



Institut Mines-Télécom



CHAIRE  
CYBERCNI  
Sécurité des infrastructures critiques

# We are hiring!

# Jeune Master (<2ans après Ing/MSc) (24 months/ full time 35h/w) IPSec

We are looking for an outstanding candidate to strengthen our research team. We offer challenging research in a rich environment with excellent research perspectives. This position is to be filled from Oct 15, 2021.

## Job description

IPsec permet d'authentifier des paquets ethernet, et optionnellement des les chiffrer afin d'assurer leur confidentialité.

Il s'agit d'un ensemble de standards IETF qui vient augmenter un paquet IP pour pouvoir y ajouter les informations de sécurité.

Une spécificité d'IPsec est de devoir effectuer le traitement en temps réel, car le moindre retard engendrera une perte de paquets en amont.

Sur la base d'un travail de montage d'une plateforme de prototypage rapide, l'IMT Atlantique recherche un post-doctorant pour travailler sur l'implémentation efficace "concrète" du protocole.

L'enjeu est de pouvoir garantir différentes propriétés :

- flexibilité architecturale vis-à-vis du débit ;
- support des nombreuses options d'IP, à savoir le mode tunnel vs transport, IP v4 vs v6, GRE activé ou non, etc.
- caractère déterministe du traitement.

Les missions seront de définir une méthodologie de capture de la fonctionnalité à haut niveau, dans un environnement permettant une exploration architecturale.

La fonctionnalité devra pouvoir se décliner en langage de description de matériel, en vue d'une implémentation sur composant reprogrammable (FPGA).

Les tâches sont les suivantes :

- spécification d'un formalisme de description d'architecture (typiquement en langage python) ;
- vérification fonctionnelle (par exemple grâce à scapy) ;
- équivalence bloc par bloc des fonctions python avec une architecture en langage de description de matériel (comme SystemVerilog ou VHDL) ;
- implémentation sur FPGA et validation des performances.

En termes de retombées scientifiques, ce travail de post-doc conduira à :

- la publication des concepts permettant de capturer une architecture IPSec à haut niveau (un "design framework") ;
- la rédaction d'un article de "survey" sur les optimisations en terme de performance, avec revue de l'état de l'art et positionnement de nos travaux ;
- éventuellement, un article plus formel sur les garanties "par design" que la cadence est respectée, et qu'ainsi l'IP conçu est adapté à une utilisation dans un contexte de "sûreté de fonctionnement".

Ce travail permettra à l'étudiant post-doc d'interagir avec les doctorants de la Chaire Cyber CNI, et aussi partager ses résultats avec l'entreprise Secure-IC.

## Requirements - what you should bring

A recent (<2 years) engineering or Masters Degree in a related field, extraordinary research skills. Curiosity and motivation to work in a dynamic research environment.

Languages: French, English (ability to read and write research papers in English)

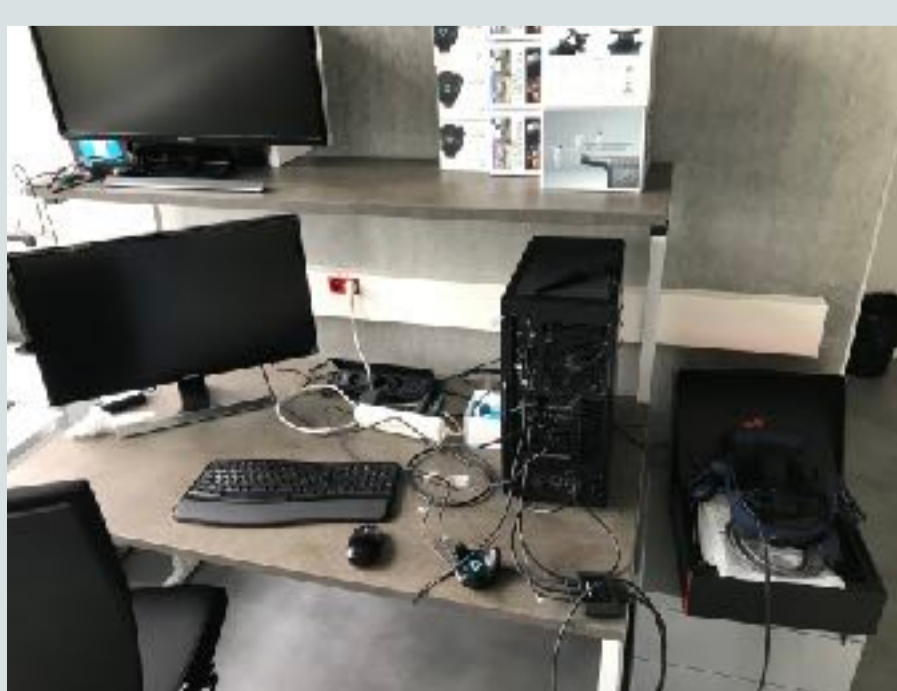
## Application process

**Application deadline: 21.9.2021, 3pm CEST**

Please send an email with one (1) PDF including:

- a motivational letter (covering the points "requirements")
- your CV
- your certificates
- a research statement (containing your research methodologies and possible research directions you would be interested to develop including references)
- contact addresses (mail and phone) of 1-3 people we can contact to inquire information about you

to [recruit-secure-ic-2021-2@cybercni.fr](mailto:recruit-secure-ic-2021-2@cybercni.fr).



# Your future hosting environment: Excellence in Cybersecurity research and education in France

cyber-cni.fr/

## The hosting environment

The offered position is within one of France's finest addresses for research at a chair that is well-known for its excellence in cybersecurity. This offer is together with Secure-IC (<https://www.secure-ic.com/>), the security science company, where you will spend 80% of your time. 20% of your time you will be at the chair.

The position is located within the IMT's school IMT Atlantique at the Rennes campus within the SRCD department at the chair Cyber CNI. Relocation to Rennes is required.

**IMT:** The Institut Mines Télécom (IMT) is France's biggest engineering school. It is comparable to an elite university in Germany for instance. IMT is a public institution dedicated to higher education and research for innovation.

It is a key player in the fusion of science, engineering and digital technology, and takes its schools' skills into the major fields of transformation in digital technology, industry, energy and the environment as well as their impact on the industry of the future, cities, health, and autonomy. For more info: <https://www.imt.fr/en/imt/presentation-of-imt/>

**IMT Atlantique:** Internationally recognized, IMT Atlantique's research positions it as one of the world's Top 400 Technological Universities. This research, conducted in the fields of digital sciences, engineering sciences, physics and management, fosters the conditions for inter-disciplinary research that is a source of innovation in response to the major challenges facing companies and society. For more info: <https://www.imt-atlantique.fr/en/research-innovation>



80% of your time you will be located at Secure-IC. 20% of your time you will be at the chaire [cyberCNI.fr](https://cybercni.fr) at the second floor of our new building with our lab infrastructure and many more PhDs, PostDocs and engineers of the chaire.

**Chair Cyber CNI:** Cybersecurity for Critical Networked Infrastructures (Cyber CNI) is an industrial research chair. The Cyber CNI Chair at IMT Atlantique is devoted to research, innovation, and teaching in the field of the cybersecurity of critical infrastructures, including industrial processes, financial systems, building automation, energy networks, water treatment plants, transportation.

The chair covers the full stack from sensors and actuators and their signals over industrial control systems, distributed services at the edge or cloud, to user interfaces with collaborative Mixed Reality, and security policies.

The chair currently hosts 6+3 PhD students, 1+3 PostDocs, 11 Professors, 1+1 engineers, and 1 internship student. The chair runs a large testbed that enables applied research together with the industry partners. The industry partners of the second funding round are Airbus, Amossys, BNP Paribas, EDF, Nokia Bell Labs, and SNCF.

Brittany is the cybersecurity region number 1 in France. The chair Cyber CNI is strongly embedded in the cybersecurity ecosystem through its partnerships with the Pôle d'Excellence Cyber (PEC) and the Brittany Region. The chair provides a unique environment for cybersecurity research with lots of development possibilities. For more info : <https://cybercni.fr>