New WiFi Network Rules:
Designing for Performance, Security and Scalability
**Wireless is increasingly becoming the first choice for local area network (LAN) connectivity.** The share of business users that rely on WiFi as their primary means of corporate connectivity has nearly doubled in the last 24 months.¹ Within four years, 66 percent of all IP traffic will be wireless.² Not surprisingly, four of ten CIOs are increasing wireless LAN (WLAN) spending.³

While the surging number of mobile devices and applications at work is a key driver for WLAN growth, businesses are also investing in WiFi to achieve broader strategic objectives. In a recent survey, 94 percent of businesses said untethering employees and devices can boost productivity.⁴ In particular, five key trends are raising the bar on business WiFi network performance:

1. **The Rise of BYOD:** More than 70 percent of U.S. consumers now own a smartphone or tablet⁵ and 80 percent of the data accessed through these devices is via WiFi.⁶ Employees expect to connect their mobile devices to the business WiFi network while at work. Highlighting the trend, nearly three out of four companies say they currently plan, or plan to support, bring-your-own-device (BYOD) WiFi access.⁷

2. **Unwiring:** WiFi makes office workspace modifications faster and less expensive, as a wired cabling change within a business can cost as much as $1,000.⁸ To capitalize on the benefits of wireless networking, Gartner predicts 40 percent of businesses will soon specify WiFi as the default connection method for a range of historically wired devices, including desktop computers, IP phones, printers and projectors.⁹

94% of businesses report that WiFi boosts productivity
3. **Thing Networking:** Businesses are gathering real-time information from an increasing array of devices, sensors and applications to gain actionable insights. This emerging Internet of Things (IoT) is connecting everything from security cameras, smart thermostats and lighting systems to manufacturing equipment, medical devices and sprinkler controls. IoT traffic is expected to surge by 400 percent over the next four years, much of it through wireless connections.

4. **Video and Voice:** As more devices are connecting wirelessly, they are increasingly accessing video and voice applications, raising network performance requirements. Seven out of ten businesses have deployed IP voice and more than six out of ten use videoconferencing. A single high-definition videoconference with 1080p resolution requires a 4.5 Mbps data stream.

5. **Wireless Amenities:** High-speed wireless Internet access on the go has evolved from a nice-to-have option to an essential and expected amenity for the customers of many businesses. Nearly two out of three consumers expect restaurants to offer WiFi access while almost half of retail shoppers say they would be more likely to choose a store with WiFi. According to a 2015 survey, travelers rank free WiFi as the number-one amenity when choosing a hotel for both leisure and business stays. To meet the needs of connected collegians, over two out of three higher-education institutions report offering robust WiFi access across more than 80 percent of their campus.
New WiFi Network Rules

The swift shift to wireless is turning longstanding network design rules inside out. A leading IT integrator notes that, historically, 80 percent of an organization’s LAN ports were dedicated for wired users with only 20 percent allocated to wireless. Soon, it is predicted, 80 percent of LAN switch ports will serve wireless users.¹⁶

To capitalize on the benefits of wireless-first networking, organizations must ensure WiFi provides performance, reliability, manageability and security comparable to wired LANs. Over the past 15 years, WiFi network capacity has increased substantially, from a maximum transmission speed of 11 Mbps with the 802.11b WiFi standard to 3.2 Gbps with today’s 802.11ac. (See Table 1.) Likewise, WiFi security has evolved to the current WiFi Protected Access II (WPA2) standard for enhanced wireless device authentication and traffic encryption. In a recent survey, half of businesses said they planned to deploy 802.11ac by the end of 2015.¹⁷

The rise of 802.11ac means that businesses may need to upgrade their Ethernet wiring and switches connecting wireless access points to support gigabit WiFi speeds. Wired Ethernet still matters in a WiFi world.

### TABLE 1

**WiFi 802.11 Standards Evolution**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Year</th>
<th>Max Speed</th>
<th>RF Band</th>
<th>Antennas</th>
</tr>
</thead>
<tbody>
<tr>
<td>802.11b</td>
<td>2000</td>
<td>11 Mbps</td>
<td>2.4GHz</td>
<td>1x1</td>
</tr>
<tr>
<td>802.11g</td>
<td>2003</td>
<td>54 Mbps</td>
<td>2.4GHz</td>
<td>1x1</td>
</tr>
<tr>
<td>802.11n</td>
<td>2009</td>
<td>600 Mbps</td>
<td>2.4GHz, 5GHz</td>
<td>4x4</td>
</tr>
<tr>
<td>802.11ac</td>
<td>2013</td>
<td>3.2 Gbps</td>
<td>5GHz</td>
<td>8x8</td>
</tr>
</tbody>
</table>

Source: Kinetic Strategies
Real-World WiFi

Building reliable, secure, high-performance business WiFi networks is both an art and a science. Real-world engineering and operations experience matters. Professional WiFi network design and installation begins with a comprehensive site survey to map the physical layout and characteristics of the business location, as well as expected device and application usage patterns.

All wireless radio frequency (RF) signals, including WiFi, can be impacted by physical objects in the transmission path, as well as electromagnetic interference. For example, WiFi signals are absorbed by walls (especially those made of concrete, brick or stone) and doors. Large metal objects can reflect signals while glass and water can refract them, impairing coverage. Likewise, interference from microwaves, manufacturing and medical equipment can compromise WiFi quality. In short, WiFi signal impairments can reduce available WLAN capacity and access speeds. Additionally, such problems can increase latency, jitter and packet loss, undermining the performance of IP video and voice, as well as mission-critical cloud applications.

Professional WiFi network designers and installers employ unique tools of the trade, including RF spectrum analyzers and software that can measure WiFi signal coverage, throughput and transmission errors, as well as benchmark real-world usage scenarios. With this intelligence in hand, network engineers can offer precise recommendations for wireless access point (WAP) placement to maximize WiFi network capacity, quality and reliability. (See Table 2.)
In addition to robust wireless RF network design and installation, business-class WiFi requires intelligent approaches for seamless device connectivity. Consider the importance of WiFi network naming approaches, for example. Even casual users are familiar with this function when opening a list of available WiFi networks on their favorite mobile device. These names can be continually broadcast by wireless access points through the use of SSIDs (Service Set IDentifiers). To maximize capacity and the number of devices supported, a single access point can broadcast multiple SSIDs. Businesses benefit from using one universal SSID for employee connections, simplifying connectivity for end users and enabling seamless roaming across multiple WiFi access points. A second universal ID with access restrictions that protect the business network can be offered for guest use.
Ensuring Wireless Security

WiFi enables untethered connectivity, enhancing productivity and collaboration for workers. However, unless properly managed, wireless networks can pose unique security risks. In a recent survey, nine out of ten CIOs say they are concerned about insufficient wireless security.18

These fears are well founded. A recent analysis of wireless access point (WAP) routers used by some businesses to provide WiFi access found pervasive security vulnerabilities, including 80 percent of Amazon's top 25 best-selling small office/home office (SOHO) wireless routers.19 Such flaws provide a pathway for hackers to quickly penetrate an organization's network. Even more troubling, businesses without IT expertise may fail to properly configure the basic security controls available with wireless routers to improve protection from attacks or regularly update router software.

Beyond basic WAP configuration concerns, intelligent strategies are essential when providing guest WiFi access at a business location. To ensure guest connections do not offer hackers a way into the corporate network, businesses may quarantine guest traffic by mapping it into a separate virtual local area network (VLAN). Retail and hospitality businesses offering public WiFi access may go a step further and use physically separate WAPs or a turnkey WiFi hotspot service solution. This way, public WiFi bandwidth and security are distinct from the corporate network.
In a recent survey, half of midsized businesses reported that information technology (IT) decision-making falls on the shoulders of the business owner or other employees due to the lack of strategic in-house technical expertise. To bridge the skills gap, businesses are increasingly turning to managed service solutions for many IT functions, including WiFi networking, security and router management. This approach enables companies to offload network support requirements from limited internal IT staff and gain best-in-class expertise. In a 2015 survey, nearly half of companies reported outsourcing some or most IT functions. Of these, 93 percent said managed services have met or exceeded their cost-savings expectations. Indeed, a 2015 market analysis found that managed services can reduce recurring in-house IT costs by 30 to 40 percent while delivering a 50 to 60 percent increase in efficiency.

Comprehensive managed WiFi service solutions include business site surveys and network design; equipment and cable installation; plus network configuration and device management. Managed WiFi solution providers implement business-grade security and authentication as well as traffic management and prioritization. *InformationWeek* noted such services offer “an attractive option for WLAN management, particularly for small and midsize businesses and educational institutions that may be short on IT resources.”

Some managed WiFi providers enhance ease of use by providing web-based administrative portals for the business and customizable landing pages for guest users. For hospitality organizations, managed WiFi offerings may include credit card processing and property-management system interfaces to bill for premium wireless Internet access services.
Wireless First

Organizations are increasingly pursuing a wireless-first local area networking strategy to connect both mobile and traditionally wired devices. Businesses understand WiFi connectivity offers the opportunity to enhance employee productivity and workplace design flexibility while reducing the costs associated with wired cabling changes. Additionally, in the hospitality and retail sectors, WiFi is becoming an essential customer amenity. Managed WiFi solutions provide the performance, reliability, manageability and security required to drive business success.

Endnotes

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About the Author

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