



SMART ANTENNA & RADIO FOR ACCESS AND BACKHAUL FOR ADVANCED NETWORK NODES

PROJECT INFORMATION

Reference: 288267
Start Date: 03/10/2011
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(Extended 6 months)

PROJECT COORDINATOR

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sarabandfp7.eu

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UNDER 7TH FWP



Welcome to the SARABAND newsletter!

SARABAND is a project supported by the European Commission's Seventh Framework Programme.

The overall objective of the SARABAND project is to push the boundaries of RF technology by developing high performance, smart, multi-beam, programmable and reconfigurable antennas containing miniaturized Q-band (40,5 - 43,5 GHz) radio technology to enable an energy efficient and high performance future wireless backhaul, as well as last mile access to bridge the digital divide.

During the lifetime of the SARABAND project different antenna technologies have been analyzed in order to meet the required performance for future backhaul networks in terms of gain, size, and cost. In particular low-profile high-gain antennas exploiting lens technology with a sub-wavelength structure and Fabry Perot concept have been implemented. On the other hand, antennas with electronic beam scanning capabilities using the parasitic array concept have also been fabricated. Additionally, three RF modules (Transmitter, Receiver, Transceiver) on System in Package technology have been manufactured.

In order to demonstrate the capabilities and improvements over the state-of-the-art technology achieved in SARABAND, a field trial has been deployed in Valencia. In this issue, the demonstrator platform will be described and the results of the measurement campaign will be summarized.

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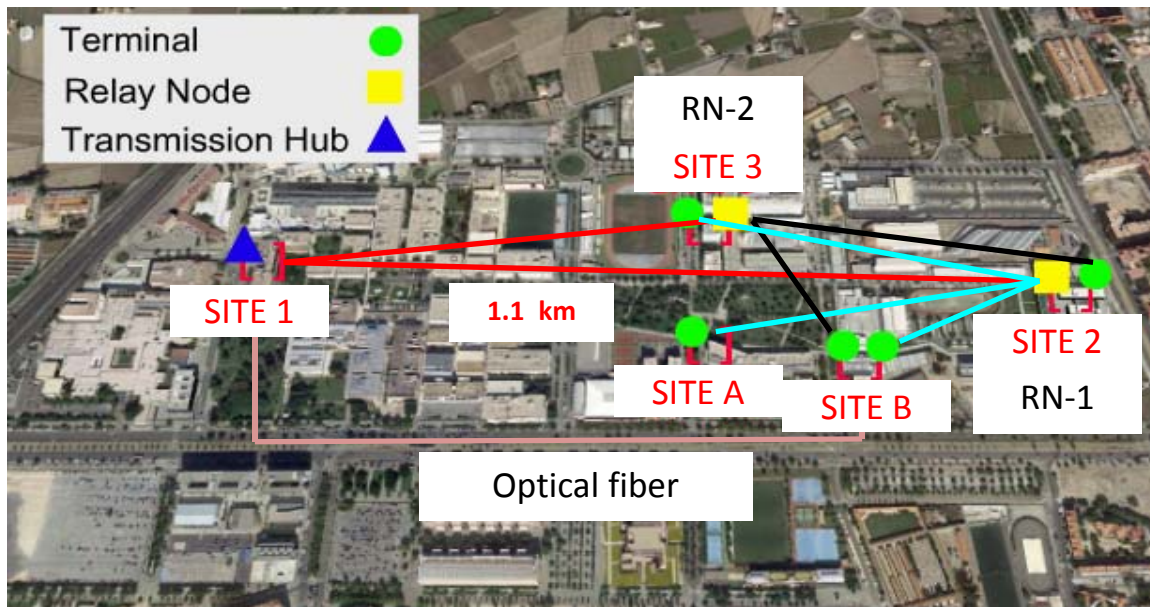
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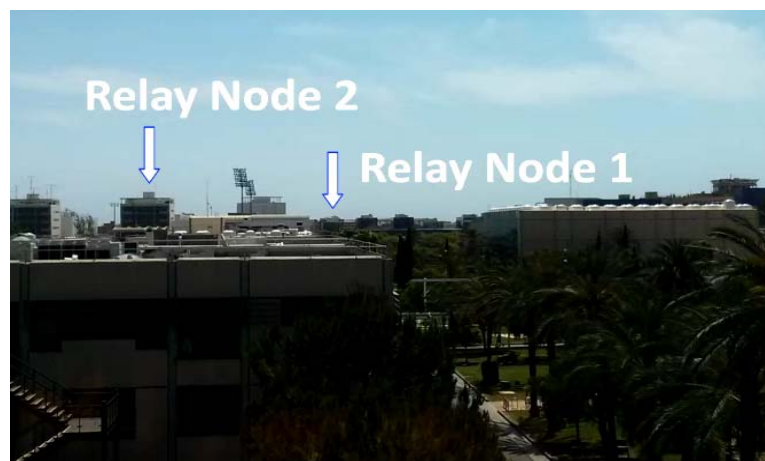
SARABAND Demonstrator

For enabling efficient and high performance backhaul networks, the SARABAND project has developed disruptive millimetre wave technologies (high-gain antennas, multi-beam antennas and miniaturized radio front ends) to supply the demanded requirements for 4G networks and small cell deployments.

At the end of the project, all the technology has been integrated in a wireless network platform deployed at the campus of the *Universitat Politècnica de Valencia*, in Spain, where specific smart-antenna and radio functionalities have been tested in the system platform. In particular, the platform consists of the interconnection of 5 sites through millimeter-wave wireless links, in a point to multipoint (PMP) architecture, as shown figure below.



The **Transmission Hub (TH)**, in Site 1, is the central point of the deployment, where the capacity is distributed over the different sites covered by this PMP sector. Here a high gain antenna is employed to provide connectivity to two Relay Nodes (RN) which extend the system range beyond the line of sight of the Transmission Hub.



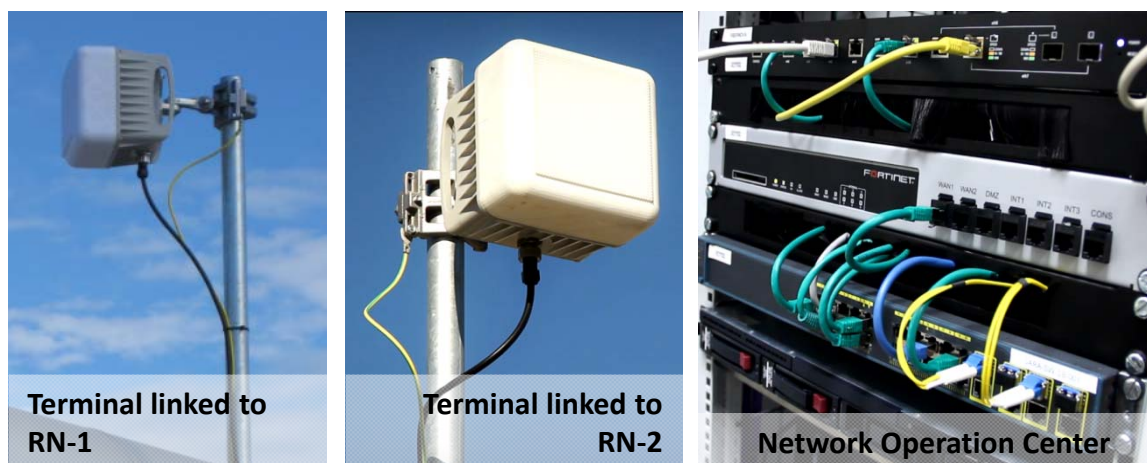
In Site 2, **Relay Node 1 (RN-1)** retrieves and retransmits the millimetre-wave signal from Site 1 to terminals installed in Site 3, Site A and Site B through an innovative multi-beam lens antenna, which creates 3 narrow lobes with high gain.



In Site 3, **Relay Node 2 (RN-2)** provides coverage to terminals installed in Site 2 and Site B, which are configured to share the capacity as if they were, for example, home subscribers of a broadband Internet service.



In Site B, two terminals and a Network Operation Center (NOC) are installed. The NOC enables the management and performance measurement of the deployed network.



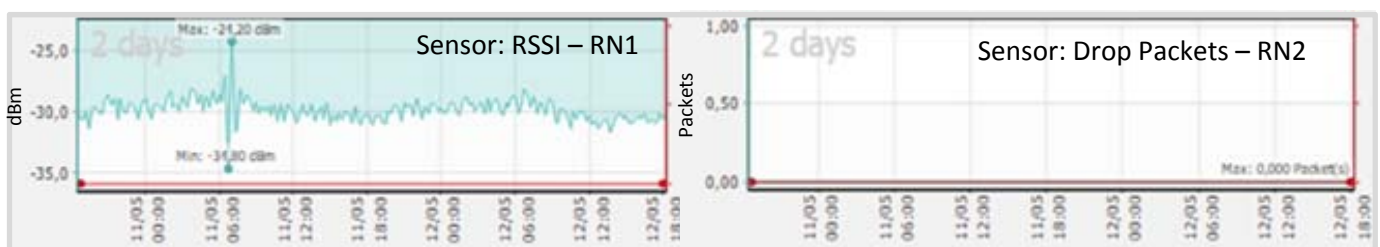
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Small Scale Field Trial Results

The parameters shown the following table correspond to the configuration of the IF modems for each link in the platform. The configuration has been optimized and validated with EXFO FTB-860 equipment.

Link	Distance	Modulation	Max. Aggregated Capacity
TH-RN1	1100 m	QPSK 3/4	96 Mbps (3 links, each 32 Mbps)
TH-RN2	610 m	64 QAM 2/3	104 Mbps
RN1-Terminal 1	495 m	16 QAM 3/4	72 Mbps
RN1-Terminal 2	496 m	16 QAM 3/4	72 Mbps
RN1-Terminal 3	305 m	16 QAM 3/4	72 Mbps
RN2-Terminal 4	495 m	16 QAM 3/4	72 Mbps
RN2-Terminal 5	280 m	16 QAM 3/4	72 Mbps

After wireless configuration, a set of network services have been set in place in order to be able to monitor the system performances and test the network by generating traffic and monitoring throughput, RSSI and dropped packets statistics for several months. Some examples of the measurements:



The results show that the system provides over 100 Mbps peak capacity in the higher modulations and dropped frame rates values compliant with tier 1 and tier 3 operators' requirements.

These results lead to different application scenarios such as fast backhaul to small cells, broadband Internet services for small-medium enterprises, residential access or IP-based video surveillance systems.

LOOKING OUTSIDE

SARABAND Special Session at the Microwave & RF Conference

SARABAND project organized a special session in the frame of the Microwave & RF Trade Show & Conference, which was held in Paris on the 1st and 2nd April 2015.

This Special Session was focused on “Microwave-systems solutions for the digital divide”. Particularly, the SARABAND project introduced the position of millimetre wave point to multipoint networks (PmP) in efficient Heterogeneous Networks (HetNet) deployments for LTE backhaul and last mile access and presented the economic model used for computing the Total Cost Of Ownership (TCO) of networks in terms of CAPEX and OPEX.

This economic model showed that the multi-beam implementation of SARABAND permits to reduce the CAPEX in 22% compared to mere 4 sectors solution so that the TCO of the PmP wireless multi-beam solution turns out to be 4 times cheaper than the TCO of fibre.

In addition, the SARABAND project presented the design, developments, electrical tests and production process of antennas for Q-band Communication, especially the high-gain and multi-beam lens antennas with sub-wavelength structures.

More information: http://www.microwave-rf.com/info_event/92/microwavesystems-solutions-for-the-digital-divide.html

SARABAND at the EUCNC 2015

The European Conference on Networks and Communications (EUCNC'2015) is the 24th edition of a successful series of a technical and scientific conference open to the world research community, sponsored by the European Commission, in the area of Telecommunications, focusing on communication networks and systems, and reaching services and applications. It aims at showcasing the results of the consecutive programmes on R&D and projects co-financed by European programmes, as well as presenting the latest developments in this area.

The SARABAND project will participate in this edition, which will be held in Paris from June 29th to July 2nd, presenting the small scale field trial deployed within the project and the performances of the system.

More information: <http://www.eucnc.eu/>

SARABAND at the European Microwave Week 2015

SARABAND will participate at the European Microwave Conference which represents the main event in the European Microwave Week 2015 and is the largest event in Europe dedicated to microwave components, systems and technology. Indeed, this Conference is the premier event to present the current status and future trends in the field of microwave, millimeter-wave and terahertz systems and technologies.

SARABAND will present the millimetre wave technology developed in the project and the network platform deployed to demonstrate the capabilities and improvements over the state-of-the-art in Q-band antennas and associated subsystems achieved in SARABAND.

More information: <http://www.eumweek.com/>

LIST OF PARTNERS

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Let us know your opinion!

The goal of this newsletter is to inform our readers of the progress of our project.

Since we appreciate very much your opinion, please send us your feedback, comments and questions to saraband-info@upv.es!

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