



ERCIM "ALAIN BENSOUSSAN"
FELLOWSHIP PROGRAMME



Scientific Report

First name / Family name

Ali Chelli

Nationality

Tunisian

Name of the *Host Organisation*

Norwegian University of Science and
Technology (NTNU), Trondheim,
Norway.

First Name / family name
of the *Scientific Coordinator*

Kimmo Kansanen

Period of the fellowship

01/02/2015 to 31/01/2016

I – SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

The research activities have been related to two topics:

- Dual-hop relay networks
- Multihop relay networks

For the first topic, the activity focused on the study of the performance of dual-hop relay networks. The relay operates in an amplify-and-forward fashion. Multiple interferers affect the received signal at the relay and at the destination. The different fading links are modelled as Nakagami distributed channels. The performance analysis of this communication system includes the study of the bit error probability (BEP) of the system and an analytical expression have been derived for the BEP.

In the second research topic, the activity explores the performance of multihop amplify-and-forward relay networks. The relay network is composed of a source node, a relay node, and N relay nodes. The fading link for each hop is modelled as a Nakagami distributed channel. Several interferers affect each relay as well as the destination node. The aim of our investigation was to derive expressions for the outage probability and the BEP of the multihop relaying system. To get a better insight on the system performance upper-bounds on the BEP have been derived.

II – PUBLICATION(S) DURING YOUR FELLOWSHIP

Accepted for Publication:

- Miloud Bagaa, Adlen Ksentini, Tarik Taleb, Riku Jantti, Ali Chelli, and Ilangko Balasingham “An efficient D2D-based strategies for Machine Type Communications in 5G mobile systems” IEEE Wireless Communications and Networking Conference (WCNC 2016), April 2016, Doha, Qatar.

Under Review:

- Ali Chelli, Kimmo Kansanen, and Mohamed-Slim Alouini “Bit Error Probability of Multihop Relaying with Co-Channel Interference over Nakagami-m Fading” IEEE Transactions on Wireless Communications
- Ali Chelli, Miloud Bagaa, Djamel Djenouri, Ilangko Balasingham, and Kimmo Kansanen “One-Step Approach for Two-Tiered Constrained Relay Node Placement in Wireless Sensor Networks” IEEE Wireless Communication Letters.
- Miloud Bagaa, Ali Chelli, Djamel Djenouri, Ilangko Balasingham, and Kimmo Kansanen “Realistic Constrained Relay Node Placement in Wireless Sensor Network” IEEE Transactions on Wireless Communications
- Ali Chelli, Kimmo Kansanen, and Torbjörn Ekman “Bit Error Probability of Dual-Hop AF Relaying with Multiple Interferers over Nakagami-m Fading” IEEE International symposium on Personal Indoor and Mobile Radio Communications (PIMRC-2016), Valencia, Spain.

III – ATTENDED SEMINARS, WORKHOPS, CONFERENCES

As a listener:

- Various seminars at the Department of Electronics and Telecommunications, NTNU, Trondheim, Norway.

As a speaker:

- One seminar at the Department of Electronics and Telecommunications, NTNU, Trondheim, Norway.

IV – RESEARCH EXCHANGE PROGRAMME (REP)

I was planning to have a research stay at INRIA in Avignon but due to some problem related to my residence visa, this internship was cancelled.