SUMMARY
ON CONTRIBUTIONS OF DOCTORATE DISSERTATION

Thesis's title: ***"Studying, evaluating and improving the performance of in-band full-duplex relaying systems".***

Specialization: Electronics Engineering

Specialization code: 9 52 02 03

PhD candidate's name: Ba Cao Nguyen

Research advisors: Prof. Dr. Xuan Nam Tran and Dr. Dinh Tan Tran.

Research location: Le Quy Don Technical University.

MAIN RESULTS OF THE DISSERTATION

1. Proposing the system model and analyzing the performance of one-way FDR system with ideal hardwares.

- Proposing the system model and analyzing the performance of one-way FDR system in cooperative communication when FDR uses AF protocol. The dissertation derived exact and approximate expressions of outage probability for both fixed and variable gains. From there, approximate expression of symbol error probability is obtained. To improve the system performance, we propose power allocation for FDR. Numerical results show that with optimal transmission power, the system performance is significantly improved compared with the case of non optimization.

- Proposing the application of one-way FDR system when FDR uses DF protocol in the case of V2V communication. Based on the system model, the dissertation analyzes the performance when relay and destination are moving, meanwhile, source is stationary or moving. Applying mathematical transforms, the dissertation derived exact closed-form expressions of OP and SEP of the considered system. Based on these expressions, the effect of various factors such as RSI, double Rayleigh fading channels, data transmission rates, …, are analyzed.

2. Proposing the system model, analyzing and improving the performance of one-way and two-way FDR systems using AF protocol with hardware impairments (HI) in all nodes in systems. By mathematical analysis, the dissertation obtains the exact closed-form expressions of OP over fading Rayleigh channel. Based on that, the dissertation derives the approximate and asymptotic OP expressions to clearly indicate the impact of HI on the system performance. From OP expressions, SEP is derived. To improve the system performance and reduce the impacts of both HI and RSI, the dissertation proposes power allocation for FD transmission mode. By applying optimal transmission power, the system performance is greatly enhanced.

Particularly, for one-way AF-FDR system, the system performance avoids error floor when applying optimal transmission power. On the other hand, these results could be applied for ideal hardware system when setting the HI equals 0 in the mathematical expressions.

Hanoi, May 20th, 2020

RESEARCH ADVISOR	**PHD CANDIDATE**
	
Prof. Dr. Xuan Nam Tran	**MS. Ba Cao Nguyen**