



Wireless Sensing for Monitoring & RISC-V for Cellular RAN

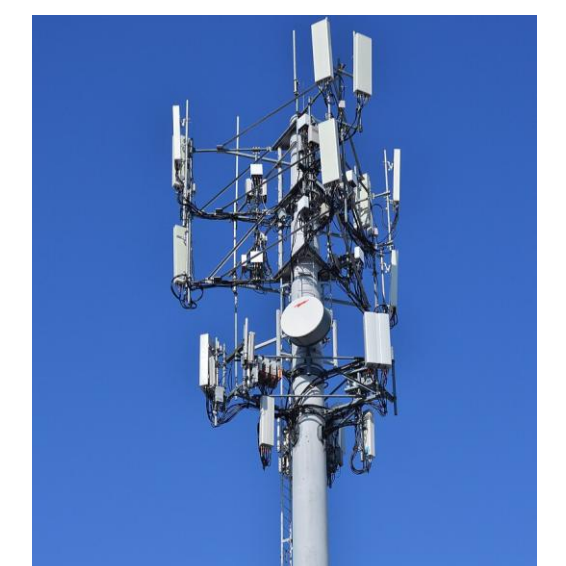
Activity Monitoring via WiFi Access Points

- Asset tracking market is valued at USD 23.42 billion in 2024, projected to grow to USD 59.64 billion by 2032¹
- Improved knowledge of number and location of users allows targeted services
 - Count number of people in a museum
 - Present detailed information about artwork on display on user's smart phone
- How to inexpensively monitor rooms and locate users?
 - **Already-in-place wireless infrastructure (WiFi) can be harnessed!**
- Goal: **monitor indoor venues and locate users or assets using WiFi**
 - Using Angle-of-Arrival, Fine Timing Measurements, and other techniques
 - Significant challenges (non-Line-of-Sight, multipath); AI can assist
- What about cellular?
 - Some works perform positioning in cellular, e.g. using TDoA² using OAI
 - **How to integrate position information in the 5G system?**
 - Although technology is available, services of cellular positioning remain to take off



RISC-V Platforms for Cellular RAN

- **RISC-V is an instruction set architecture (ISA) free to use and implement**, unlike ARM or x86. Projected to grow to over 16 billion chips by 2030³.
 - This **opens up the market to new players** that can design and market new General Processing (GP) and Application Specific (AS) processors.
- In turn, the **5G RAN relies on heavy computations**, for which softwarization & virtualization not always meets requirements.
 - **Most RAN solutions remain tied to ARM and x86.** This applies to two open-source RANs, **OAI RAN** and **srsRAN**.
- Two-levels of integration of RISC-V platforms with 5G RAN:
 - Dedicated hardware – design RISC-V programmable processors for RAN computing
 - **Advantages: future-proof – adaptable to 6G without having to replace hardware**
 - Software-based approaches – typically, customized for x86 and ARM architectures
 - **Question: performance in RISC-V devices? And ENERGY-WISE?**



- **Looking for national partners**
 - Industrial entities operating WiFi & 5G systems
 - Industrial entities developing platforms to run 5G systems (interested in RISC-V)
 - Service providers interested in exploring user (or asset) positioning
- **Looking to integrate a consortium with one (or both) use-cases**

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