

# Opponent's Review of Diploma Thesis

Department: Department of Radio Electronics  
Student: **Bc. John Richard Ritter**  
Study program: Telecommunications (N0714A060012)  
Academic year: 2024/2025  
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## **Title:**

An Easily Scalable Reconfigurable Intelligent Surface Prototype

## **Overall evaluation of the thesis:**

**Total number of points:** 90

### **Verbal evaluation:**

The thesis contains a follow up on previous design of RIS and its modification so that the basic module is borderless and allows to be stacked side by side for easy scalability. The work is structured into two main parts.

The first part presents the theoretical foundation of RIS technology. It covers both the physical and system-level aspects, and provides examples of the state-of-the-art RIS designs. The depth of this review slightly exceeds typical expectations for a master's thesis.

The second part focuses on the design, fabrication, and evaluation of the modified RIS prototype. While the core unit cell remains unchanged from the earlier design, the key innovation lies in eliminating the module borders and relocating the control network to additional PCB layers behind the RIS elements. Simulations conducted in HFSS confirm that the modified design maintains proper functionality. The RIS prototype has been fabricated and tested using uniform phase distribution. Although the measured reflection coefficient was lower than anticipated, the explanation attributing this to radiation pattern overspill lacks sufficient support, particularly in the absence of references to similar cases. Including simulations that mirror the measurement setup would allow for side-by-side validation of the results and provide clearer insight. It would also be interesting to see some more phase configurations of the RIS.

Overall, the thesis is well-written, clearly structured, and formally sound. One minor issue is the placement of references, which should appear within the sentence, before commas or periods.

**Questions for the defence:**

- 1) What is the purpose of the X-shaped slot in the unit cell design (Fig. 3.1)?
- 2) How is the incident RF signal prevented from traveling down the bias control network?
- 3) How is the line-of-sight coupling between the TX and RX antennas mitigated to ensure accurate measurement results?

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Ing. Ondřej Franek, Ph.D.  
Opponent of the thesis