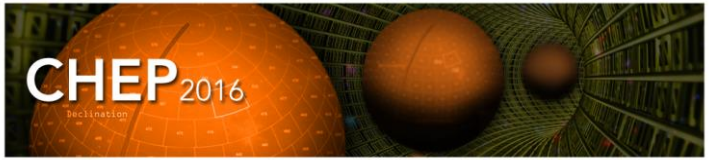
CERN



22nd International Conference on Computing in High Energy and Nuclear Physics, Hosted by SLAC and LBNL, Fall 2016

Wi-Fi Service Enhancement at CERN

vincent.ducret@cern.ch

Scope and goals of the project

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Moving from here:

Scope and goals of the project

Moving from here:

To here:

Scope and goals of the project

Moving from here:

To here:

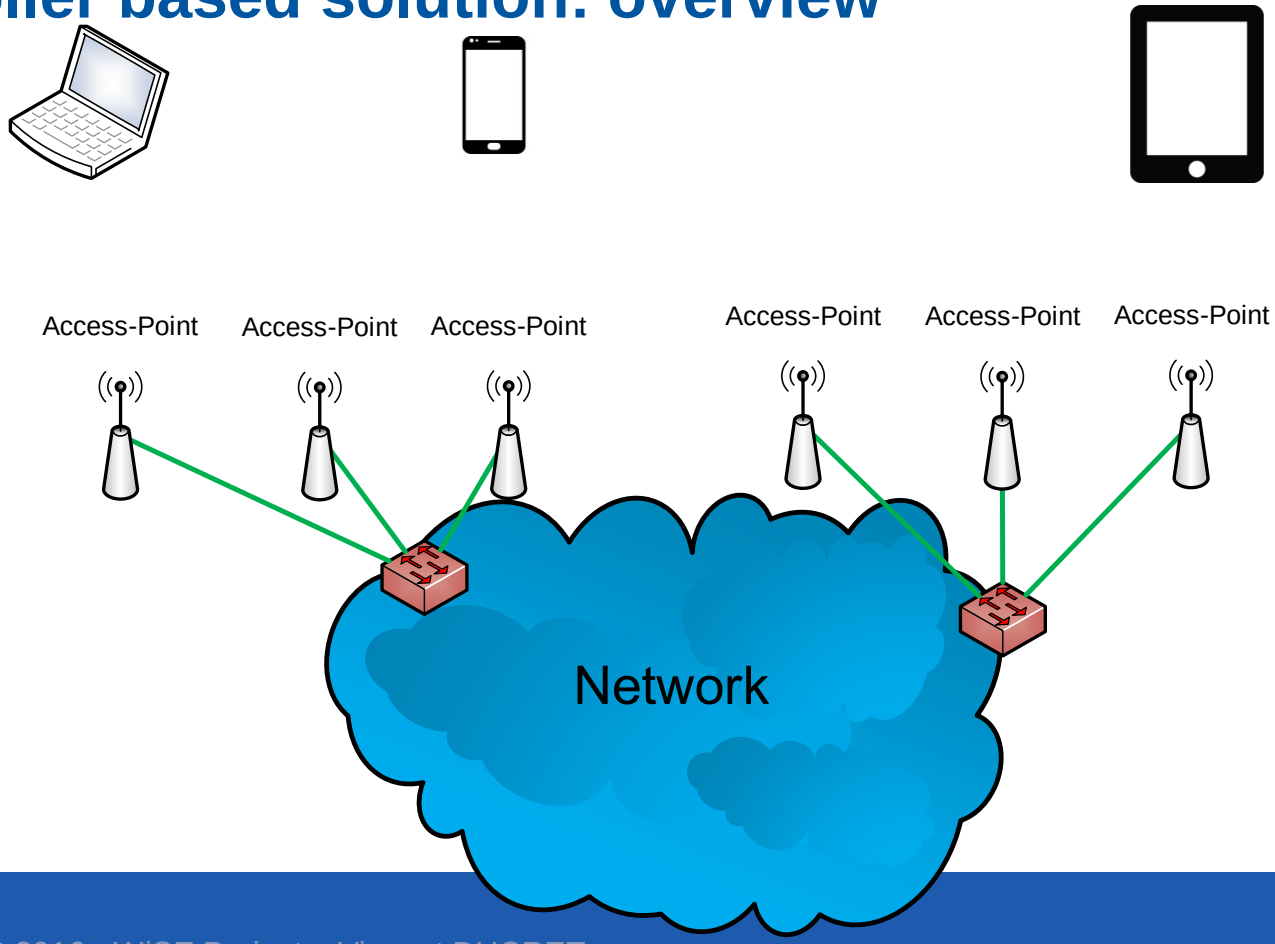
How to achieve this ?

- Dense access-point deployment in all our office buildings

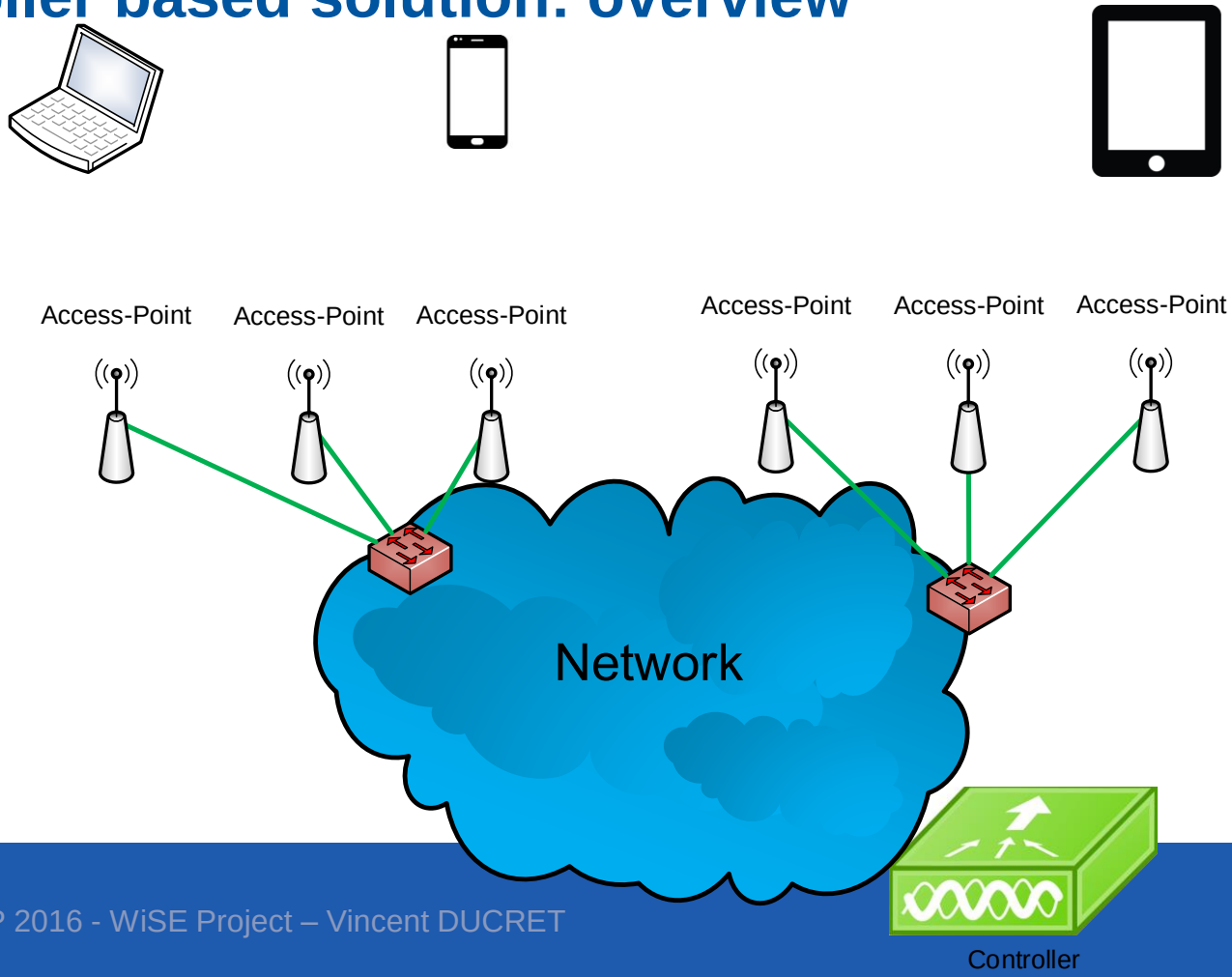
- Migrate to a controller-based Wi-Fi solution
  - Centralise the configuration
  - Simplify monitoring
  - Support advanced RF features
  - Support enhanced services (Guest, Rogue Access-point detection)

- Rely on the 802.11ac standard (Wave1 and Wave2)

Controller based solution: overview



Controller based solution: overview



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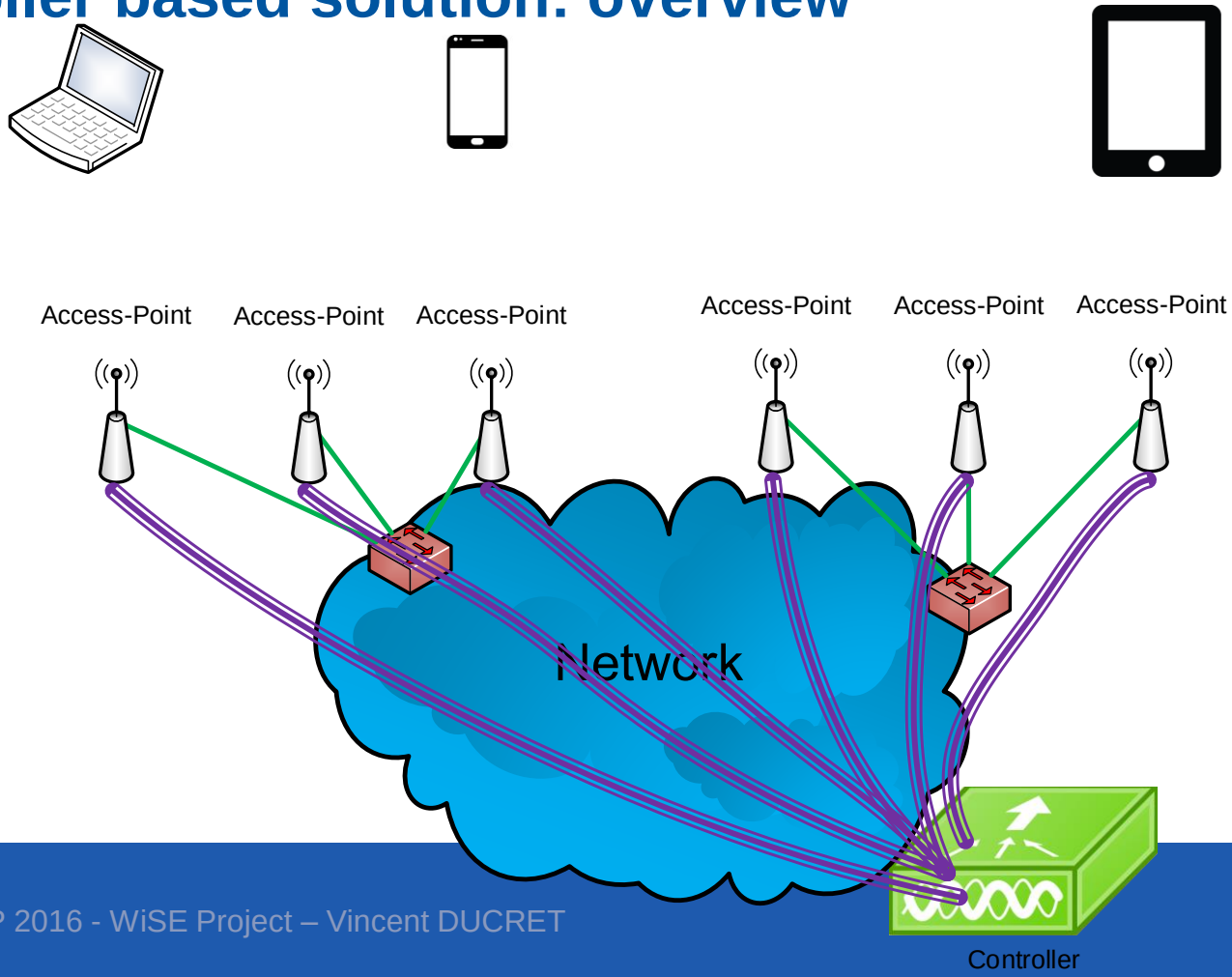

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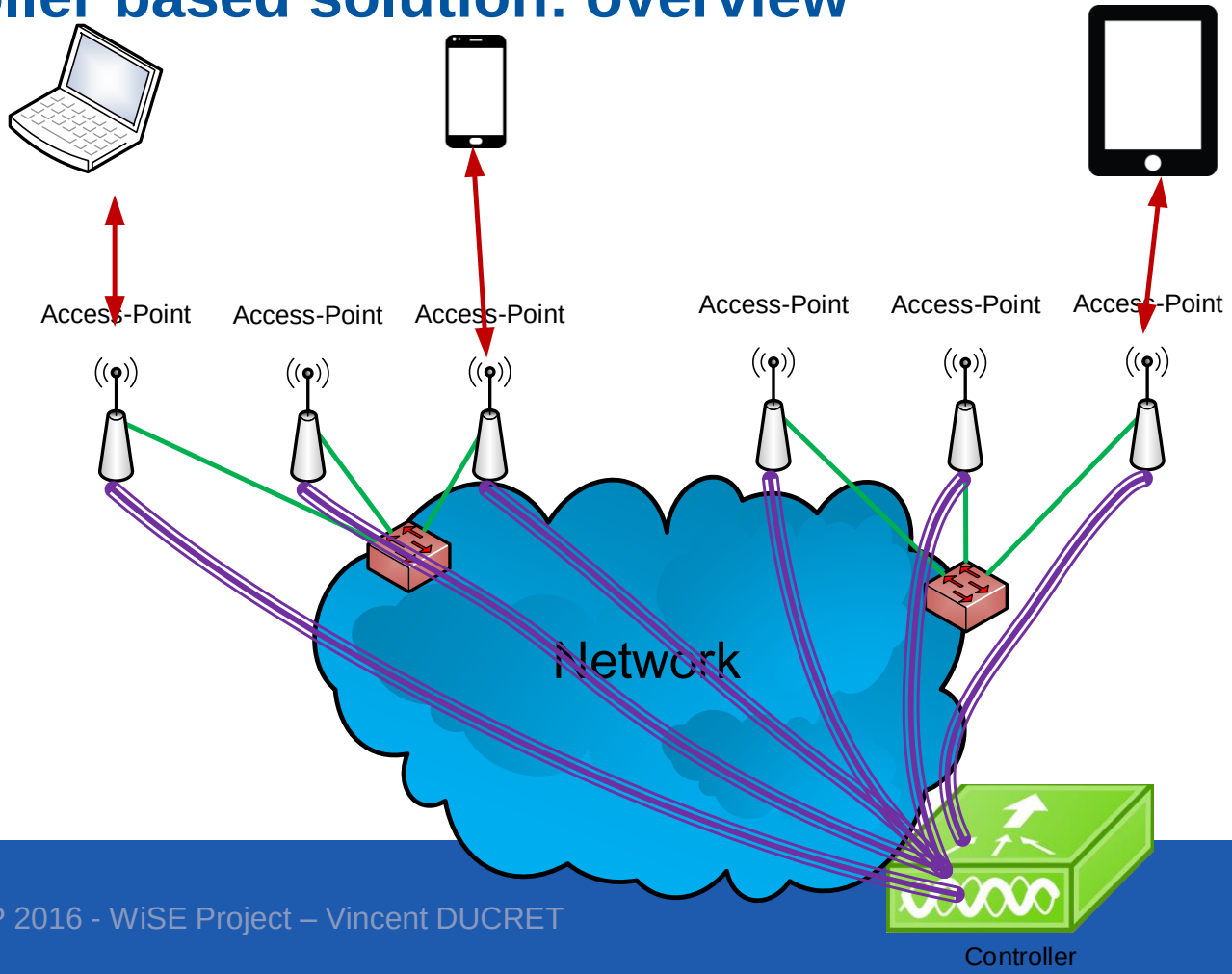

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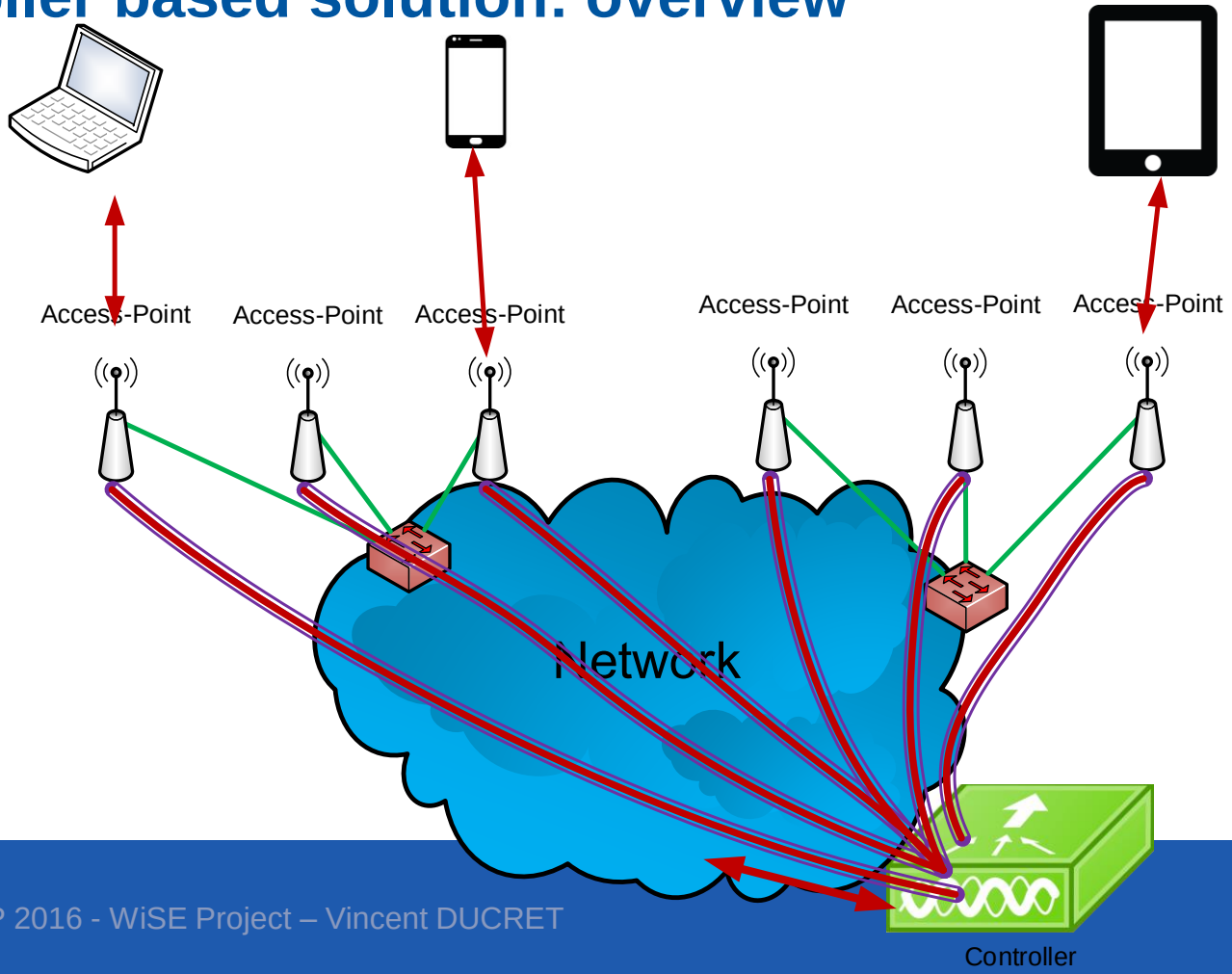


Service provided today

Building A
Fully covered
by CERN Wi-Fi

Building B
No CERN Wi-Fi

But some “rogue” APs

Building C
CERN Wi-Fi
in some rooms only

Building D
Fully covered
by CERN Wi-Fi
but it does not
work properly
…
users add “rogue” APs
…
and it works even worse

Service provided tomorrow

Building A

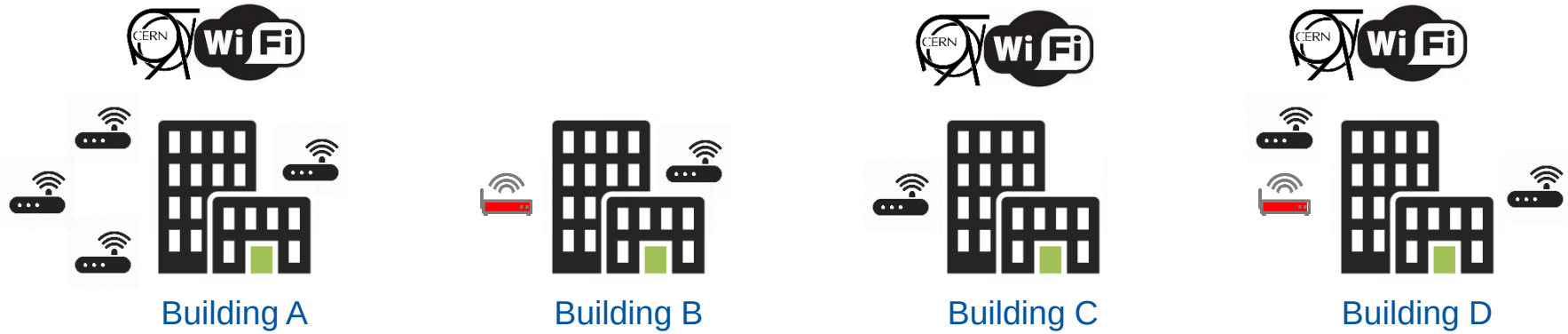
Building B

Building C

Building D

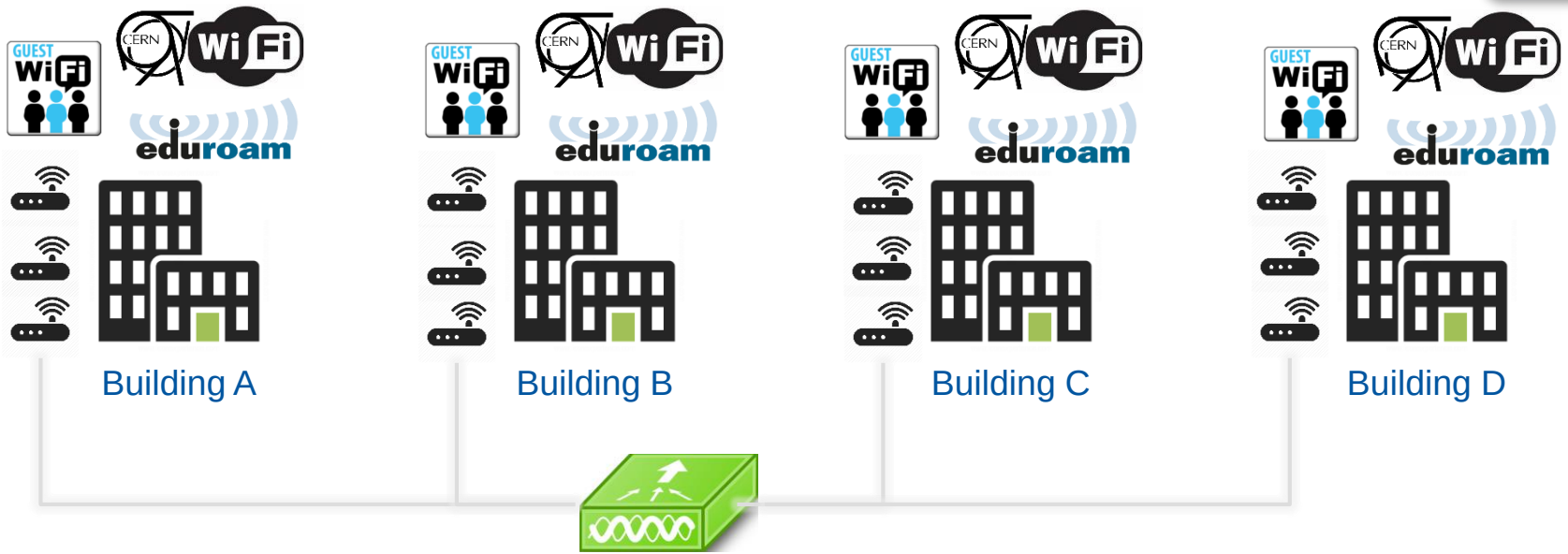
- The same, high-quality service in all office buildings (~200 Buildings, ~4.000 Access-Points)
- “Guest Wi-Fi” for visitors
- No more rogue access-points

Configuration and Monitoring today



- ~1.500 Access-Points = ~1.500 Configuration files
- Many unmanaged rogue access-points
- No global overview

Configuration and Monitoring tomorrow



- ~4.000 Access-Points = 1 single point of configuration
- No more rogue access-points (we can detect them!)
- Fully detailed global overview of the Wi-Fi environment

User mobility today

A.A.A.A

Building A

IP Subnet A

Building B

IP Subnet B

Building C

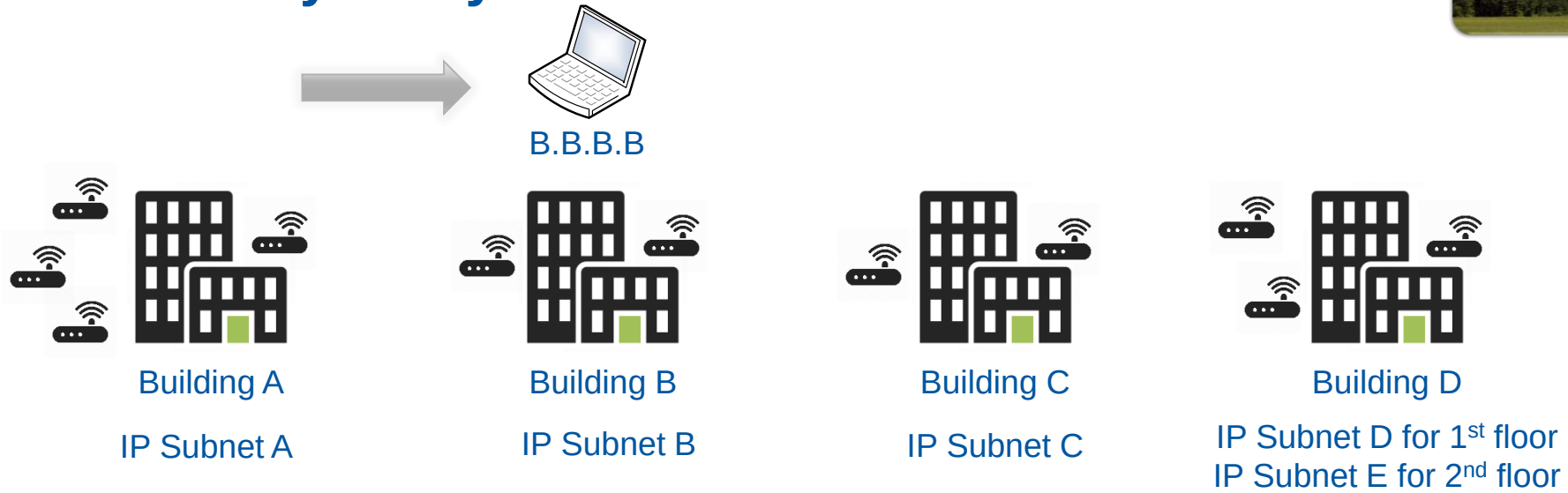
IP Subnet C

Building D

IP Subnet D for 1st floor
IP Subnet E for 2nd floor

- A client's IP address depends on its physical location
- Clients need to change IP address when moving across the coverage area ==> disconnection

User mobility today



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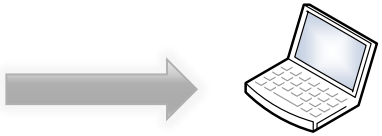

C.C.C.C

Building A

IP Subnet A

Building B

IP Subnet B

Building C

IP Subnet C

Building D

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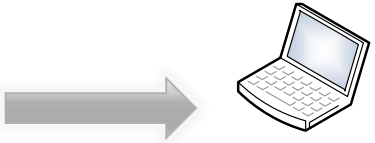
User mobility today



D.D.D.D
or E.E.E.E

Building A

IP Subnet A

Building B

IP Subnet B

Building C

IP Subnet C

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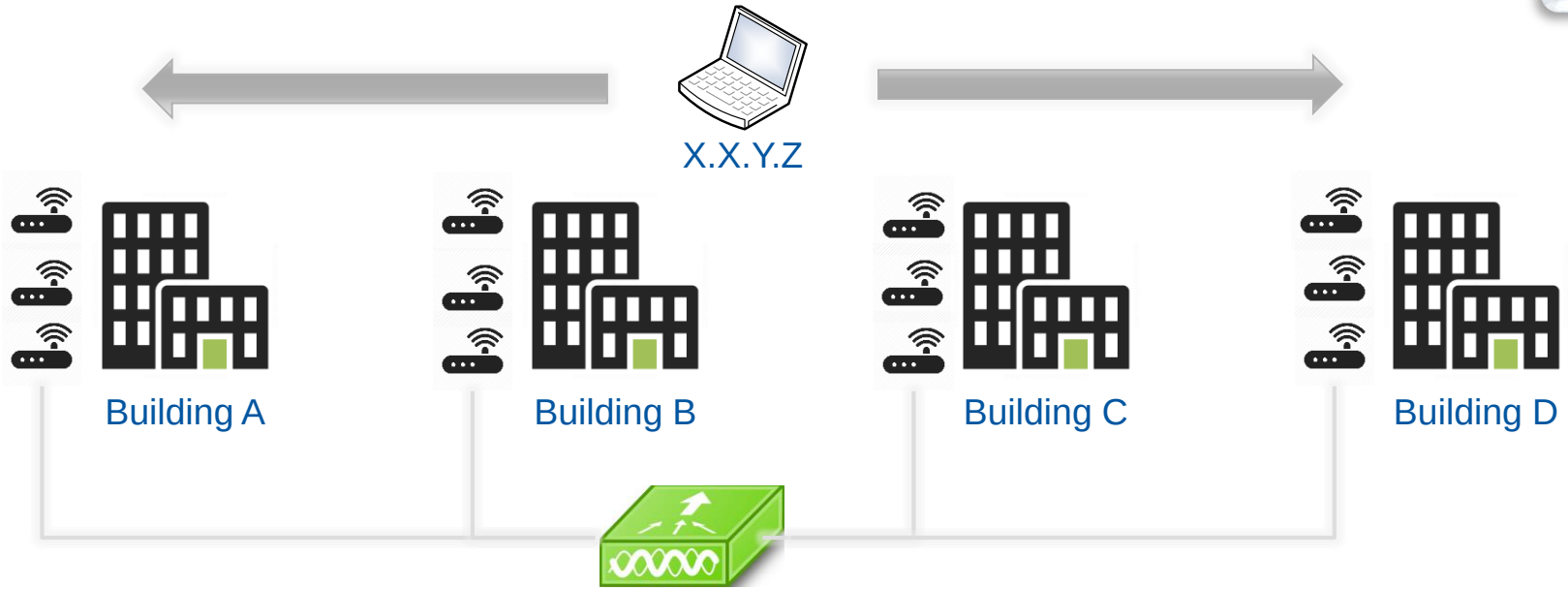
User mobility tomorrow

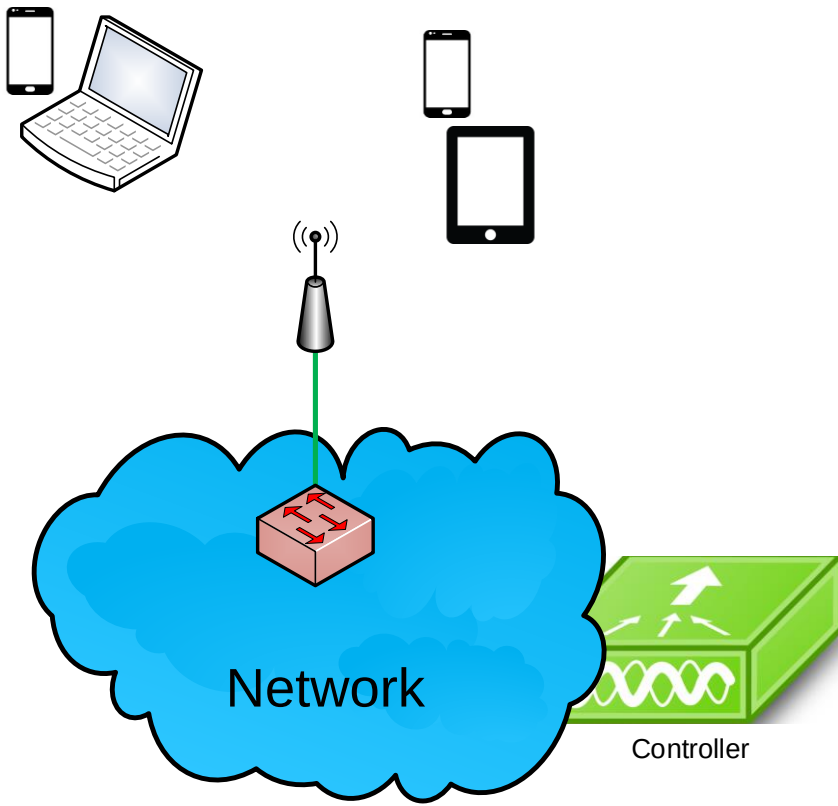


- A client's IP address is INDEPENDENT of its physical location
- Clients can keep the same IP address when moving across the coverage area

Guest Wi-Fi with the new solution

- Controllers centralise the traffic
- Guests are redirected to a self-registration portal which sends an access code via SMS.

  => No need for a CERN approver.
- Guest traffic is isolated (internet access only)



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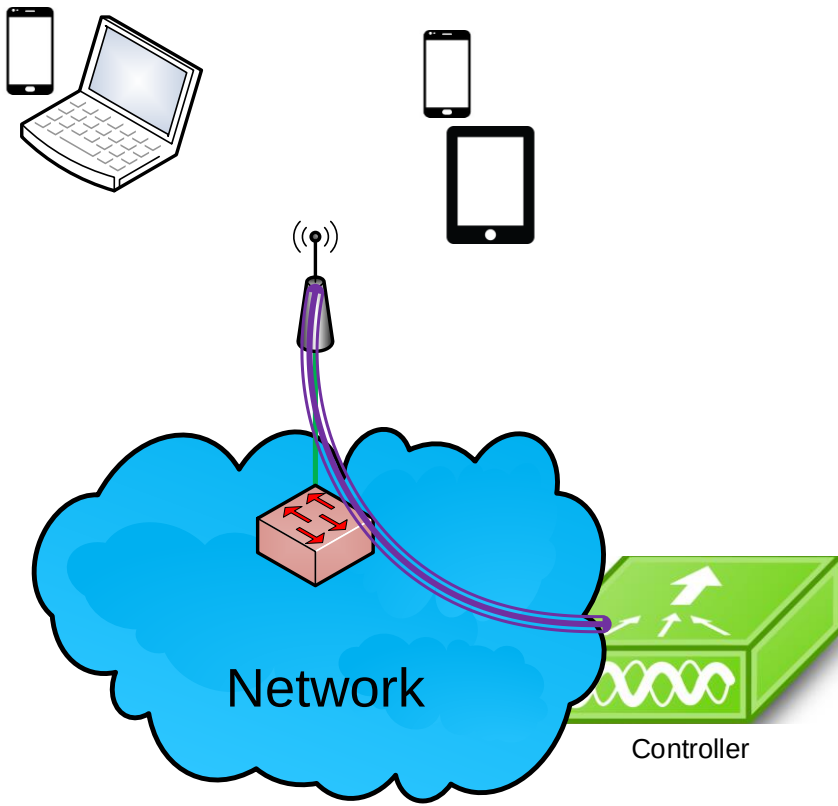

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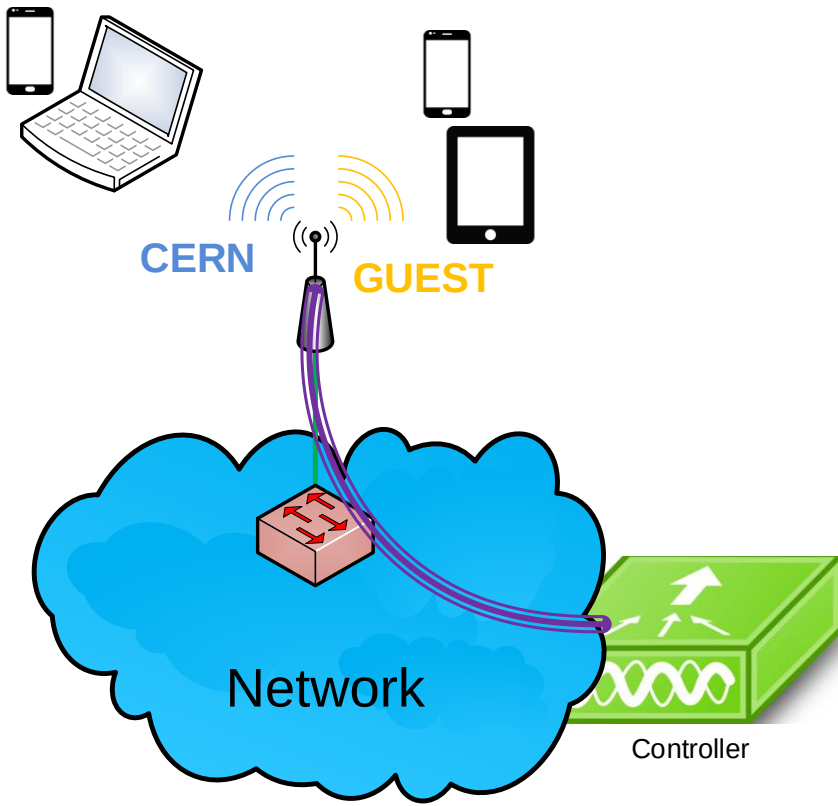

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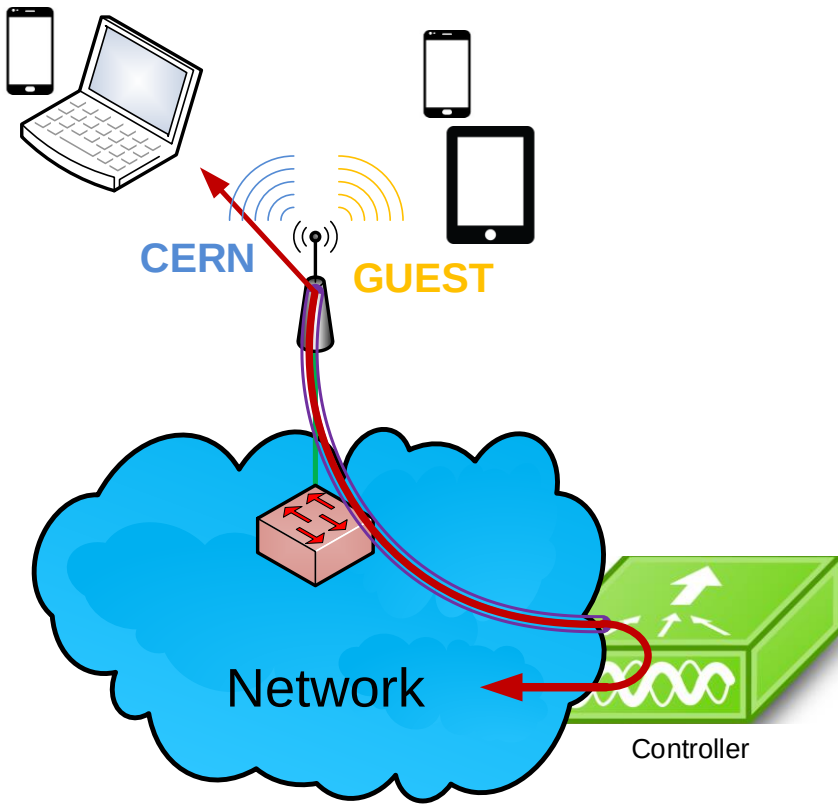

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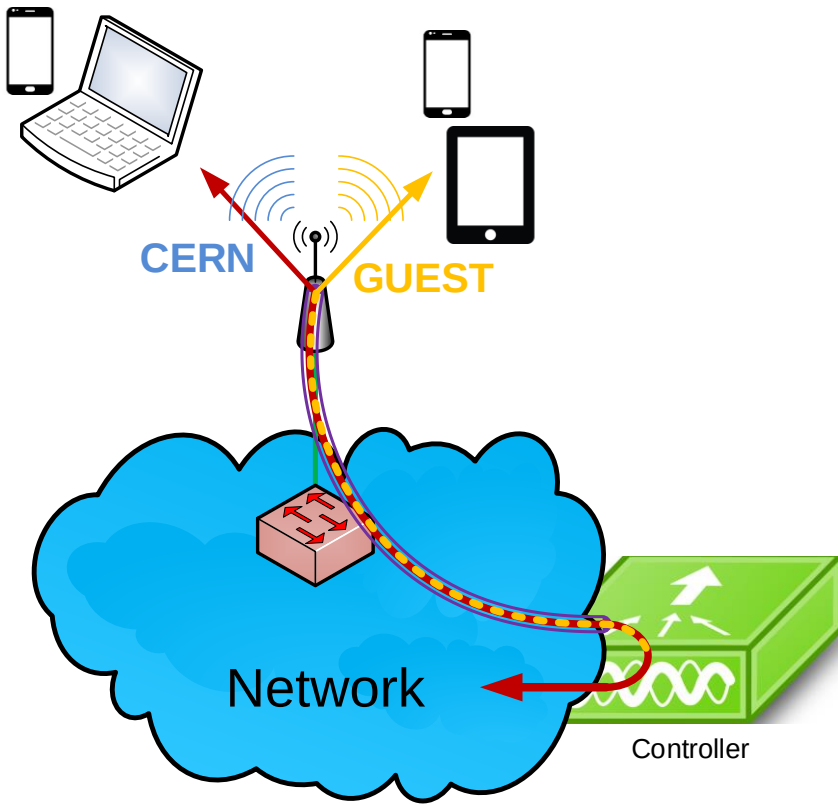

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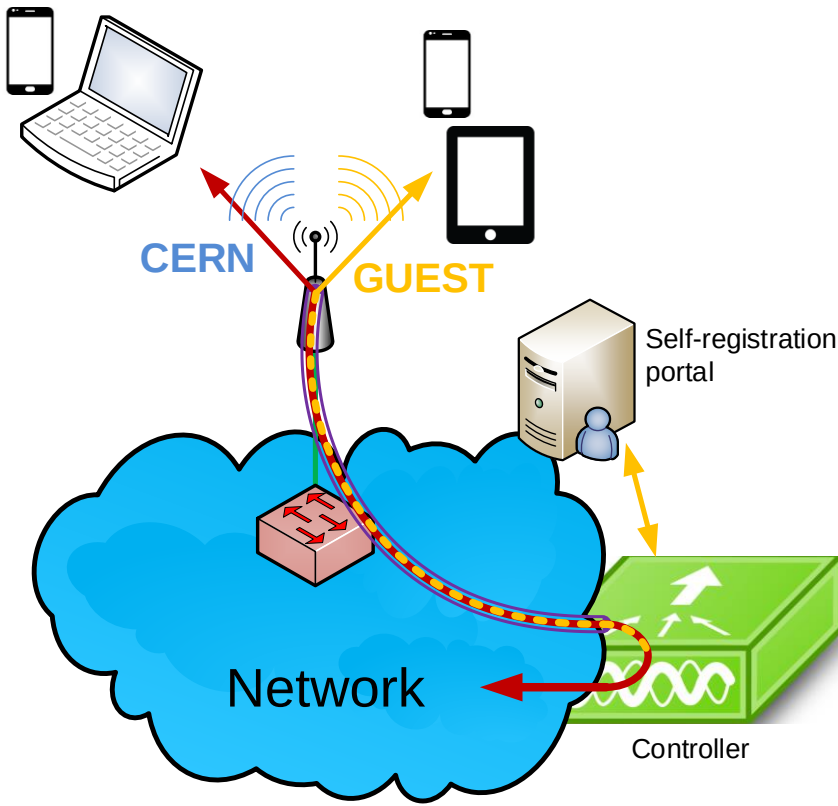

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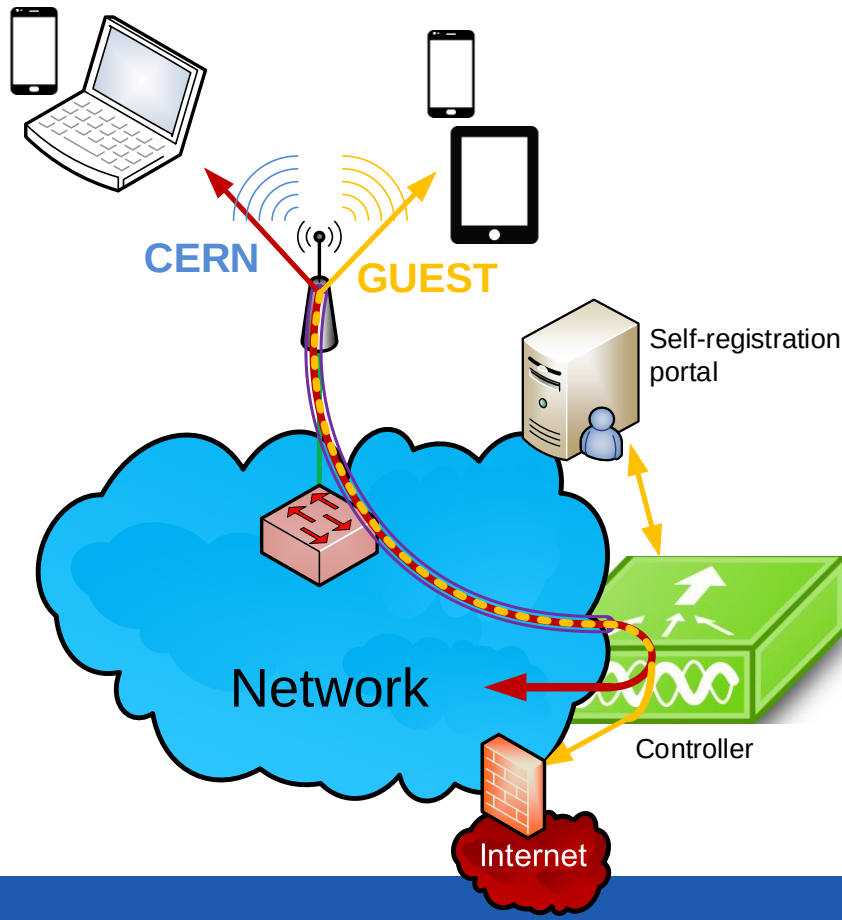

What performance can we expect ?

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Theory

802.11ac

866 Mbps
1300 Mbps
1733 Mbps
2340 Mbps
3466 Mbps

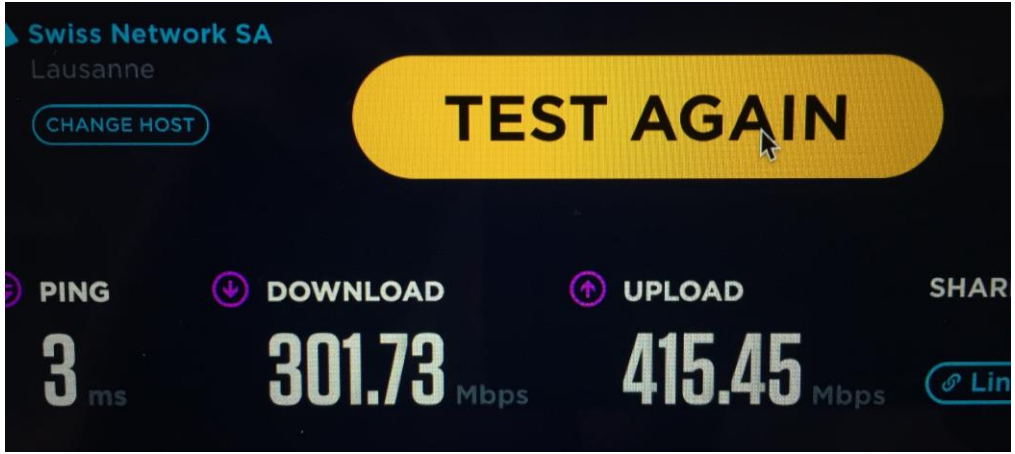
What performance can we expect ?

Theory

802.11ac

866 Mbps
1300 Mbps
1733 Mbps
2340 Mbps
3466 Mbps

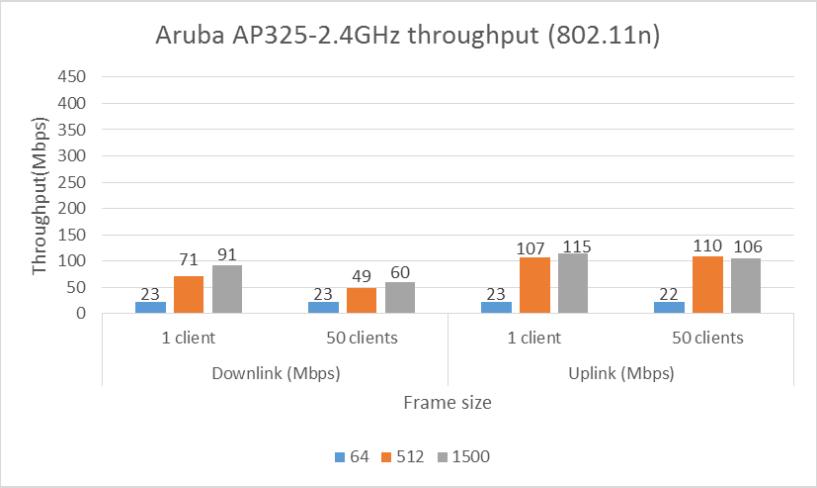
802.11ac reality today

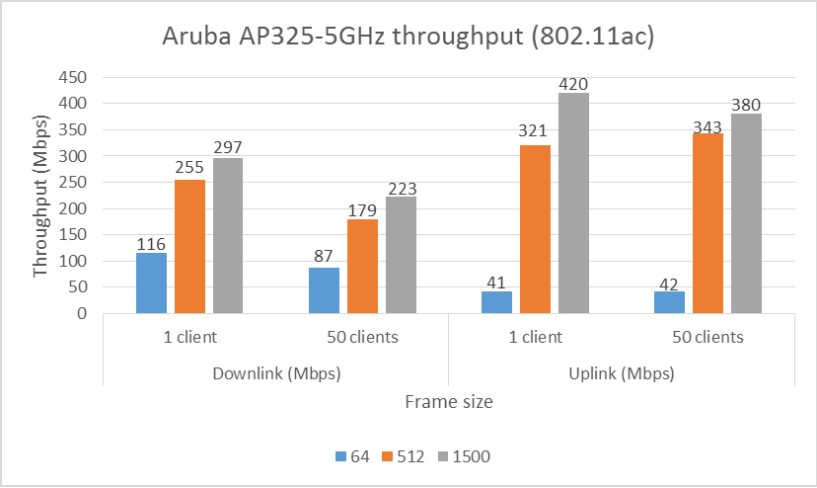


Technical evaluation: expected performances (real traffic throughput)?

- 100-150 Mbps for a Smartphone (2015+)
- 200-300 Mbps for a laptop (up to 400Mbps with the latest models)

Performance depends on the client and not, as today, on the Wi-Fi infrastructure.





Next steps

- Pilot implementation on-going
  - Controllers installed
  - API tests for deployment/configuration automation are underway
  - Guest Wi-Fi interface being tested
- Deployment in the Pilot buildings: November 2016
- Global deployment: from mid-January 2017
  - 55+ buildings are cabled and waiting

Questions?