Low powered mesh networks

Exploring and implementing Wi-Fi HaLow mesh networks on modern routers

Innovation is in our DNA. We're committed to pushing the boundaries of wireless technology. With expertise across multiple wireless protocols and generations—from 0G to 5G—we are now exploring the vast potential of Wi-Fi HaLow (IEEE 802.11ah). Our mission is to leverage this low-power, long-range technology to build next-generation networks that meet the evolving needs of smart cities, IoT, and industrial automation. As a national leader in wireless connectivity, we are offering an exciting internship that delves into the possibilities of Wi-Fi HaLow.

Context of the internship

Wi-Fi HaLow operates in the sub-1 GHz band, allowing for:

- Extended range: Up to 1 kilometre or more.
- Low power consumption: Ideal for battery-powered IoT devices.
- Enhanced penetration: Stronger signal through obstacles, making it perfect for smart homes, agricultural sensors, and industrial settings.
- Scalability: Supports thousands of devices, perfect for high-density IoT applications.

Wi-Fi HaLow's mesh network capabilities are promising for building resilient, self-healing networks where nodes can communicate efficiently over longer distances. We are eager to explore how this technology can be implemented in modern networking environments.

The goal

Our access points currently support **Wi-Fi 7** and operate in the **2.4 GHz, 5 GHz and 6 Ghz** frequency bands, providing modern devices' best speeds and performance. However, as Wi-Fi HaLow gains traction, it opens the door for **future Wi-Fi specifications**, including **lower frequency bands** for ultra-low-power user equipment (UE) in standby mode. This is especially relevant for IoT devices that require long battery life and minimal power consumption.

Objectives:

1. **Setting up a Wi-Fi HaLow mesh network**: Use the Wi-Fi HaLow specification to design, implement, and evaluate a mesh network.
2. **Identification and profiling**: Compare and contrast the performance, range, and power efficiency of Wi-Fi HaLow versus traditional Wi-Fi technologies.
3. **Future tech insight:** Analyze potential use cases for future Wi-Fi specs, including **lower frequency bands** for low-power, long-standby devices.
4. **Integration**: Study and work with our **Wi-Fi 7 routers** to determine how Wi-Fi HaLow can integrate into modern and future router specifications.
5. **Testing and Validation**: Conduct thorough testing, including lab and real-world simulations, to validate the system's effectiveness and reliability in different network environments.

Mentor: Max Deconinck

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Our approach

Our team combines cutting-edge research with practical implementation. We strive to remain at the forefront of wireless technology, and as part of this internship, you'll be working alongside our research and development teams to shape the future of Wi-Fi.

Student profile

Background and Education:

- Bachelor or Master's student in IT, Telecommunications, or a related field.
- Strong academic record with coursework in networking, cybersecurity, and programming.

Technical Skills:

- Interested in programming languages and tools such as FreeRTOS, Python,shell scripting and C.
- Knowledge of **Linux**, **networking protocols**, and **router management**.

Skills and Qualities:

- Strong problem-solving and analytical skills.
- Eagerness to learn and adapt to new technologies and challenges.
- Interest in mesh networks, IoT, and long-range wireless communication.
- Good communication skills to convey technical concepts effectively.
- Attention to detail and a methodical approach to tasks.
- Ability to work independently and as part of a team.

Interested?

Contact Jens Buysse (jens.buysse@citymesh.com and celine.vileyn@citymesh.com) with your CV. We have other internships available as well! Don't hesitate to contact us.

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