





HEPiX Fall 2016
at Lawrence Berkeley National Laboratory,
Berkeley, CA, USA



Pre-Studies for Wi-Fi service enhancement at CERN

adam.sosnowski@cern.ch



Agenda

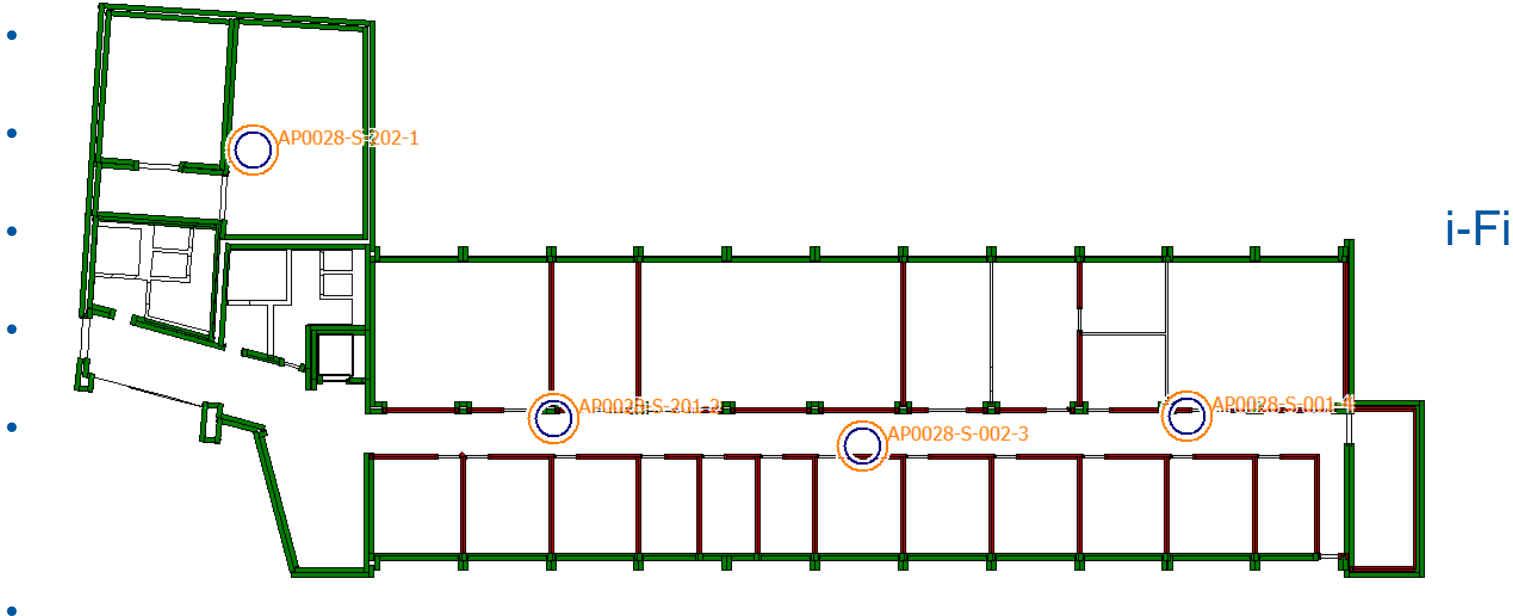
- Modern Wi-Fi infrastructure
- Wi-Fi planning and validation



Outline

- Modern Wi-Fi infrastructure
 - Current infrastructure
 - Overview: autonomous AP vs controller-based
 - Goals and challenges for modern Wi-Fi infrastructure
 - General rules for campus coverage
- Wi-Fi planning and validation

Current Wi-Fi infrastructure



Direction of changes

Moving from here:



To here:



How to achieve this?

- Dense access-point deployment in all our office buildings
- Migrate to a controller-based Wi-Fi solution
 - Centralise the configuration
 - Simplify monitoring
 - Support advanced RF features
 - Support enhanced services (Guest, Rogue Access-point detection)
- Rely on the 802.11ac standard (Wave1 and Wave2)

Autonomous Access-Point vs Controller based setup

	Autonomous AP	Controller based AP
Wi-Fi service	✓	✓
Configuration of a group of APs	✗	✓
Overview of the infrastructure	✗	✓
Global management of radio	✗	✓
Differentiation of users and traffic	✗	✓
Global roaming	✗	✓
Scalability	✗	✓

Modern Wi-Fi – challenges

- The World is going mobile
- Wi-Fi connectivity starts to be mandatory
- Wi-Fi becomes the primary way of connection
- High demands for performance
- Big differentiation of client devices



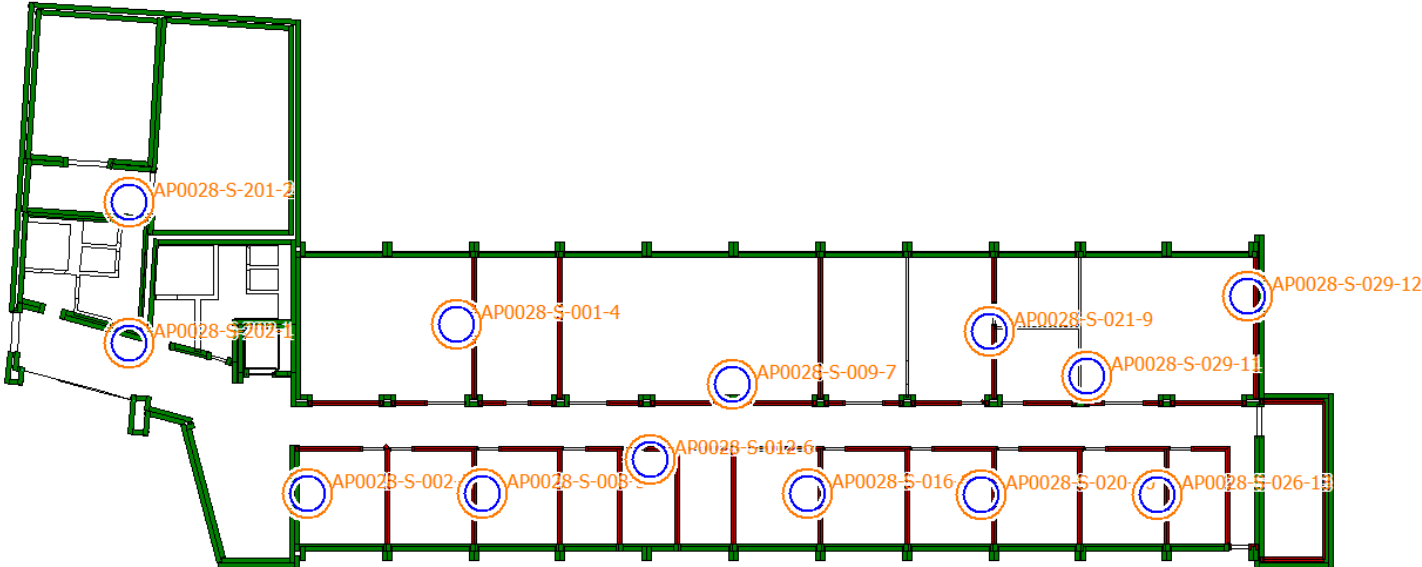
Modern Wi-Fi – challenges



Source: http://www.arubanetworks.com/vrd/VHD_VRD_Collection/wwhelp/wwhimpl/common/html/wwhelp.htm#href=ChapP1.html&single=true

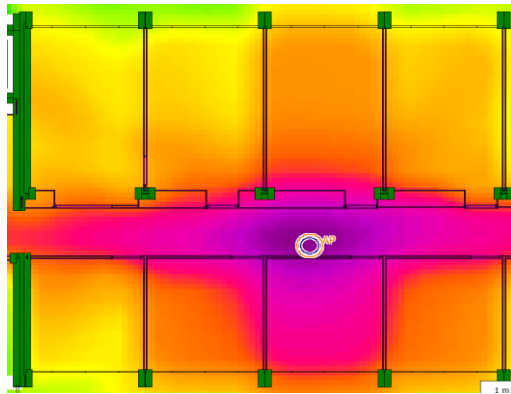
Wi-Fi infrastructure – demands and goals

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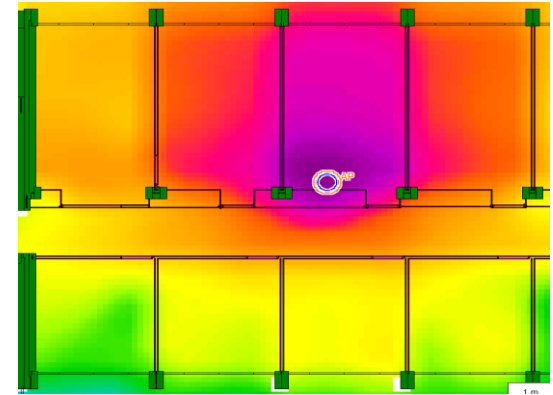


Wi-Fi infrastructure – rules for planning

- Dedicated APs for meeting/conference rooms
- APs installed inside offices
- Density of ~1 AP per 3 offices
- Providing roaming between floors inside single building
- Providing roaming between selected buildings



current



future

Outline

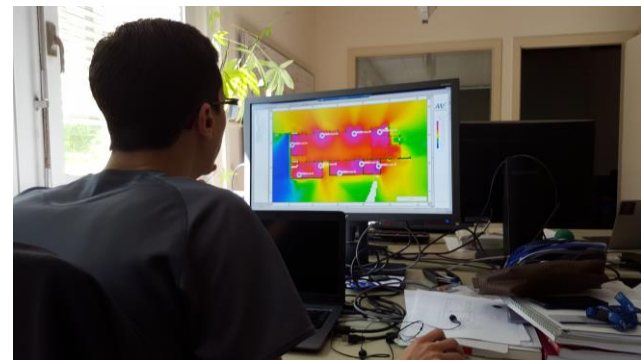
- Modern Wi-Fi infrastructure
- Wi-Fi planning and validation
 - RF simulation
 - Site survey
 - Deployment

Wi-Fi planning and validation

- RF planning and simulation
 - Preparation of plans: AutoCAD & WallMAN
 - RF Simulation: ProMAN
- Site survey
 - Planning meets reality!
- Deployment
 - Post deployment site survey

RF simulation

- Computer simulation of RF propagation based on an accurate model of a building
- Saves time, as accurate planning can be prepared without measurements on site
- Reduces impact on building occupants as on-site measurements are made only at the end of the process
 - Initial on-site visit necessary to gain some knowledge of building structure, but this is less intrusive
- It is not perfect...but it works for most of cases!

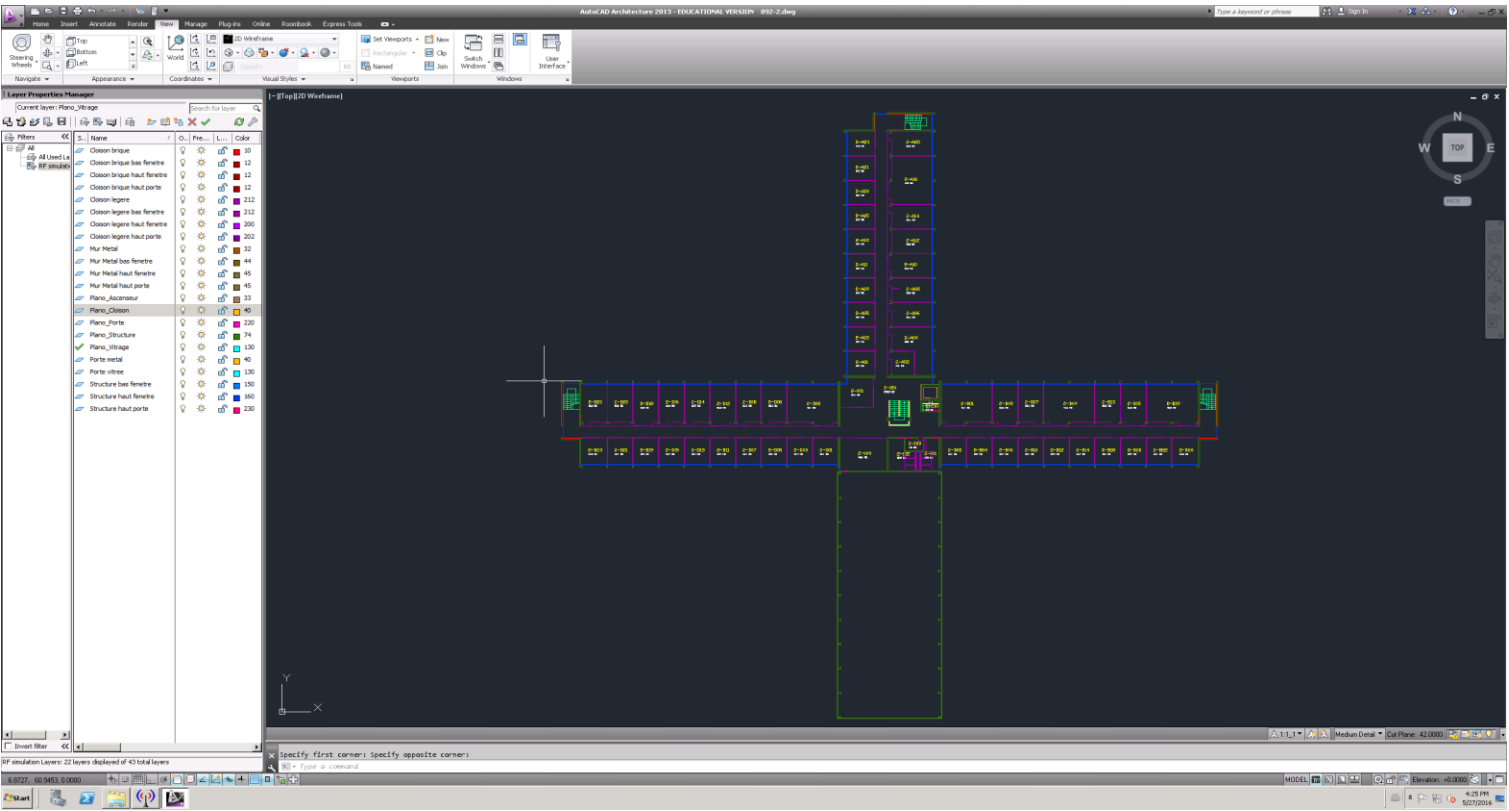


RF simulation tools

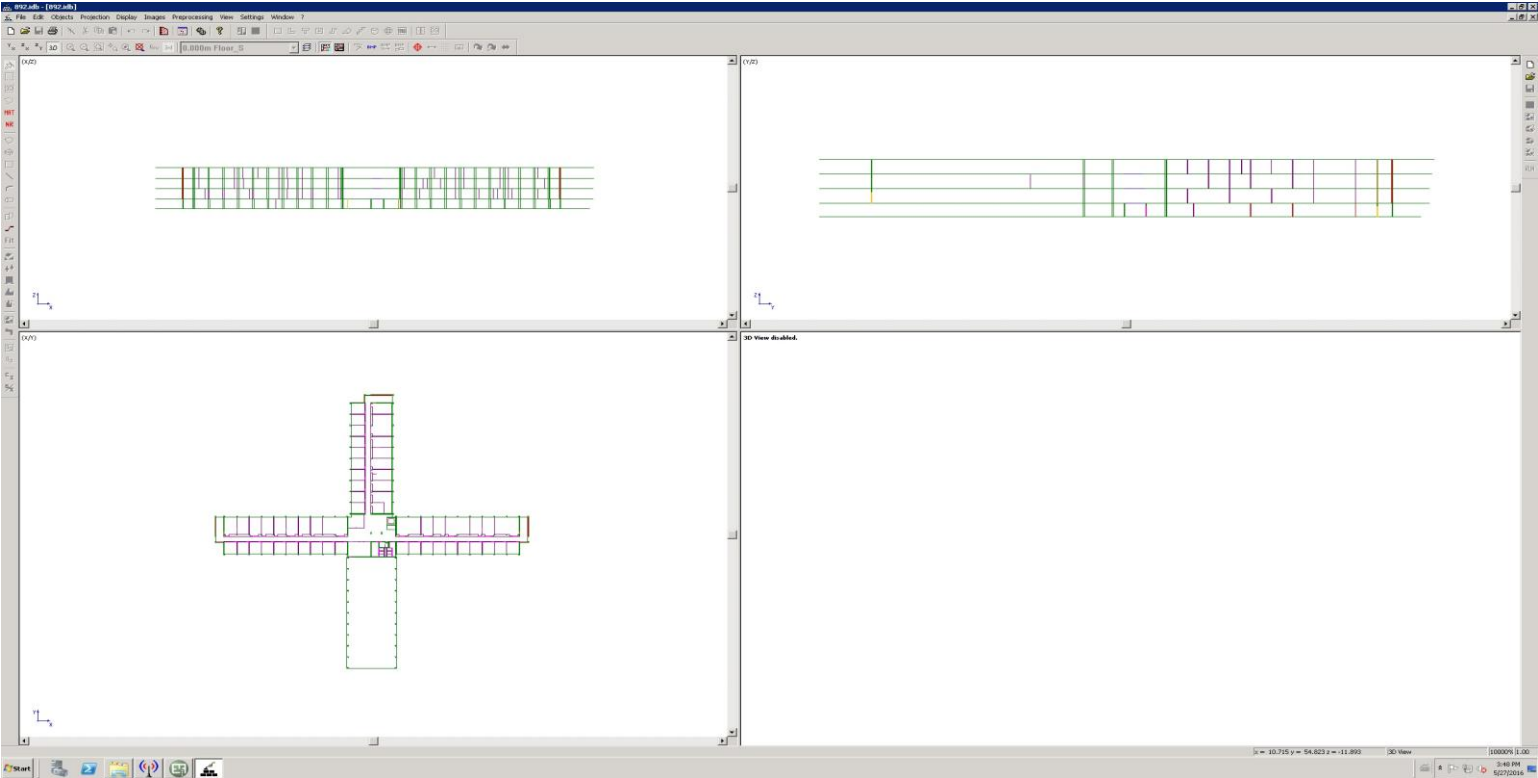
- AutoCAD
 - process and adapt building plans
- WallMAN
 - Create 3D building model to give a realistic (but not perfect) view of the RF transmission characteristics
- ProMAN
 - Model Access Point placement and simulate propagation of the RF signals within a building



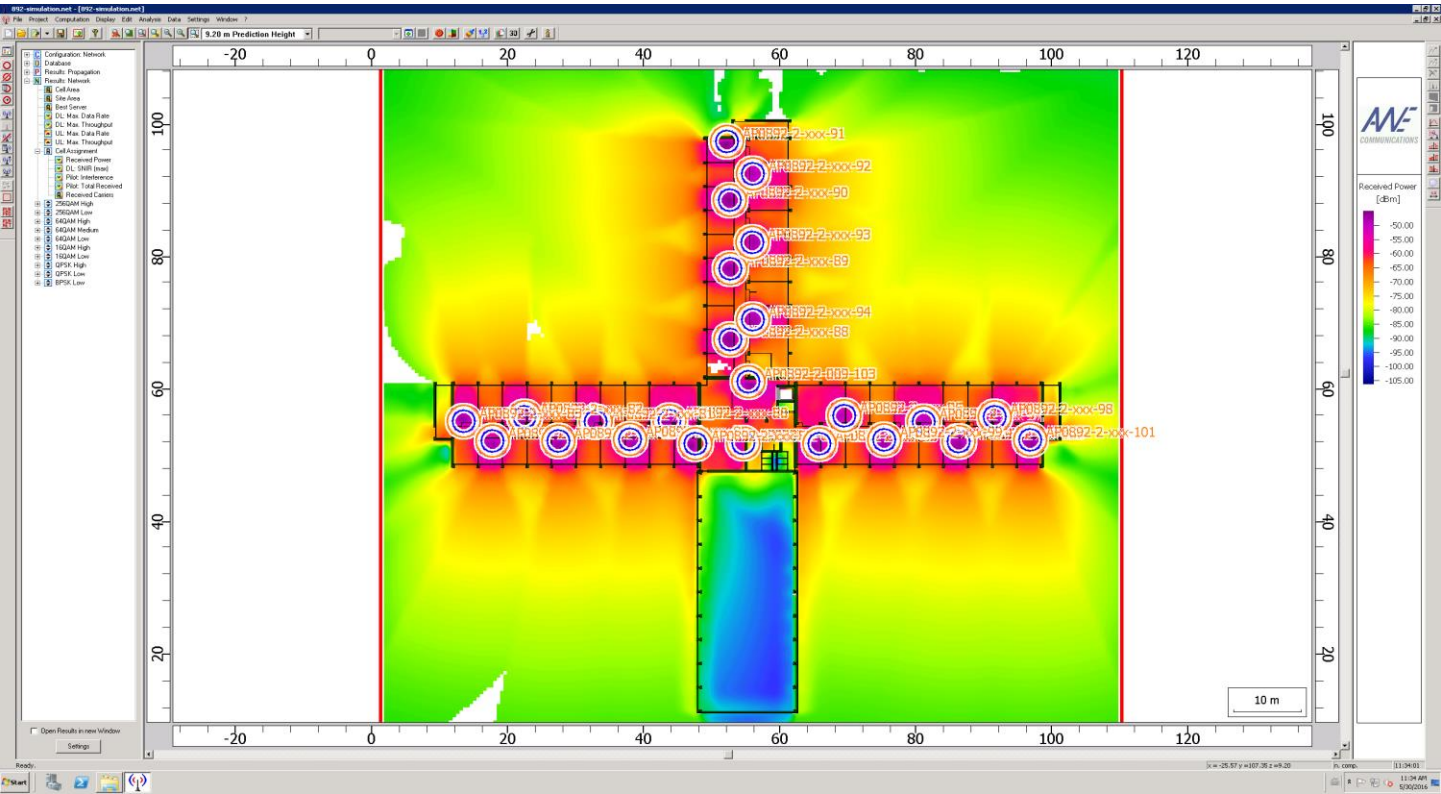
RF simulation – AutoCAD preparation



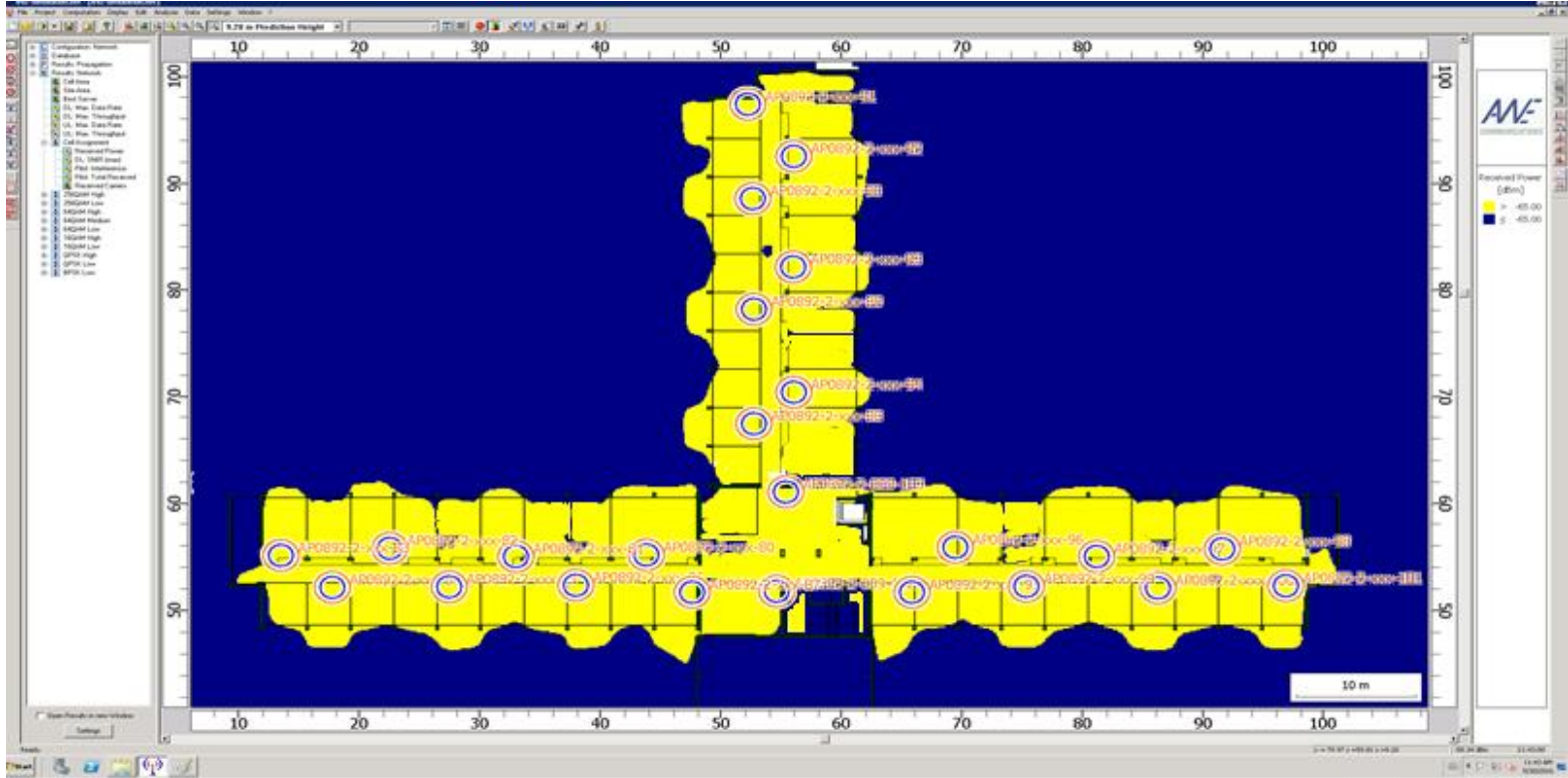
RF simulation – modelling a full building



RF simulation - positioning the APs

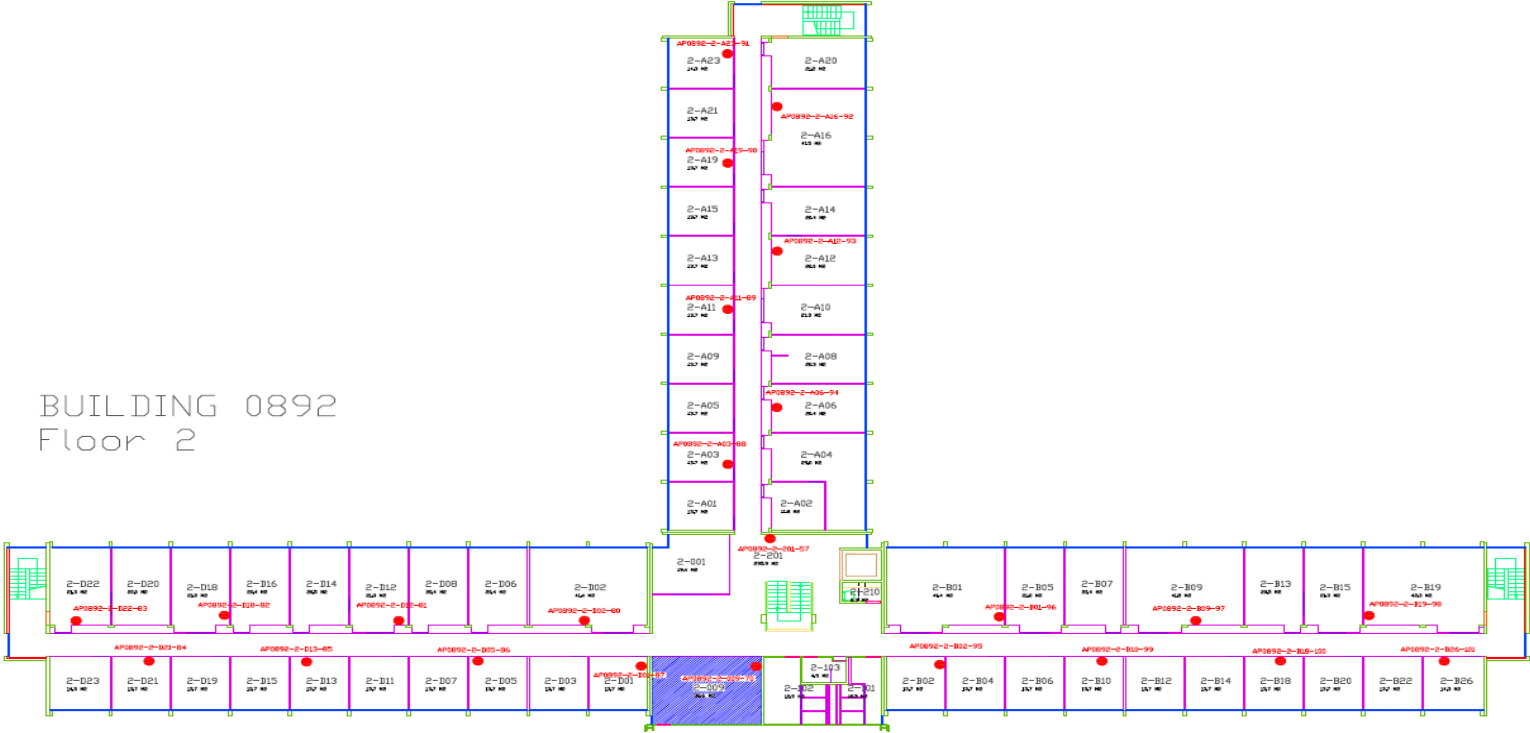


RF simulation – predicted coverage



RF simulation – map with AP positions

BUILDING 0892
Floor 2

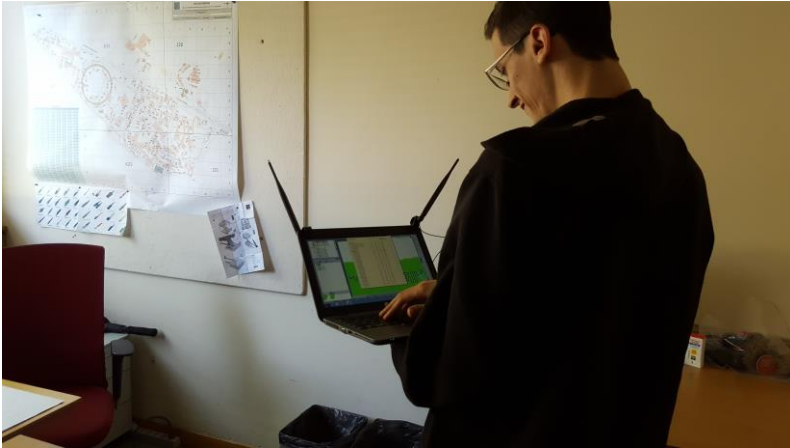


RF simulation – on site validation

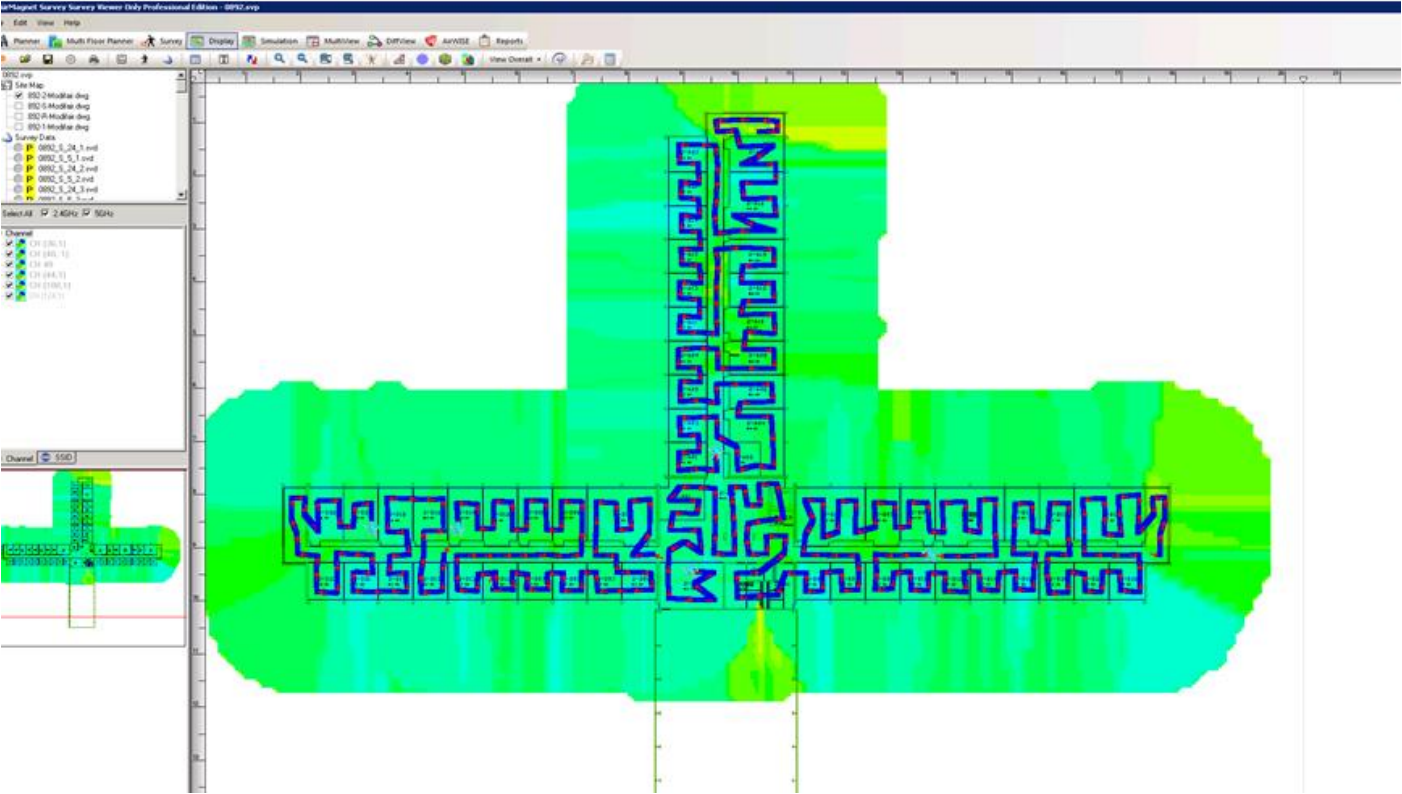
- The planned AP positioning needs to be validated on site
- Visit is made with the deployment specialist who will be responsible for the future work
- Goal: ensure there are no physical obstacles to install APs in the proposed places

Site survey

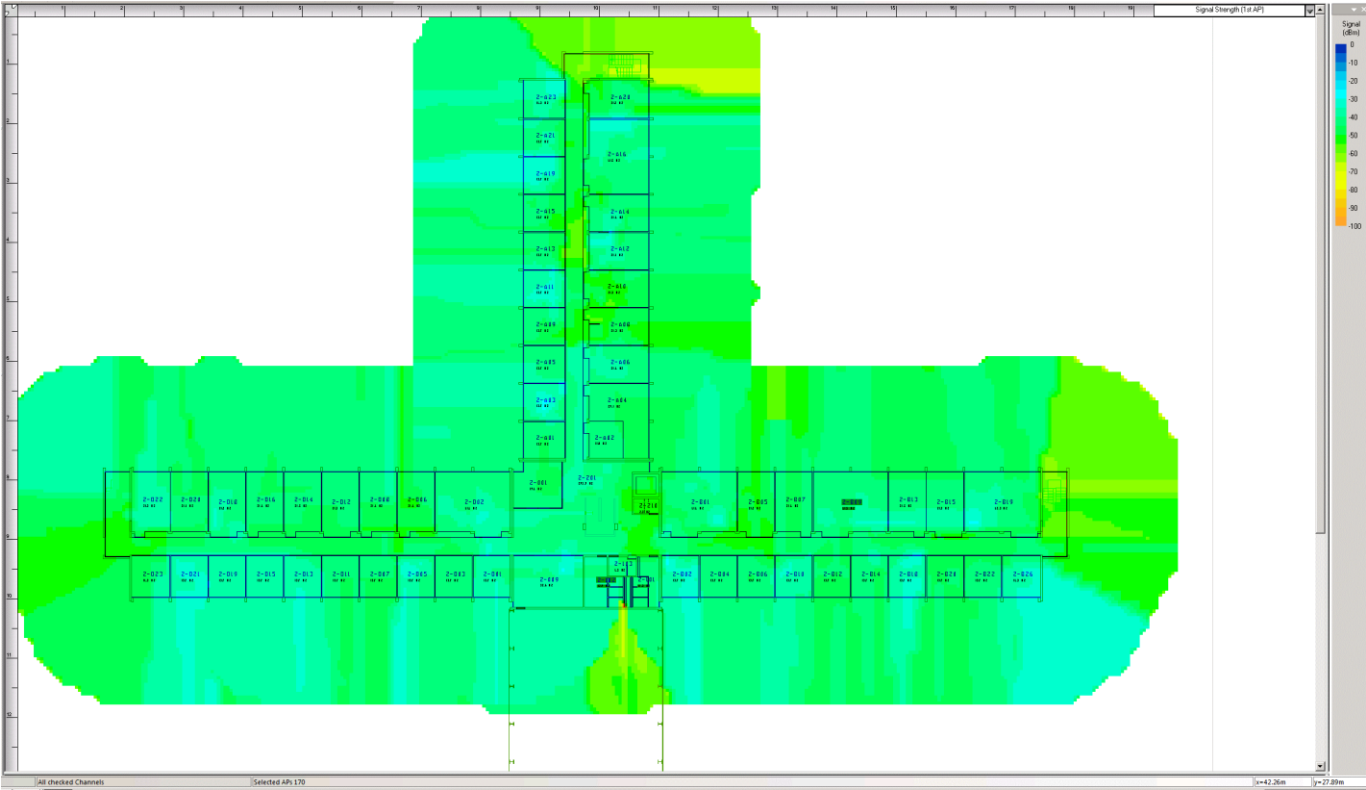
- Measurements of signal quality with a real device
- Validation of a planning in a real environment
- Validation if signal/service level will be high enough to fulfill performance requirements



Site survey – validation path



Site survey – results



Deployment

- Cabling
- AP installation
- Post deployment site survey



Thank you!

