



The Incredible Shrinking Ethernet Cable

Embrace the digital transformation

*Enrich the connected workplace experience with Wi-Fi –
and save money over Ethernet deployments in the process*

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Analyst: Mike Feibus

in association with
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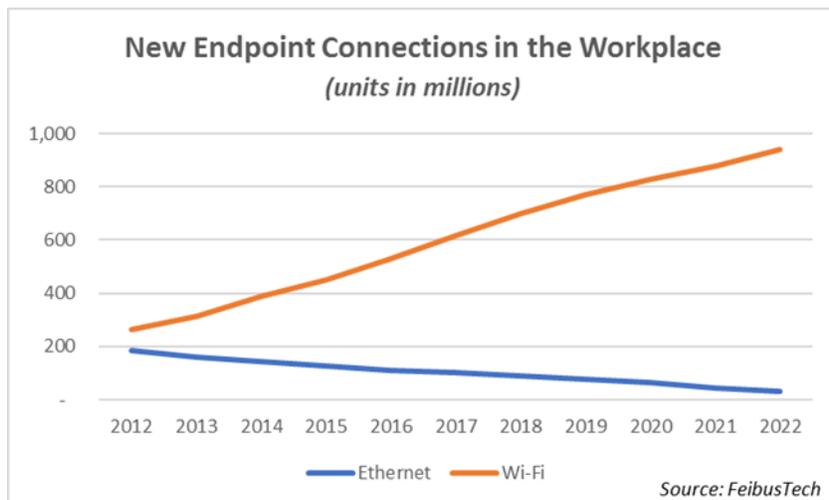
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Enterprise networks have changed dramatically since early this century, when the first PCs, printers, phone systems and other office devices came available with gigabit-speed Ethernet capability. But the lion’s share of those changes occurred not in Ethernet, but in wireless connectivity.

Wireless, in fact, was virtually nonexistent in the enterprise at the time, save for the occasional rogue access point installed by employees for their own laptops. Indeed, wireless was only just beginning to make a dent in the consumer market.

A lot has changed since then – for Wi-Fi. Client Ethernet connections today are 10/100/1000 Mbps, the same standard coming online a decade-and-a-half ago. For wireless, dramatic improvements in speed, security and network capacity have paved the way for widespread adoption in the enterprise. And because wireless is not only more convenient for employees to use, but also more flexible and less expensive to deploy, Wi-Fi is beginning to squeeze out Ethernet deployments.

Indeed, new wireless endpoint connections overtook wired at the start of the decade, according to FeibusTech estimates of network deployments. Further, FeibusTech estimates that new LAN connections are now being made with Wi-Fi at 6:1 ratio over Ethernet. By 2022, the ratio will grow to more than 30:1, FeibusTech forecasts.



The chasm between wired and wireless is even more vast when you consider BYOD, a powerful and growing force in the enterprise connectivity mix. BYOD devices, which overwhelmingly connect via Wi-Fi, are beyond the scope of this study. Only devices provisioned and activated by employers are covered.

Inertia can be a powerful force in the enterprise, as any IT buyer still soliciting RFPs for fax machines can tell you. Which explains why, despite the decisive shift to wireless connectivity, Ethernet ports are still so prevalent in the workplace.

But as the data would suggest, last-foot cables required to make connections to client devices are becoming increasingly scarce. And the growing number of unpopulated ports serves as an ever-present reminder that the modern-day network is moving on.

Certainly, there is no paucity of reasons for the disappearing Ethernet cables.

Wi-Fi offers so many advantages over tethered connections. As mentioned, it is less expensive to deploy and maintain than Ethernet. Deployments are far more flexible, which means Wi-Fi is more conducive to inevitable changes, from technology upgrades to office-space reconfigurations. It is far friendlier to workgroup collaboration.

As the data illustrates, Wi-Fi is overwhelming traditional Ethernet. And as the workforce increasingly expects free-roaming office connectivity, studies show that pervasive Wi-Fi connectivity can make your employees more productive – and help make your company more competitive in attracting talent.

Eventually, the force of inertia fades, and legacy invariably gives way to progress. In the case of *The Incredible Shrinking Internet Cable*, there are forces at play that together are conspiring to make Ethernet ports as scarce in coming years as the cables that connect them to client devices.

Enhancements to the state of the art in Wi-Fi offerings are only part of the story. Client devices are migrating away from tethered connections. The trend toward ever-thinner laptops, for example, is literally squeezing out Ethernet jacks. And the shift toward soft VoIP phone systems is obviating the need for a second workspace port.

This research brief is designed to help IT decision-makers plan their digital transformation initiatives. It will paint a picture of the state and direction of wired versus wireless workplace connectivity, provide guidelines for judging cost differences between the two approaches, and provide a forecast for the transformation to wireless.



Market Forces

They say that breaking up is hard to do. But breaking legacy in the enterprise may be harder. Without question, it takes far longer.

Make no mistake about it, the digital transformation of the workplace is underway. Even the most cautious IT decision-makers across small-and-medium business, the enterprise, government and education, are either making or enacting plans for the wireless workplace. And yet, despite this, they continue to maintain and connect existing Ethernet terminations. They're even adding new ports, many of which won't ever be used.

There are myriad advantages for going wireless. And they are growing with the convenience and security that employees increasingly demand.

Increasingly Mobile Workforce

With the growing prevalence of laptops, tablets and smartphones, employees no longer need to be tied to their desks. In fact, they're increasingly demanding pervasive Wi-Fi so that they can work alone or with others in the cafeteria, in the break room and in collaboration areas.

Indeed, the evidence strongly suggests that employees appreciate wireless connectivity in the workplace. Last year, Intel and Dell released their [Future Workforce Study](#), which found that more than 80 percent of millennials surveyed would be more likely to take a job at a place with better technology. [A similar survey](#) undertaken by Microsoft and SurveyMonkey revealed an even higher number, 93 percent. Both studies also found that millennials, who make up nearly 40 percent of the workforce in the US, are demanding a redesign of the workplace, with smaller "home-base" workstations and larger, more prevalent collaboration spaces.

More Mobile Devices

Those same studies not only show that employees increasingly expect work to flow freely throughout the workplace and beyond, but also across their devices.

These revelations cry out for wireless connectivity, for two reasons. First, working and collaborating anywhere on campus demands untethered connectivity. And second, the cost of reconfiguring office environments is far costlier for Ethernet than Wi-Fi connections. This holds true even for the smallest of workplaces, though the savings compound with the number of employees.

Lower Costs for First-Time Deployments

Without question, the cost of outfitting the workforce with Wi-Fi connectivity is lower than Ethernet. The only issue is how much less.

Deployment costs vary widely, depending on a host of variables, such as geography, the age of construction and the way the structure is built. In practice, parts and labor for cabling range from about \$100 to \$300 per node, plus another \$100 to \$350 for the port on the Ethernet switch.

The costs are about the same to wire and install a wireless access point – except you only need one node and one port on the switch for multiple users. You also need to factor in the cost of the access point itself. The number of clients on the access point can vary widely, depending on the presence and composition of walls and other obstacles, the concentration of employees and the existence of radio interference.

Of course, the more devices you can serve per access point, the more the cost equation favors Wi-Fi. Toward that end, Wi-Fi technology is advancing rapidly to accommodate higher-concentration work areas. Most enterprise-class routers available today are built around the 802.11ac standard, which can handle up to 50 clients – and provide better throughput at a comparable distance than 802.11n. And the emerging 802.11ax standard has the potential to more than double what 802.11ac can deliver.

In this simple example, we outfitted an area that can handle up to 20 wired and wireless devices. We assumed that cable drops and ports on the switch each cost \$200, and that access points cost \$1,200. As you can see, the cost of connecting the devices wirelessly is just one-fifth that of connected 20 tethered devices. For 50 devices, the cost of installing the access point is unchanged – while Ethernet jumps to \$20,000.

	Ethernet	Access Point
Cabling	\$4,000	\$200
Switch Ports	\$4,000	\$200
AP		\$1,200
Total	\$8,000	\$1,600

Lower Costs for Existing Deployments

The cost of wireless transformation is still compelling, even when upgrading an existing site with Ethernet terminations dotting the office. Simply by disconnecting the Ethernet jacks in offices, conference rooms and common areas, IT decision-makers can save more than enough on service contracts for Ethernet switches to pay for a new wireless installation.

Take this example of a 10,000-square-foot office with 50 employees. For this example, we've assumed 1.7 ports per employee workspace, and another port per employee in break rooms, conference rooms and other common areas.

	Switch Ports	Cost of 3yr Service Contract
Wired	139	\$8,340
Wireless*	8	\$480
Savings		\$7,860
Cost of New Wi-Fi Deployment		\$5,600

** assumes continued Ethernet support for printers, conference phones*

Overall Connectivity

The mix of wired and wireless devices in the commercial setting is skewed by the influx of smartphones and tablets, which only connect via Wi-Fi. But as the table below illustrates, PCs and traditional office equipment – computers, printers, copiers and multi-function printers – are moving decisively over to Wi-Fi, as well.

This year, new electronics deployments connecting via Wi-Fi outnumber new wired edge devices by more than 6:1. The number is forecasted to grow to more than 31:1 by the end of the forecast period.

Note that the proliferation of IoT devices like connected light bulbs, security systems, comfort measurement and control, building maintenance and management systems, are not covered here. Though it is important to note two things:

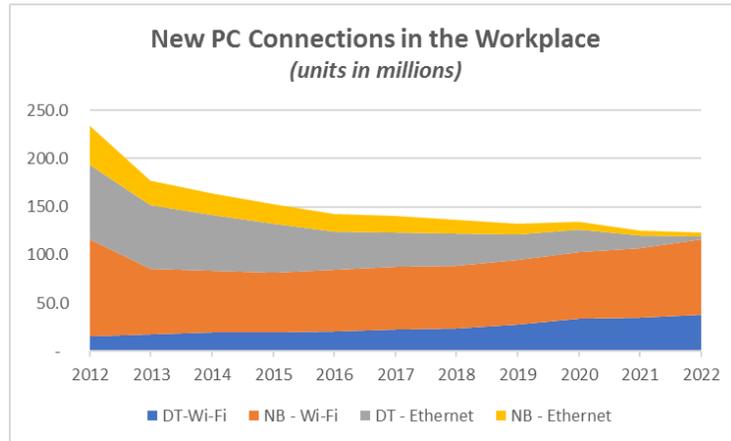
- The number of IoT devices will dwarf office equipment in the next decade, and
- The vast majority of IoT devices will be connected wirelessly.

Commercial Devices Purchased for the Workplace, by connection (units in millions)											
Office Equipment Connectivity	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Ethernet	0	0	0	0	0	0	0	0	0	0	0
DT	76.8	65.8	58.4	51.1	40.0	35.8	33.7	26.7	23.4	12.7	2.3
NB*	40.2	25.6	21.8	19.8	18.5	17.4	14.3	10.3	8.4	5.8	4.3
Smartphone	-	-	-	-	-	-	-	-	-	-	-
Tablet	-	-	-	-	-	-	-	-	-	-	-
Printer/Copier/MFP	69.4	67.4	65.1	56.5	51.9	47.4	42.8	38.4	33.6	27.6	23.3
All Ethernet	186.4	158.8	145.2	127.4	110.4	100.6	90.8	75.4	65.3	46.1	29.8
Wi-Fi											
DT	15.9	17.5	19.4	19.5	20.8	22.7	23.2	28.2	34.1	34.6	38.2
NB*	100.6	68.3	63.9	61.8	63.6	64.9	65.4	66.7	68.5	72.5	78.3
Smartphone	117.4	166.2	220.0	280.3	353.7	421.0	498.8	551.9	589.0	623.7	668.3
Tablet	21.8	50.6	73.6	76.5	75.7	89.6	93.4	99.8	110.6	116.2	125.3
Printer/Copier/MFP	8.9	9.5	10.9	11.7	14.1	16.9	20.0	23.0	26.4	29.4	30.5
All Wi-Fi	264.5	312.1	387.8	449.8	527.8	615.2	700.8	769.6	828.5	876.4	940.5
* some NBs connect at times via both Ethernet & Wi-Fi, making the totals larger than the actual market											
											Source: FeibusTech

Personal Computers

Laptop computers overwhelmingly connect via Wi-Fi. While most laptops still include Ethernet ports, few are ever used in practice. In older deployments with limited Wi-Fi access, laptops most commonly are connected to the network via docking stations.

Integrated Ethernet is fading fast, however. Many newer laptops are simply too thin to accommodate the ports. Most entry-level and mainstream devices as well as higher-end workstations still include integrated Ethernet. Ironically, that seems to be changing faster at the high end. The quick migration to USB Type C is making the move away from integrated Ethernet seem like a smaller step for IT buyers, because it accommodates inexpensive Ethernet dongles.



HP, for example, just announced the ZBook X2, a performance-minded creation station for engineering design and video, animation and photo editing activities. The detachable PC powerhouse features performance processors from Intel high-end graphics from Nvidia. Built for the work-anywhere model, it eschews Ethernet for 802.11ac, though it is thick enough to accommodate the port.

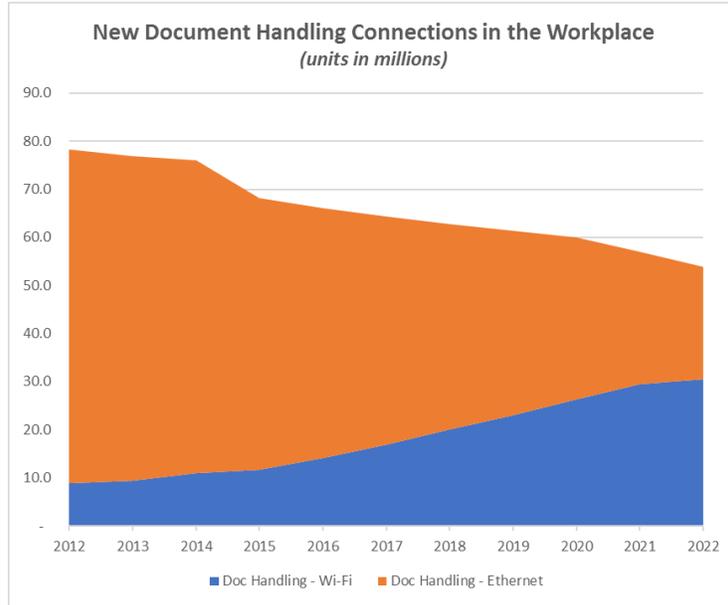
Although the cost differential between deploying wired and wireless clients is substantial, there hasn't been much else to draw desktops into the wireless world. That is starting to change as well, now that the enterprise migration to Windows 10 is in full swing. OEMs are beginning to build wireless antennas into desktop cases, which will make them much easier to attach to the network via Wi-Fi. Some of the impetus for integrating antennas actually has nothing to do with Wi-Fi.

The multi-factor authentication capabilities of Windows 10, which can use employees' smartphones for authentication, is creating demand for Bluetooth on desktops. FeibusTech forecasts Wi-Fi will benefit from this wave, as it greatly lowers the obstacle for integrating wireless LAN connectivity.

Document Handling

Most document-handling devices in the workplace still connect to the network via Ethernet, though a large and growing percentage feature built-in Wi-Fi.

Further, the number of printers, scanners and fax machines is declining, a casualty of the trend toward electronic documents combined with a shift to multi-function devices and a growing tendency to outsource printing. On a revenue basis, document services now make up half the market for document handling devices.



The age of the wireless office is upon us. The number of wireless connections already dwarfs tethered. And as market conditions conspire against Ethernet client connectivity, the gap is widening faster.

That's not news to the vast majority of IT decision-makers. Virtually all of them have digital transformation plans that connect the lion's share of connected devices via Wi-Fi.

IT buyers would do well to accelerate those plans. As study after study shows, pervasive Wi-Fi connectivity leads to greater productivity, collaboration and workplace satisfaction. And as we've illustrated, there is a decisive cost advantage to deploying wireless clients.

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FeibusTech
P.O. Box 25685
Scottsdale, AZ 85255
www.feibustech.com
+1-480-922-3244

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