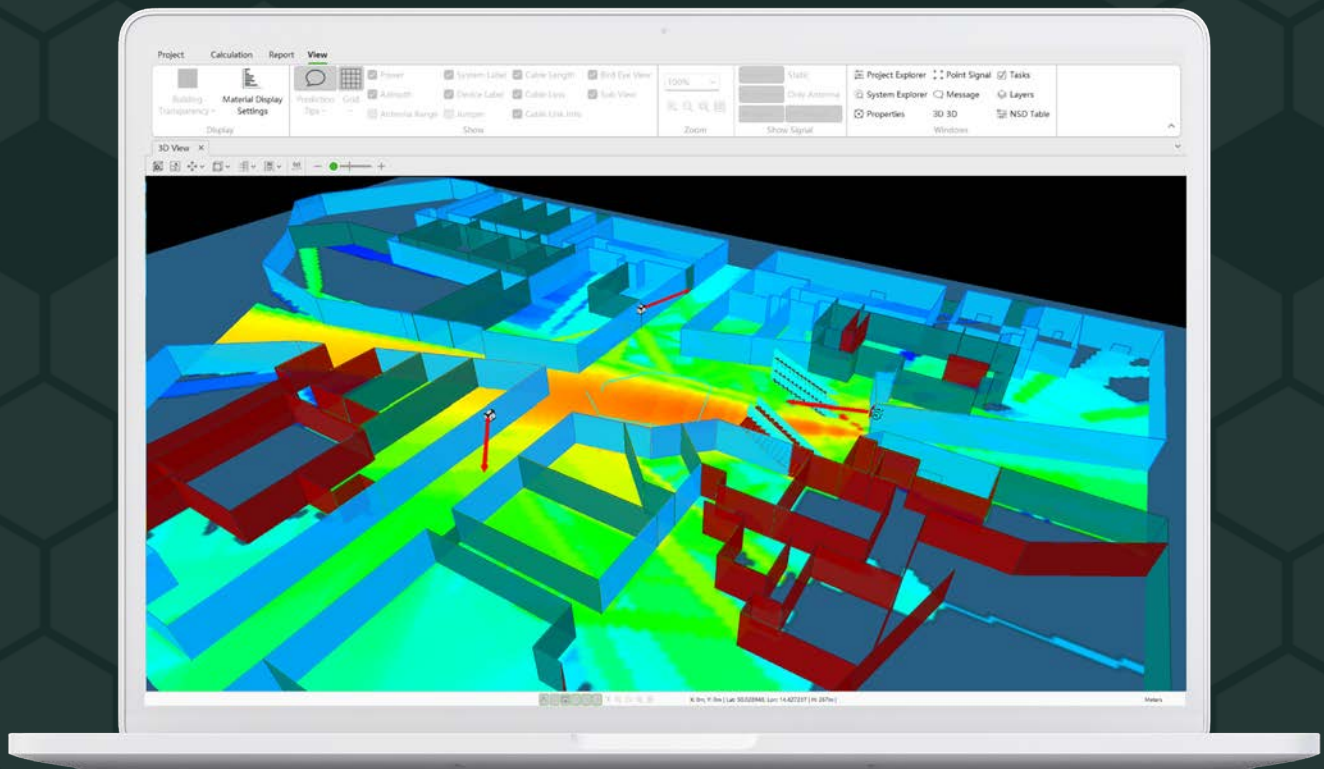# Ranplan Academic

Advanced Wireless Network Planning Software
for University Education and Future-Focused Research

## What is Ranplan Academic?

Ranplan Academic equips universities and research institutions with a powerful 3D modelling and simulation platform to support hands-on learning and advanced research in wireless network design. Built on the same core engine as Ranplan Professional, this academic edition provides the tools needed to study, model, and analyze complex indoor, outdoor and outdoor-to-indoor wireless environments—including 5G, IoT, Wi-Fi, and emerging technologies such as Massive MIMO and RIS.

Key Benefits

- Real-world wireless planning experience for students and researchers.

- Multi-technology and multi-environment simulation (indoor, outdoor, outdoor-to-indoor).

- Advanced 3D ray-tracing and propagation modelling.

- Ideal for thesis projects, wireless systems education, and technology research.

Comprehensive 3D Modelling for Learning

- **Import BIM Files:** Seamlessly import 3D building models from any BIM (Building Information Modelling) authoring software.
- **Import LiDAR Scans:** Model 3D buildings and structures by importing IFC files from the Metaroom ® App.
- **Smart CAD Extract:** Automatically convert 2D/3D CAD files into rendered 3D building models.
- **Manual 3D Modelling:** Create comprehensive 3D models (stadiums, tunnels, stairwells, campuses) using intuitive tools.
- **Import 3D Mesh Files:** Accurately model structures such as curved rooftops, tunnels, and pillars by importing 3D mesh files.
- **Attribute Exact Building Information:** Precisely attribute building materials of walls, doors, windows, and interior objects to characterize their frequency properties.
- **Instance-Based BIM Models:** Import, create, modify, reuse and export building elements from a centralized library for accurate environment modelling.
- **Direct Geographic Information Imports:** Accelerate outdoor environment modelling by directly importing geographic information (buildings, terrain, foliage, and clutter) from all major Geographic Information Systems.
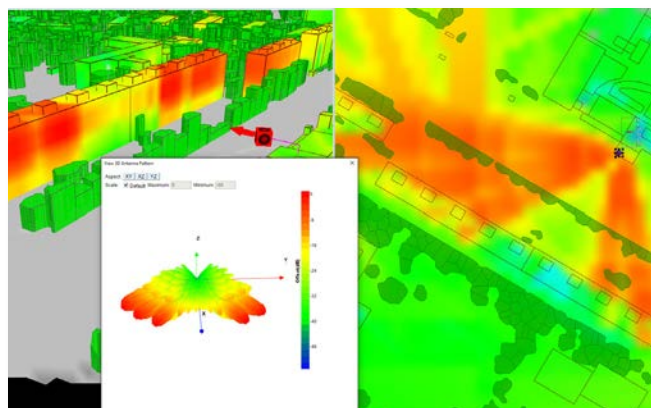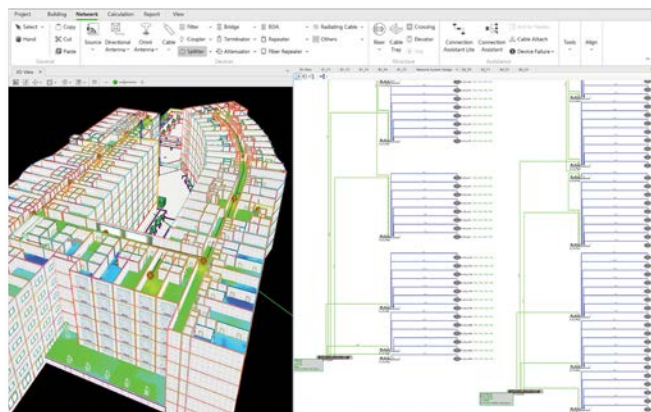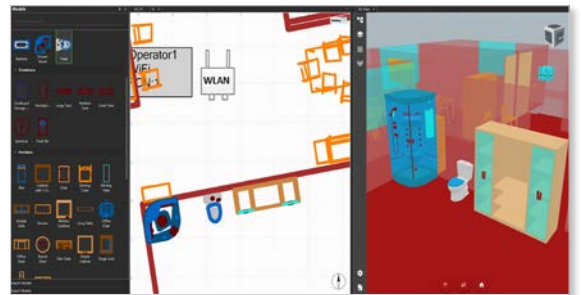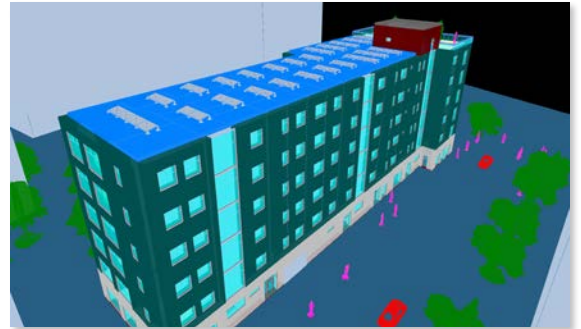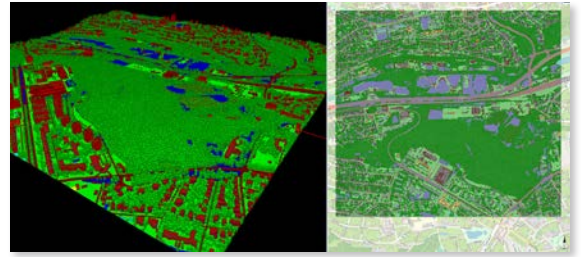
## Network System Planning for Academic Exploration

Study and simulate wireless networks that deliver reliable signal coverage, capacity, latency and reliability.

- **Support Multiple Wireless Systems:** In-building and outdoor systems, including Active/Passive DAS, small cells, DU/RU, O-RAN, vRAN, WLAN, Macro and Micro.
- **Study Leading Technologies:** Simulate 5G NR, 4G, IoT, Wi-Fi (including Wi-Fi 7), and public safety systems such as TETRA, PMR, DMR, and P25.
- **Understand Antenna Configurations:** Gain hands-on experience with 2x2, 4x4, 8x8, 16x16 MIMO, and Massive MIMO arrays, including 2D/3D beamforming and antenna modeling.
- **Learn Cable Planning Techniques:** Model and plan with multi-strand fibre, coaxial, radiating, and jumper cables to support practical infrastructure design.
- **Compare and Evaluate Designs:** Run simulations to test network performance and compare alternative configurations for use in student projects and academic research.

Network Optimization and Automation

Intelligent design automation tools enhance wireless network performance—ideal for exploring how professional systems are optimized before deployment.

- **Intelligent Cell/Antenna Optimization (ICO/IAO):** Automatically fine-tune the location, number, transmit power, and antenna configuration to meet defined KPIs.

- **Intelligent Topology Optimization (ITO):** Design efficient cable layouts by automating the routing of fibre, coaxial, and jumper cables.

- **Intelligent Network Profiler (INP):** Analyze signal strength, coverage, and leakage using preset system measurements to evaluate and refine network performance.

- **Intelligent Frequency Optimization (IFO):** Optimize channel allocation and transmission power for Wi-Fi Access Points based on predicted interference and coverage—ideal for high-density environments.
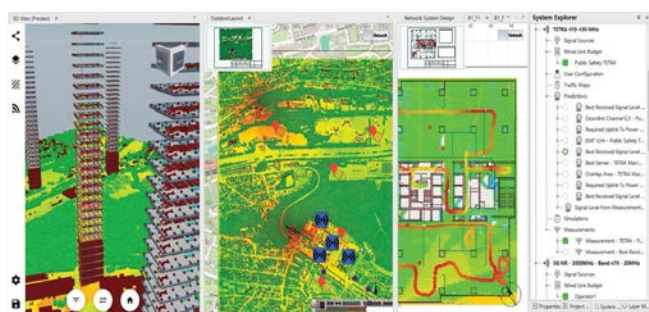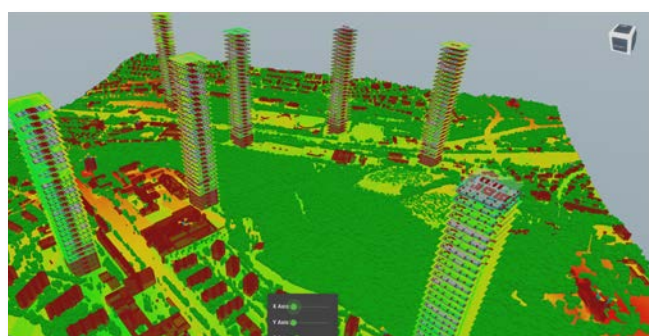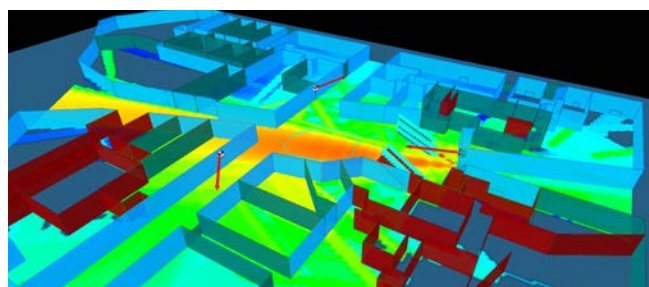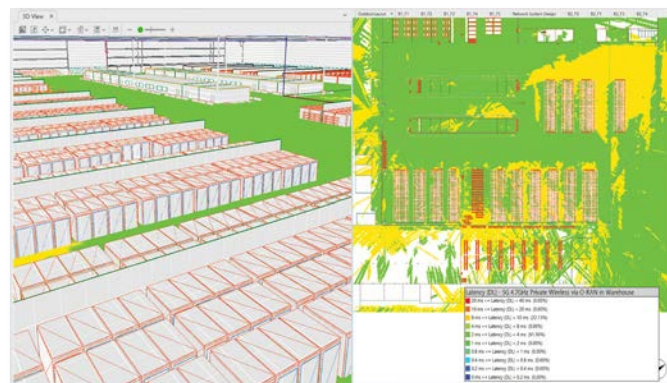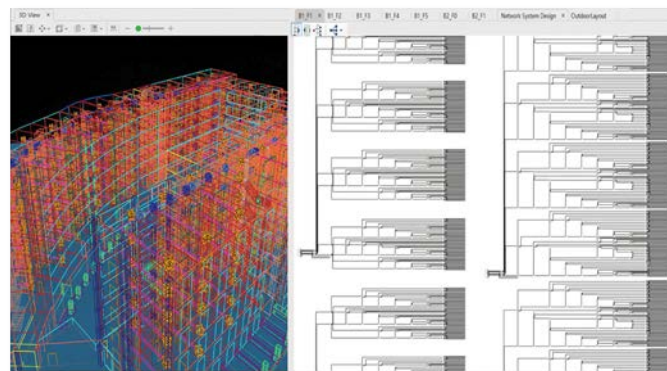
3D Network Propagation Simulations

Ranplan Maxwell, the integrated 3D ray-tracing and ray-launching engine, enables realistic indoor and outdoor simulations to assess network coverage, capacity, latency, and reliability.

- **3D Coverage Prediction:** Accurately model signal behaviour across entire environments, accounting for connected devices in both indoor and outdoor scenarios.

- **Dynamic Capacity Simulation:** Simulates real-world network performance based on user traffic patterns and density.

- **Body Loss Zones:** Improve simulation precision by modelling human body impact in high-density venues like lecture halls or stadiums.

- **Advanced Antenna Support:** Simulate the uplink and downlink of 2x2, 4x4, 8x8, 16x16 MIMO antenna arrays in 2D and 3D.

- **Field Measurement Calibration:** Align simulations with actual measurement data for research validation.

- **Energy Consumption Simulations:** Assess and optimize energy consumption using various load profiles—ideal for sustainability-focused studies.

Looking to take your research further?

Ask us about our optional Research Modules— designed for academics, engineers, and innovators seeking to push the boundaries of wireless network design and performance analysis.

With a range of specialized modules, researchers gain a powerful environment to explore new methodologies, test emerging technologies, and validate theoretical models.

Whether you're investigating propagation models, studying interference effects, or optimizing system parameters for future networks, the Research Modules support robust, reproducible, and cutting-edge research.
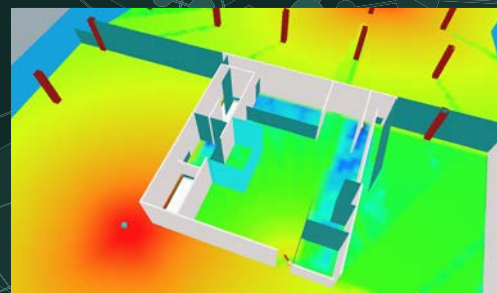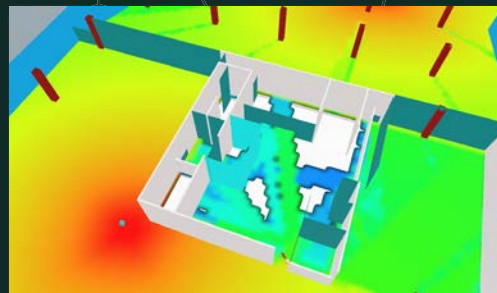
Technical Specifications

Minimum hardware requirements

Processor: Core i5 6th Generation, 2.0 GHz
Operating System: Windows 10 (64bit)
Memory: 8GB
Hard Disk Space: 50GB
Display: 1024 x 768

Recommended hardware requirements
Processor: Core i7 7th Generation, 3.0 GHz
Operating System: Windows 10 (64bit)
Memory: 16GB for medium projects /
            32GB for complex projects
Hard Disk Space: SSD with minimum 100GB
                For Stadiums: minimum 200GB
                For HetNet projects: minimum 300GB
Display: 1920 x 1080
GPU: RTX graphic cards 3070 or above are recommended,
(For AMD CPU we recommend GPU with 4GB+ RAM)
API: OpenGL, OpenCL 1.2 or higher
Cloud/Virtual platforms: Microsoft Azure

Wireless Technologies Supported

5G NR Sub-6GHz and mmWave
4G systems (3GPP Release 17) LTE/LTE-A
3G systems HSPA/HSPA+/WCDMA/1xEV-DO/TD-SCDMA
2G systems GSM/CDMA/EDGE/GPRS/TDMA
Public safety systems P25/PMR/DMR/LMR/TED/TETRA
IoT systems LoRa/eMTC/NB_IoT/SIGFOX
Wi-Fi (IEEE 802.11b/n/g/j/ac/ad/ax/be)

About Ranplan Wireless

Ranplan Wireless pioneer software solutions for the design, optimization and simulation of in-building and urban outdoor wireless networks. Our open platform, intelligent automation and 3D ray-tracing simulations streamline the network planning process, expertly identifying potential issues and optimizing network performance for reliable connectivity. This results in an unparalleled quality of service, ensuring seamless and efficient wireless communication for end-users and business operations.