



Institut Supérieur de l'Aéronautique et de l'Espace

RESEARCH MASTER INTERNSHIP

Department of Mathematics, Informatics, Automatics

Supervisors :

Ahlem MIFDAOUI, Fabrice FRANCES

Location : Toulouse, ENSICA campus

Tel. : +33 5 61 33 90 90

E-mail. : Ahlem.mifdaoui@isae.fr

INTERNSHIP DESCRIPTION

Domain : Embedded Networks

Title : **MODELIZATION AND PERFORMANCE ANALYSIS OF REAL TIME SWITCHED ETHERNET**

Switched Ethernet is incontestably the most cost effective technology thanks to its ubiquity, simplicity and maturity and it became the communication network in many real time application domains e.g. for avionics applications, an ARINC 664-compliant Avionics Full Duplex Switched Ethernet (AFDX) network has been integrated recently into new generation civil aircrafts like the A380, A400M and A350; for industrial applications, various real time communication solutions are recently offered using either a centralized communication scheme like Ethernet Powerlink, EtherCAT and SERCOS III, or a distributed communication scheme like Time Triggered Ethernet (TTE), TCnet and EPA.

However, these industrial solutions lack in general of a quantitative performance evaluation to have an idea about the worst case behavior in terms of latency and bandwidth utilization.

Hence, the aim of this internship is:

- First, to develop the analytical models of the most common control mechanisms used upon Switched Ethernet to guarantee real time communication constraints like Master/ Slave protocol and TDMA mechanism, using the Network Calculus theory
- Second, to implement these models within WPANets tool (Worst case Performance Analysis of communication Networks) which is developed in ISAE to analyze the worst case performances of a given network.
- Finally, to illustrate these analysis in the case of a realistic real time application using these control mechanisms

Methods: Network Calculus and java coding

40 % Theoretical Research

60 % Applied Research

0 % Experimental Research

Possibility to go on a Ph.D.:

Yes

No

APPLICANT PROFILE

Knowledge and required level:

Ethernet network

Network calculus

Langages/Systèmes : Java, Windows or Unix

Applications should be sent by e-mail to the supervisor.