAPEX. The smart antennas also contribute to CAPEX reduction since they do not require complex antenna pointing at installation.

Finally, SANSA will also deal with interference management techniques among terrestrial and satellite segments in order to improve the spectrum usage in the microwave region.

Impact

SANSA outcomes will demonstrate that the satellite segment will become an essential part of mobile networks, and thus of future 5G networks. This will open new business opportunities for European satellite operators generating economic growth of the European satellite sector. In a similar way, SANSA will allow mobile network operators to provide better and faster services to their users which will be translated in increased revenues too. In addition, equipment manufacturers will be able to develop new product lines to address the technological challenges of the hybrid solution, which will also turn in increased revenues. The European society will beneft not only from this economic growth but also from the improved network capacities.

On the scientific side, SANSA will make a significant step forward in fields such as low cost beamforming antennas, radio resource management and network management in hybrid systems, database-assisted shared access, and traffic routing algorithms, among others.