



Hospitality Wi-Fi

Best practices for designing a Wi-Fi network for a hospitality venue.

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Did you know that a stable Wi-Fi connection is more important to a hotel guest than a breakfast or parking?

Or that 65% of hotel guests connect to Wi-Fi within seven minutes of arrival? And 9 out of 10 hotel guests expect free Wi-Fi?

In other words, fabulous swimming pools, extra comfy beds, vitamin water showers, luxurious lobbies and exquisite foods are great add-ons but are easily surpassed by the lack of necessities —like a reliable Wi-Fi connection.

The fact is, providing a reliable Wi-Fi connection is no longer a nice-to-have for hotels, it is critical for customer satisfaction. And with the popularity of review platforms like Booking.com, Expedia, Trip Advisor, Google Maps, having lousy Wi-Fi can have severe consequences for a hotel's rating and reputation. Simply put, a poor performing Wi-Fi network can be costly for hotels.

A high-performance Wi-Fi network starts with a good design that can accurately simulate and predict how the network will perform under the conditions it is subjected to. These conditions include anything from the number of guests at any given time, to the materials of the walls, the placement of the bathrooms and piping, the number of devices that require support, and so on and so forth.

In this eBook, we explore what the different challenges and best practices are of designing a Wi-Fi network for a hospitality venue.

What venue types do we cover in this eBook?

When it comes to hospitality venues, there are many different types of buildings and environments to consider. There are high-rise hotels, low-rise hotels, resort hotels spread out over a vast territory and many variations in between. All of these types of venues can have varying degrees of density at any given time— from empty low-density environments to busy high-density environments.

Depending on the size of a facility, its purpose and types of services offered to guests and staff, the hotel's Wi-Fi network requirements, network design challenges and best practices can all vary.



Challenges of hospitality Wi-Fi

While there can be many challenges when designing a Wi-Fi network for a hospitality venue, the level of complexity often depends on the type of venue and its operational model. Just as Wi-Fi project requirements vary depending on the

size and the purpose of a facility, the potential challenges of designing a Wi-Fi network for that venue differ too.

Here are the most common Wi-Fi challenges to consider.

Capacity and performance challenges

Did you know that on average, we each carry about three wireless devices on us? And when you consider the rate at which new wireless devices are coming onto the IoT and wearables market, you can imagine that the number of devices per person is only going to grow. In fact, for select countries, the number of connected devices per person is forecasted to grow to an average of 6.58 by 2020.

For hospitality venues where large populations of people and devices can exist all at the same time, this means that the wireless networks need to be able to handle a high amount of data traffic at any given time. In other words, wireless networks need to be designed not only for coverage but capacity and overall performance as well.

Here are some key issues associated with capacity and performance challenges.

Applications and data traffic

In addition to the number of devices that will potentially exist within the spaces of a hospitality venue, the types of devices must also be considered and more specifically the types of applications that they use. With more and more people using their mobile devices to access social media,

video streaming sites, voice over Wi-Fi calling services, e-mails and just about everything else—you need to consider both the number of devices and the applications they will use on them.



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Different standards

Standards are a shifting landscape when it comes to designing wireless networks. For Wi-Fi there are already different standards in place (802.11 b/g/n for 2.4 GHz, 802 a/n/ac for 5 GHz) and new standards that are soon to come — 802.11ax.

And while evolving standards are a challenge that can be present in any venue, venues that need to be paid particular attention to are the high-density venues where many different types of devices are present, such as a hotel.

This is because when guests and staff are using different kinds of client devices with a different Wi-Fi connectivity standards, compatibility problems can occur and result in a slower network experience.

To avoid this, it's important to consider setting up the requirements depending on the technology that is already used in the venue when doing the planning and design of the Wi-Fi network.

Hidden node scenario

Wi-Fi is a shared medium, and all devices (per AP radio) need to be able to hear each other to communicate effectively. So when completing the design, consideration needs to be given to the fact that often multiple guests are staying in a single room and all of their Wi-Fi devices will connect to the same Wi-Fi bandwidth/spectrum and radio capacity on a single AP. In some cases, in-house wireless devices located in the same room will also use the same AP and wireless bandwidth (e.g., Voice over Wi-Fi phone, Heat and Ventilation controllers). If all of the wireless devices in a single room are not able to hear each other, a so-called "hidden node" scenario will occur.

Simply put, hidden node scenario is when a device is visible to an AP (Access Point), but not to other wireless devices

communicating with the same AP. When this happens, it commonly leads to noise and communication problems on the network.

Hidden node scenario can also occur when APs with external antenna connectors are extended to other hotel rooms to save on the number of APs.

To escape the "hidden node" scenario, remember that capacity and performance of a network depends extensively on the number of APs connected to it (more is not necessarily better!). The location of clients and APs (the closer the device is to the AP the better the data rate between them), the density of Wi-Fi clients, and the power balance between them (to prevent "packet retry" and "discard packet") are also important in avoiding the "hidden node."

Backhaul cabling challenges

Older cabling

Have you ever noticed most older hotels still have CAT-3 (twisted pair telephone cabling) in the guest rooms for standard analog telephone connectivity and coaxial cables for analog television? And that newer hotels tend to have CAT-6 or CAT-5e cabling installed per hotel room?


This is because re-cabling older hotels is often not a viable option – from both a budget perspective but also from a business interruption perspective. Re-cabling an entire hotel can be a very large job. However, some solutions allow using these older cabling systems as a backbone for Wi-Fi network — they are just typically limited in capacity, performance, and scalability. Therefore, where possible to do, re-cabling is a much better solution.

Local based servers

Cabinets, computer rooms and data centers with local based servers (e.g., with centralized management systems, Wireless LAN Controllers, services to provide IP address to the Wi-Fi clients) can also cause difficulties when designing a wireless network in a hospitality venue.

To avoid these issues, it is essential to learn the capacity of the used servers as well as the network connectivity (technology

10/100/1000Mbps, switches, routed) and communication protocol flow to see and bypass any bottlenecks in the infrastructure of those areas. You also need to always pay attention to the capacity provided by the Internet Service Provider (ISP) to the Internet and supported speeds (e.g., 1/10Gbps or more to support the volume of video/voice/data services the guests consume in the hotel).



You need to consider both the number of devices and the applications they will use on them.

Business challenges

Deploying Wi-Fi in hospitality venues is not just about the actual performance of the network but about overcoming the challenges often in place even before the network

is deployed or upgraded. Mainly, these two challenges revolve around two things: budget and planning, and then approval by the business to implement the design.

Budget

When looking at the cost of deploying a high-performance Wi-Fi network, it can get expensive. There are the equipment costs (APs, cabling, other network components), the labor costs throughout each phase of the project, and last but not the least – the cost to troubleshoot and fix the network if it does not perform as expected once it's turned on. Fact is, deploying a great Wi-Fi network can get expensive, so the

costs need to be planned and budgeted for accordingly to optimize the design while minimizing the costs associated with it. But the budget is not the only business challenge you can have on a Wi-Fi deployment project.

What is the other big challenge of deploying networks within hotels?

Aesthetics

Often in hospitality venues, the building owner can be a different entity from the business owner, and each has their different criteria and limitations. Building owners tend to be more protective of the actual property, and if that is the case, it might be challenging or prohibited to do any physical changes to the building (drilling holes, mounting

access points, laying cables, etc.) preventing a proper device installation. On the other hand, business owners know that some of the most significant measurements of their success will be customer satisfaction, customer advocacy and repeat business – so are more open to physical changes if the tradeoff will help their business succeed.



Best Practices for Hospitality Wi-Fi

Now that we've covered the challenges of designing wireless networks within a hospitality venue let's look at some best practices for designing them.

Where should there be networks?

While every hospitality venue is different, within a typical hotel or resort environment, there are frequent areas where hotel guests and staff are usually located and the demand for wireless connectivity will be higher.

In-building

These spaces are your typical indoor hotel or resort spaces like the lobby, guest rooms, pool area, fitness room, conference rooms, etc. These areas usually have the most guest traffic and need to be designed according to expected capacity. For example, a conference room will have higher capacity requirements than each of the individual guest rooms.

Outside the building

Outside the building should have coverage in areas where guests and staff would commonly walk or hang out around. This would include areas like the general hotel grounds, outdoor pool areas, recreational areas such as tennis or basketball courts, or in the case of resorts, in the beach area.

Facilities

Facilities outside of the main hotel venue need to be considered in the design of the network. Facilities could be indoor fitness centers, recreation centers, second or third guest room buildings, etc.

What types of networks need to be planned for?

When looking at the different types of networks that need to be designed within a venue, it's important to segment by the type of users, which means there will often be more than one type of network to install. If this type of network segmentation is not done, or not done properly, it can cause both network performance and security issues. To avoid such issues, use proper segmentation implemented with different physical cabling or by using Virtual LANs - VLANs (depending on the security requirements).

In hospitality venues, users of the typically fall into one of three categories: guests, staff, or the technology and devices that support the operations of the hotel.

Guest Wi-Fi networks

The most important network in a hospitality venue is the guest Wi-Fi network. It is the network that the guests are given access to and rely upon to communicate across. As you can imagine, this is the network that often sees the heaviest amount of wireless traffic both in terms data and density.

Staff Wi-Fi networks

In addition to the guest Wi-Fi network, there should be a staff Wi-Fi network. The purpose of this network is to strictly supports the front and back-end operations of the hotel: check-in/out, porter service, voice over Wi-Fi, PoS (Point of Sales) terminals enabled over Wi-Fi, etc. This network is typically only accessed by hotel staff - but depending on the size of the hotel, the data and density of traffic on this network can also be very heavy.

Supporting devices Wi-Fi networks

Thirdly, there should be a separate wireless network for the devices that support the hotel facilities. These devices can be anything but typically include things like room/temperature control, LED-Lighting, Wireless/RFID door control, wireless cameras, smart TV systems. And with the growing IoT (Internet of Things) market, the importance of having a network for devices will only grow. Gartner Inc. forecasts that 8.4 billion connected things will be in use worldwide in 2017, and will reach 20.4 billion by 2020 . In the future, as the number of IoT (Internet of Things) devices that come on the market is rapidly growing, the importance of this type of network will become more and more significant.



Gathering Customer Requirements

Because every venue is different with different limitations and requirements, it's always important to gather customer requirements before you start the design of the network.

It's also important to gather the existing information about the hotel to understand what issues users of the network are currently experiencing, what applications are currently using the network. It's also important to consider how the

usage of the network may scale up in the future in terms of new technologies and devices, capacity, and operational management.

Use the following check-list for either an existing environment or a new building environment to prepare and understand the customer requirements and existing issues of the venue Wi-Fi services.

Planning

- › What services are currently in use over the Wi-Fi network? (Internet, Work Orders, etc.)
- › What types of applications are most commonly used: Voice, video, or data
- › What are peak on/off hours for network activity? (morning, noon, early evening)
- › Is the venue located in a high-density city area? (to account for any Wi-Fi bleeding into the facility from neighbouring buildings)
- › Is there restricted access to the venue that you need to adhere to? (for example, you can only do site walks late evening or early morning, not on weekends)
- › What equipment does the venue already have installed? Is there a vendor of preference for equipment?
- › What are the Service Level Agreements in place?

Planning & design considerations

- › Is a floorplan available? If yes:
- › AutoCAD including building materials? JPG or PNG? PDF? Drawing? Other?
- › What are the building materials you need to model the venue with during the design (concrete walls, windows, metal, fire-rated doors, etc.)
- › How is the network expected to perform once installed? What is the targeted performance for each network type?
- › What aesthetic limitations exist?
- › Can Access Points be visible to guests?
- › Are blinking LED lights allowed?
- › Are there high-density environments? If so, what are they? (lobby, conference rooms)
- › What are the RF coverage areas to consider? (indoor/outdoor)
- › Estimated number of active Wi-Fi devices on the network for Guest Rooms, Lobby, Restaurant, Conference Rooms, Swimming Pool, Gymnasium, Any other distinct area/zone of the environment

Regulations

- › What are the regulatory domain/frequency limitations for the country? (Check with government or regulator about the allows Transmit Power, EIRP,etc)

To understand customer requirements and the existing issues within the venue you will need to different hotel personnel: existing wireless staff, cabling staff, network/server/storage administrators, site/facility manager, security manager, finance manager, and where possible maybe even the odd guest (although not always allowed).



Designing Guest Room Wi-Fi

A high-performance Wi-Fi network that guests can rely on to access and share their data is critical for any hospitality venue in this day and age. Not always easy to do when there can be a large amount of people and devices all trying to

access the network at the same time to share large amounts of data (video, images, emails, etc).

Here are some best practice approaches to use.

Option #1: access points in guest rooms

A suggested best practice for guest room Wi-Fi is to install an AP right in the guest room where possible. But for several reasons like limited access to rooms, an owner fearing vandalism or theft, lack of budget or a “no guest disturb” policy it is not always possible to do. If that is the

case, you may have to consider what is possible to do given existing circumstances and limitations.

Tip! Do not hide APs behind a desk, closet, or bed. Doing so will negatively impact the Wi-Fi signal strength and cause issues for guests in that room.

Option #2: access points in corridors

In cases where the building materials are not heavily impacting the RF (Radio Frequency) propagation of the Wi-Fi signal, a good solution can be placing the APs in the corridors. But when this happens, aesthetics need to be carefully considered— as previously mentioned, the placement and visibility of an AP can be a very important factor in having the design of a network approved or not approved. If you find yourself in a situation where you don't seem to have much of a choice, you can consider ‘hiding’ an AP behind the ceiling panel using a “wall-plate” AP.

Wall-plate APs work well in many places because they tend to be small, aesthetically unobtrusive and easy to install. They can also be secured/locked to the wall to avoid theft or someone pressing the reset button. The downside to wall-plate APs are that they can be limited in features and

as a result may not be able to cope with high-density zones which means the network may end up being over-utilized and slow which could lead to a poor guest user experience.

One overall downside to using APs in corridors is the distance from the AP to where the guest chooses to work or access the network. For example, typically, when browsing the internet or working in a hotel room, guests tend to sit closer to windows because it's often where the desk or table is located. If this is the case and an AP is installed in the corridor, anything located between the corridor and the hotel room's window (fire-rated doors, bathrooms, and mirrors) will be attenuating the Wi-Fi signal and will put the guest's Wi-Fi experience at risk.

Which is why another option is...

Option #3: access points outdoors

In the case described above where there can be no AP in the room, and the distance between the AP in the corridor and where the person may work the most in the room is

put at-risk by materials which may attenuate the Wi-Fi signal, another alternative is to mount the APs outdoors and propagate Wi-Fi through the windows.

Dual radio or single radio access points?

Dual radio access points

When looking beyond just the placement of APs and into the type of APs themselves, then a best practice for guest room Wi-Fi is to utilize a dual-band AP (2.4 GHz and 5 GHz) in the deployment. This is because a single 2.4 GHz only

radio can be limited in both channels (mainly 1, 6 and 11) and spectrum utilization. In addition to this, most of the newer devices coming onto the market or that will come onto the market in the future will support 5 GHz frequencies.

Single radio access points

In the situation where you are using only a single-radio AP that is band-unlocked (thus flexible to choose 2.4 GHz or 5 GHz), and the thickness of the walls does not attenuate the signal too much, you can adopt the configuration alternation between 3 hotel guest rooms as your Wi-Fi design strategy.

An example of this would be ROOM #1 uses 2.4 GHz, ROOM #2 uses 5 GHz and ROOM #3 uses 2.4 GHz. The wireless network from room #1 covers room #2 as well, and the coverage of the room #2 extends to the rooms #1 and #3.

APs in guest rooms, depending on the building structure, can work the same way to provide coverage in the corridors because Wi-Fi clients will roam automatically based on the signal strength (RSSI – Received Signal Strength Indicator and SNR – Signal to Noise Ratio).

Important! Use 20 MHz channels only in the 2.4 GHz frequency (Channels 1,6,11 or sometimes 1, 5, 9, 13). Do not use 40 MHz channels in 2.4 GHz. Likewise, use 20 or 40 MHz channels in 5 GHz. While using 80 MHz is common in hotels it is not recommended because it occupies more spectrum and does not allow more throughput.

Designing high-density areas?

Hospitality venues can have many common areas that will be high-density and will require capacity planning to plan for the number of devices, people, and applications. Common areas in a hotel that would require such consideration would be conference rooms, lobbies, fitness centers, and anywhere many people at once will potentially try to access the network.

The most important aspect of designing Wi-Fi networks in high-density areas is to make sure the network can support

numerous devices working at the same time. This seems straightforward, but in reality it can be difficult to achieve.

Why so difficult? In each AP, each radio (2.4 GHz / 5 GHz / dual 5 GHz) can handle a high number of client associations but wireless operates as a kind of a round-robin mechanism. That means that only one device can communicate to one AP at a time and vice versa. Therefore, if all devices are transmitting at the same time your Wi-Fi network will either not work or not work well.

How can you best design for high-density areas?

- › Use multiple APs to distribute the clients evenly among them.
- › Consider using additional external directional antennas to cover specific areas to avoid the interference and Wi-Fi channel overlap.
- › Think in 3D, to avoid co-channel interference triggered by different channels used between APs on different floors
- › Use APs that have been proven to handle as many concurrent sessions as possible
- › Use APs that support technologies like QoS (Quality of Services) to prioritize video, voice and data applications
- › Separate SSIDs for 2.4 GHz and 5 GHz



Conclusion

Designing a high-performance Wi-Fi network is a challenging task, especially in a venue as dynamic as a hotel where number of guests, devices, and access to the network can be constantly shifting. And while there is no one best practice approach to designing all hospitality venues, we hope we've supplied you with some key best practice approaches and considerations to keep in mind as you approach your own wireless network design projects in the hospitality space. Because remember, while upgrading or designing a high-performance network may seem costly upfront, there is nothing more expensive to a business than a poorly performing Wi-Fi network that frustrates and deters guests from a positive end user experience.

About iBwave

iBwave Solutions, the standard for converged indoor network planning is the power behind great in-building wireless experience, enabling billions of end users and devices to connect inside a wide range of venues. As the global industry reference, our software solutions allow for smarter planning, design and deployment of any project regardless of size, complexity or technology. Along with innovative software, we are recognized for world class support in 100 countries, industry's most comprehensive components database and a well established certification program. For more information visit: www.ibwave.com.

