



TECHNISCHE
UNIVERSITÄT
WIEN



institute of
telecommunications

To: Brno University of Technology
Faculty of Electrical Engineering and Communications
Technická 3058/10
616 00 Brno
Czech Republic

Gusshausstrasse 25/389
A-1040 Wien
Austria

Univ.-Prof. Dr.-Ing. Christoph
Mecklenbräuker
tel: +43 1 58801 38901
mail: cfm@tuwien.ac.at

Vienna, August 16, 2021

Evaluation Report for Master thesis submitted by Bc. Jiří Křivák
Supervisors: prof. Dr. Ing. Christoph Mecklenbräuker and doc. Ing. Jaroslav Láčik, Ph.D.

I am pleased to inform you that Bc. Jiří Křivák has successfully completed his Master thesis

"ANALYSIS OF FEEDING TECHNIQUES OF A PATCH ANTENNA ARRAY FOR 5G NR"

under the guidance of Dr. Robert Langwieser and me at the Institute of Telecommunications in the Department of Electrical Engineering and Information Technology at Technische Universität Wien (TU Wien), Vienna, Austria.

The thesis is well-written and nicely structured in four chapters together with a general introduction, conclusions, and bibliography. The tasks formulated for this thesis are to analyze several feeding structures of two by two microstrip patch antenna arrays. The chosen center frequency is 25.5 GHz in accordance with the fifth generation (5G) mobile communication "New Radio" standard. It focuses on the design and simulation of microstrip patch antenna arrays fed by a proximity feeding structure, aperture coupled feeding structure, and the inset microstrip line feeding structure. These are simulated for two different dielectric PCB substrates.

The achieved results of the antenna arrays are based on electromagnetic simulations carried out with a professional high frequency simulation software. Furthermore, the results are compared with their theoretical expectations which do not include the investigated implementation issues like real PCB materials and array feeding structures. Originally, it was planned to also manufacture selected feeding structures and to validate the design by measurements. Due to the difficulties created by the Covid-19 pandemic, it was agreed to drop this practical lab work from the thesis.

He presented his Master thesis results on Friday August 13, 2021 in the form of a video conference via Zoom. Unfortunately, the final thesis contains quite a number of typos which could have been easily corrected.

We give the Master thesis the following grade according to the grading system at TU Wien: **Good (2)**. Let me propose to translate this to the grading system used at TU Brno as follows: This matches a **"B" at TU Brno with achieved 85 points.**

Sincerely,

Dipl.-Ing. Dr. techn. Robert Langwieser
Senior Scientist

Dr.-Ing. Christoph Mecklenbräuker
Head of Institute