THESIS REVIEWER'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**Association of Users and Positioning of Flying Base Stations in Mobile Networks**
Author's name:	**Lukáš Vávra**
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Telecommunication Engineering
Thesis reviewer:	doc. Ing. Gabriel Bugár, PhD.
Reviewer's department:	Department of Electronics and Multimedia Telecommunications

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**extraordinarily challenging**

How demanding was the assigned project?

The diploma thesis was a demanding project, requiring deep technical expertise, innovative research, and a significant investment of time and effort.

Fulfilment of assignment	**fulfilled**

How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.

The work demonstrates significant improvements in channel capacity and distribution fairness, indicating that the primary objectives have been met. The thesis provides a comparative analysis with other competitive schemes, demonstrating improvements in channel capacity and distribution fairness. This suggests a thorough understanding of the field and the ability to advance beyond current standards

Methodology	**outstanding**

Comment on the correctness of the approach and/or the solution methods.

The approach and methods used are technically correct and align with the thesis's objectives.

Technical level	**A - excellent.**

Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?

The student has thoroughly explained the methodologies and provided detailed simulation results to substantiate the claims made. The clarity of explanation and presentation of complex technical content reflects a deep understanding and the ability to effectively communicate his work.

Formal and language level, scope of thesis	**B - very good.**

Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?

The thesis employs formalisms and notations appropriately, adhering to academic standards expected in technical research. The organization of the thesis follows a logical structure, from system model descriptions to problem formulation, algorithm development, and performance evaluation, which facilitates comprehension. The thesis is extensive, covering necessary theoretical and practical aspects, and is well-presented with clear, understandable language. The use of English is very good, conveying complex ideas effectively with minimal stylistic or grammatical errors.

Selection of sources, citation correctness	**A - excellent.**

Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?

The thesis makes numerous references to prior work, indicating a comprehensive review of existing literature on the topic of mobile networks and the integration of UAVs as flying base stations. The selection of sources, including various research papers and articles, seems adequate, covering a range of relevant technologies and advancements in the field.

Additional commentary and evaluation (optional)
Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.

The thesis opens avenues for future research, especially in enhancing DNN algorithms for more accurate predictions and exploring the environmental impacts of FlyBS deployment. This thesis provides valuable insights into the use of advanced technologies to tackle emerging challenges in mobile networks and modern telecommunications. Its blend of theoretical and practical aspects, along with a clear focus on innovation, makes it a noteworthy contribution to the field.

III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

This thesis, by Lukáš Vávra, delves into enhancing mobile network performance through the deployment of unmanned aerial vehicles (UAVs) as flying base stations (FlyBSs). This innovative concept aims to address the increasing demands for higher throughput, coverage, low latency, and reliability in mobile networks. The study proposes a novel framework that uses deep neural networks (DNNs) for optimizing the positioning of FlyBSs and the association of user equipment (UE) in the network. The framework stands out by integrating multiple offline-trained DNNs, which cooperate and share prediction information to enhance the overall performance.

Mr. Lukáš Vávra has crafted a diploma thesis of exceptional quality. The document stands out for its clarity and readability, showcasing minimal stylistic and grammatical errors. From a content perspective, the thesis is excellently structured, with each phase of the research process meticulously detailed. This work not only exceeds the standards of typical diploma theses I have encountered but also demonstrates Mr. Vávra's capabilities that surpass the expected proficiency of an engineer. His exceptional handling of the subject matter strongly suggests that pursuing doctoral studies would not only be beneficial for his academic growth but also a valuable contribution to his field of research.

Questions:
1. How scalable is the proposed framework in terms of handling rapidly changing network environments, especially in high-density urban areas?
2. Given the reliance on DNNs for predicting channel gains and UE locations, what measures are in place to ensure user privacy and data accuracy, especially in scenarios where UE location data is either inaccurate or undisclosed?
3. While the thesis focuses on optimizing channel capacity and fairness, how does the deployment of FlyBSs impact energy consumption and environmental sustainability, considering the continuous need for repositioning and potential increases in electronic waste?

The grade that I award for the thesis is **A - excellent.**

Date: **21.1.2024**   Signature: