Key Planning Factors for Deploying Ubiquitous Wi-Fi Networks in Hotels

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ABSTRACT

The Internet has changed the way in which people work and live. Many when traveling expect to be Internet-connected at all times without being tied down to physical wires, just as in their offices and homes. Wireless Fidelity (Wi-Fi) enables hotel guests with wireless-capable computers and devices to easily access high speed broadband networks within the coverage area. According to J.D. Power and Associates 2016 North America Hotel Guest Satisfaction Index Study, the most important amenity noted by guests was free Wi-Fi. Wi-Fi, initially deployed in public spaces, is now an expected room amenity. Providing reliable and robust Wi-Fi coverage throughout a hotel requires careful implementation planning for technical as well as business-related factors. This article identifies and discusses key Wi-Fi planning factors and their implications for wireless network architecture decisions in hotel environments.

KEYWORDS
Hotels, Planning Factors, Ubiquitous, Wi-Fi, Wireless Network Architecture

INTRODUCTION

Wi-Fi is a wireless local area network (WLAN) that uses radio wave technology to connect electronic devices to the Internet. Wi-Fi is based on the Institute of Electrical and Electronics Engineers’ (IEEE) 802.11 specification, a set of standards that define how WLANs communicate and enable high-speed wireless data transmission via 2.4 and/or 5 gigahertz (GHz) bands or channel frequencies. The regulated 5GHz band offers higher throughput or transfer speeds at a shorter distance but may be obstructed by physical barriers, such as walls and floors. The unregulated 2.4GHz band offers increased coverage and higher solid object penetration but maybe susceptible to interference from unlicensed devices, such as microwave ovens and Bluetooth speakers (Balchunas, 2013).

Many guest devices (e.g., smartphones, digital cameras, tablet computers, etc.) have Wi-Fi capability. These connect to the Internet via a wireless access point (AP) plugged into a wired network. Connection speeds are impacted by the number of users accessing a particular AP and the GHz rating (2.4 GHz and/or 5 GHz) of their device wireless cards. Early Wi-Fi implementations typically began in common areas (e.g., lobbies and meeting rooms). However, the trend is towards offering ubiquitous coverage, including guestroom balconies and bathrooms, and significantly greater wireless capacity. According to Oscar Gomez, director of information technology at the Mandarin Oriental, New York, the expectation for more reliable, higher speed and ubiquitous Wi-Fi literally exploded when smart bring-your-own devices (BYOD) like the iPhone and the iPad hit the market (WiFi Planet, 2012). Consequently, the complexity and cost associated with deploying and maintaining a WLAN in hotel environments has increased (Khurana, 2012).

DOI: 10.4018/IJTHMDA.2017070102

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A 2015 survey of 34,026 consumers (4,428 in the United States) identified Wi-Fi as the most important in-room amenity for today’s travelers (TripAdvisor, 2015). Marriott International, with over 3700 hotels, is narrowing down the number of Internet suppliers to improve service and increase bandwidth or the data transfer rate, which is usually expressed in bits per second (bps). According to Marriott International CEO J.W. “Bill” Marriott, Jr., guests “want to download everything they can. It is getting to be quite a challenge” (Hanashiro, 2012). Further fueling hotel bandwidth consumption is the significant growth in wireless multi-device users (e.g., smartphone, tablet, and laptop) and online streaming services (e.g., Netflix) (McCracken, 2015; Das et al., 2016). The Best Western Plus South Bay Hotel in Lawndale, California replaced its hotel WLAN after routinely receiving Wi-Fi complaints According to Marty Deng, general manager of Best Western Plus South Bay Hotel: “The lack of consistent, reliable access was damaging the overall Best Western customer experience” (Netgear, 2013).

Growing hotel guest broadband consumption is making long-range technology and infrastructure planning difficult. According to Lock and Reberger (2011), guests are taxing an already overburdened infrastructure by using multiple devices, often simultaneously, which is disrupting business models, eroding revenues, and necessitating new investments to maintain levels of guest satisfaction and loyalty. Lock and Reberger (2011) maintain that successful strategies must address both technology and business-model factors.

**KEY PLANNING FACTORS**

Hotel guests must have confidence that all Wi-Fi connections are reliable and meet the performance requirements dictated by their devices and applications used. This requires the appropriate WLAN architecture, which is surprisingly more complex than a wired LAN (Ahmed and Keshav, 2006). The findings of this article were based on an extensive review of literature and vendor documentation, research, and case studies. Additional insights were gleaned from telephone and/or in-person interviews of hotel and technology practitioners (noted as personal communications throughout the paper), which involved a:

- Hotel chain chief information officer.
- Hotel property owner and general manager.
- Hotel property director of technology.
- University director of network operations and telecommunications responsible for large-scale Wi-Fi and Super Wi-Fi implementations.
- Chief executive officer of a wireless networking company that is also the co-founder and the principal architect in the creation and development of the AIR.U Initiative – a consortium of higher education groups, Microsoft, and Google – established to deploy high capacity broadband networks nationwide by utilizing Super Wi-Fi technologies.

**Design Parameters**

A guest device cannot connect to a Wi-Fi network if it is outside the coverage area or the percentage of area where it is possible to establish a communication link with at least one of the APs. As guests roam or relocate they may experience varying degrees of performance degradation as they move away from APs. Guest device and AP power ratings, measured in milliwatts (mW), determine how far their signals can be transmitted. The mW output of guest devices with factory antennas are
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