

INFORMATION ON THE DOCTORAL THESIS

Thesis title: **Research technical solutions for locating fourth-generation mobile devices and applications for security.**

Speciality: **Telecommunications engineering**

Code: **9.52.02.08**

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Scientific supervisors:

1. Assoc. Prof, PhD **Le Nhat Thang**

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Training institution: Posts and Telecommunications Institute of Technology

NEW FINDINGS OF THE THESIS

The growth rate of mobile information networks as well as the number of mobile phone users in Vietnam over the past two decades has brought favorable conditions for the country's economic and social development, in addition to It also creates challenges for the work of ensuring social order and safety. The fact that the authorities have a solution to determine the location of a person using mobile information services on the 2G/3G/4G network contributes to ensuring social order and bringing about a peaceful life. for the citizen. Besides, mobile positioning also helps facilitate search and rescue work. With that necessity, the thesis has researched and proposed technical solutions and mobile device positioning models through using the Cell-ID database from open source and the parameter data set serving ToA, Assumed AoA along with the characteristics of mobile networks providing mobile services on 2G, 3G, 4G technology in Vietnam.

The main results of the thesis are as follows:

1) Propose a positioning technical solution based on combining a variety of data sources, improving a number of positioning algorithms to improve the efficiency of mobile device positioning.

This proposal has contributed to improving positioning accuracy on the basis of improving and expanding the basic ToA and AoA positioning technical algorithms. Improve availability and positioning accuracy by using U-TDoA positioning technique.

Due to the requirements of the fourth generation mobile device positioning problem for security work, it is necessary to collect, store, enrich, and accumulate a large positioning database from a variety of information sources. The proposed solution is to build a multi-source positioning database on an open data platform. A large database (Big Data) on an open data platform (Open Data Platform) will meet the requirements of collecting and processing diverse data from many sources and many different formats. This large database will also allow the application of new data processing technologies such as knowledge graphs (Graph Tech), machine learning (ML), artificial intelligence (AI) to improve the efficiency of mobile device positioning.

2) Proposing a model of a mobile device positioning system based on the use of positioning, security and base station emulation applications for security tasks.

This proposal has proposed an overall architectural model for a mobile device positioning system based on the use of layering and identifying positioning objects; secure transfer of positioning results; The emulated base station collects IMSI/IMEI parameters to support searching and locating objects. Technical system model meets the requirements of the fourth generation mobile device positioning problem for security tasks.

The above two proposals have also been experimentally conducted in Vietnam's mobile network environment, demonstrating the proposed technical solution and positioning system model, showing the high applicability of the solution in security tasks.

APPLICATIONS, PRACTICAL APPLICABILITY, AND MATTER NEED FURTHER STUDIES

The entire content and results of the thesis indicate that the research direction is to apply technical solutions and models of mobile device positioning systems to build a third generation mobile device positioning system. Investing in security work, in real environmental conditions, the mobile network combines the 3 generations of 2G, 3G, 4G in Vietnam today, supporting the fight against crime, public security and rescue.

The results of the thesis help authorities master technology in manufacturing 2G/3G/4G emulator base station equipment to support searching and locating mobile devices, saving state budget; Improve state management ability on security, order, and ensure information security for Vietnam's mobile network.

In addition, with the knowledge that the PhD student has acquired during the

process of implementing this thesis, the PhD student will continue to research and cooperate with the research community to continue researching technical solutions, building Building a fifth generation mobile device positioning system and applications for security tasks.

**Confirmation of representative
Scientific supervisor**

PhD. Candidate

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