Every Room Is Its Own Problem: Designing Wi-Fi for Hotels

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The guest is not comparing you to an enterprise network. They are comparing you to their broadband at home.

A school fails all at once.

A hotel fails one room at a time.

Two hundred rooms are fine. Room 412 generates a complaint most weeks, and nobody can work out why, because the survey looked good and the corridor coverage is excellent.

That is the shape of hotel wireless, and it comes from the constraint that dominates the building.

A hotel is not one space with a load profile. It is a couple of hundred small, walled, isolated spaces, each containing one or two people who expect the network to behave exactly like the one at home.

They are not comparing you to a corporate WLAN.

They are comparing you to their broadband at home, on their own sofa, with their own access point serving nobody but them.

That is a difficult benchmark.

And it is the one you are actually designing against.

The walls decide the design

In many environments, wall construction is one input into the design.

In a hotel it can become the dominant one.

Guest rooms are separated by walls built for fire separation and acoustic isolation, not for RF propagation.

Depending on the age and construction of the property, those walls might be dense block, poured concrete, plasterboard on metal stud, or, in older buildings, solid stone.

Every one attenuates RF differently.

And then there is the detail that catches people out.

In a great many hotels, the bathroom sits between the corridor and the bed.

So an access point mounted in the corridor is not necessarily transmitting through one bedroom wall.

The RF path may go through the corridor wall, across a bathroom containing tile, mirrors, plumbing and metal fittings, through another partition, and only then reach the guest sitting on the bed with a laptop.

The corridor reading is excellent.

The reading where the guest actually uses the network may be considerably worse.

And the return path matters too.

The AP may be capable of transmitting at considerably more power than the phone in the guest's hand. Seeing the SSID or measuring a strong downlink signal does not automatically mean the client has an equally reliable path back to the AP.

Understand the room layout.

Understand the wall construction.

Understand where the bathroom sits.

Then decide where the radios belong.

In this building type, geometry can drive the entire design.

Corridor or in-room

This is one of the decisions that defines a hotel deployment, and there is no universal answer.

Corridor-mounted access points can serve several rooms each.

That means fewer APs, less cabling, easier maintenance and no equipment inside the room for guests to interfere with.

The cost is that almost every client is being served through building material.

Sometimes that is one relatively benign partition.

Sometimes it is several walls and a bathroom.

The RF cells can also become irregular, with their usable boundaries ending up in places that are difficult to predict without understanding the actual construction.

In-room access points, often wall-plate units positioned near the desk, television or bedside area, bring the radio much closer to the client.

The cells are smaller, RF reuse becomes easier to control, and many wall-plate units also provide wired connectivity for televisions, phones or other room devices.

The trade-off is obvious.

More APs.

More switch ports.

More cabling.

More devices to manage, power, monitor and potentially license.

The answer is not that one topology is universally better.

The building decides.

A modern hotel with dense construction, compact rooms and a refurbishment programme already opening walls may strongly favour an in-room architecture.

A property with lighter construction, larger rooms and no practical way of pulling cable into every bedroom may be perfectly capable of using a corridor design, provided the RF design accounts for what those signals actually have to travel through.

What does not work is choosing the topology based on AP count alone and then validating it from the corridor afterwards.

Consistency matters more than headline speed

Hotels have an unusual client distribution.

The total number of devices across the property can be enormous.

The number associated with any individual bedroom AP or RF cell may be relatively small.

A room might contain two phones, a laptop, a tablet, a watch and perhaps a streaming device the guest has brought with them.

That is still enough traffic to require proper capacity planning, especially when several devices are streaming or performing large cloud transfers.

But inside ordinary guest rooms, raw density is often not the primary design problem.

Consistency is.

You are not only trying to construct a high-capacity WLAN.

You are trying to build hundreds of small RF environments that behave predictably whichever room the guest happens to receive.

That changes what you optimise for.

Transmit power.

Cell size.

Channel reuse.

Co-channel contention.

Minimum data rates.

Roaming behaviour.

Interference.

And, above all, repeatability from one room to another.

A guest who has a superb experience in room 210 and a poor one in room 412 does not conclude that room 412 has an RF problem.

They conclude that the hotel has bad Wi-Fi.

Uniformity is part of the product.

The guest brings expectations from home

At home, a guest's devices can usually discover and communicate with each other.

That is how casting works.

It is how wireless speakers, printers and other consumer devices have been designed to behave.

Hotel guest networks traditionally break that model for a very good reason.

Security.

Place hundreds of unrelated guests onto the same Layer 2 network without suitable isolation and you have created a very different problem.

So client isolation is enabled.

Now the guest walks into room 412, connects their phone and tries to cast Netflix to the television.

Nothing appears.

From the network's perspective, the security policy is doing exactly what it was designed to do.

From the guest's perspective, the Wi-Fi is broken.

Modern hospitality networking needs a better answer.

DPSK or other per-user or per-room credential mechanisms can be combined with segmentation, policy enforcement and appropriate service-discovery controls to create something much closer to a private home network.

The guest's devices can belong to the same logical room or user network.

Their own devices can communicate where policy allows.

Devices belonging to another guest remain isolated.

Room 315 cannot see room 316.

The exact implementation varies by platform. It might use DPSK, Passpoint, dynamic VLAN assignment, identity-based policy or another form of private network segmentation.

The important concept is the same.

Do not make hundreds of unrelated guests share one enormous trust domain simply because they joined the same SSID.

And if you want casting to work, design for it deliberately.

It should not be an accidental side effect of relaxing client isolation.

Onboarding has to be almost invisible

The guest has just travelled.

They may have been driving for hours, getting off a flight or moving through airports and railway stations all day.

They are standing in a room they have never been in before.

Their patience for troubleshooting your Wi-Fi is measured in seconds.

Every unnecessary step in joining the network increases the likelihood of a support call.

Keep the process short.

A room number and surname.

A credential on the room key wallet.

A QR code.

A dynamically issued private key.

Whatever mechanism you choose, it should work first time on the device the guest is holding.

If you use a captive portal, understand the mechanisms underneath it as well.

Clients need working IP addressing and DNS. Required portal resources, certificate-validation services and anything else needed before authentication must be reachable through the pre-authentication policy.

Operating systems also perform connectivity checks to determine whether they have unrestricted Internet access or have joined a captive network, while newer mechanisms such as CAPPORT can provide explicit information about captive status.

Get any of that wrong and you produce one of the most frustrating faults in hospitality Wi-Fi:

The guest is connected to the SSID.

They have an IP address.

But the login page never appears.

That guest does not raise a ticket saying:

"Captive portal detection appears to have failed."

They ring reception.

"The Wi-Fi doesn't work."

The public spaces break every rule

Once you leave the bedrooms, the design problem changes again.

The lobby, bar and restaurant may contain considerably more clients per RF cell, users are mobile, and these are often the first places where guests experience the network.

Then there are the meeting rooms.

Conference spaces and ballrooms are where hotel wireless can become a completely different engineering exercise.

The same property where an AP normally serves a handful of devices in each bedroom may suddenly have three hundred people arriving in one ballroom for an event, each carrying a phone and a laptop.

Now airtime absolutely matters.

So does channel reuse.

So does contention.

And the room you designed yesterday may not physically exist tomorrow.

A ballroom might operate as one large room for a conference on Monday, be divided into three meeting rooms using movable partitions on Tuesday, and be opened back into one large space for a wedding at the weekend.

The RF design has to tolerate all of those configurations.

Understand what those partitions are made from.

Do not assume that because a partition looks substantial it provides useful RF attenuation.

And do not assume the opposite either.

Measure it.

Then design the channel and power plan so that the WLAN remains usable when the room configuration changes.

Beyond that there are lifts, stairwells, corridors where guests continue voice and video calls while walking, pool and spa areas with unusual construction and environmental conditions, gardens and outdoor terraces that someone will eventually want covered.

At that point you are no longer designing one hotel WLAN.

You are designing several different RF environments that happen to share the same controller.

You only get the room when it is empty

Hotel deployment has another constraint that is easy to underestimate.

The building is trading while you work.

You get access to a bedroom when it is unoccupied.

That means installation may happen in phases.

Different floors may be completed at different times.

Different room types may become available on different days.

And for some period of the project, the hotel may operate with part of the new design installed and part of the old one still running.

That transition needs designing too.

The WLAN cannot become unusable simply because the installation is halfway through.

Cabling becomes its own project.

Risers may be full.

Fire stopping needs to be maintained.

Listed or boutique properties may restrict new penetrations or visible containment.

Some areas may be practically impossible to cable without significant building work.

Refurbishment cycles are therefore one of the best opportunities to fix hotel wireless properly.

If walls are already being opened and rooms are already out of service, that is the moment to be discussing AP placement and cabling.

Not six months after the decorators have finished.

Plan the deployment phasing as carefully as the RF.

Because in hospitality, the operational constraints of the building frequently decide what is technically possible.

Validate from the bed, not the doorway

Here is how room 412 gets created.

The engineer walks the corridor.

Signal looks excellent.

They step inside a few bedrooms.

Signal still looks fine.

The validation passes.

But nobody booked that hotel room to use the Wi-Fi while standing beside the door.

The guest uses it on the bed.

At the desk.

Perhaps on the balcony.

Their phone may be sitting on a bedside table.

Their laptop may be on the opposite side of the room.

Their body may be directly between the client and the access point.

And if the AP is in the corridor, the bathroom may still be sitting in the RF path.

That is where you validate.

Take calibrated, repeatable RF measurements using the appropriate survey equipment.

But do not stop there.

Validate the experience using representative client devices as well.

A modern smartphone.

A typical laptop.

If casting is part of the service, test casting.

If a captive portal is used, test onboarding.

If voice or video mobility matters, make a real call and walk from the bedroom down the corridor towards the lift.

Survey a representative sample of every room type.

Corner rooms.

Rooms at the end of corridors.

Rooms with mirrored layouts.

Suites.

Accessible rooms.

Rooms beside stairwells or lift shafts.

Top-floor and ground-floor rooms where surrounding construction may be different.

And investigate the exceptions.

If 199 rooms behave correctly and room 412 does not, room 412 is not noise in the dataset.

Room 412 is the job.

Final Thoughts

A hotel is not one wireless network.

It is hundreds of small RF environments that guests expect to behave identically, attached to public and conference spaces that may have completely different capacity and mobility requirements.

The walls decide what is possible.

The room layout influences where the radio needs to be.

The RF design determines whether the connection is reliable.

The network architecture determines whether the guest's devices behave the way they expect.

And the guest decides whether you succeeded using a benchmark set by the broadband connection they left at home.

So understand the construction before choosing the topology.

Design for consistency between rooms, not simply coverage across a floor plan.

Keep cells controlled.

Consider the client transmit power, not just the AP.

Give guests private connectivity that behaves as much like home as is safely possible.

Make onboarding take seconds.

Design casting rather than hoping it works.

And when you validate the deployment, walk past the doorway.

Sit on the bed.

Because that is where the guest is going to judge it.

Get all of that right and nobody mentions the Wi-Fi at all.

In a hotel, that might be the highest praise available.

This is part of a series on designing wireless for real environments, where the constraint that dominates the building decides the design.

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