

WILL WI-FI FIRST REALLY DISRUPT THE MOBILE INDUSTRY?

By Heinz Bernold, Alexander Dahlke, Rüdiger Schicht, and Maikel Wilms

IT MAY SEEM STRANGE to hear that now, after years of evolution and growth, Wi-Fi is suddenly poised to shake up the mobile voice and data industry. But that is exactly what the growing number of proponents of Wi-Fi First contend. In this model, as its name implies, mobile devices—no matter where or how they are used—rely on Wi-Fi as their primary network. Cellular is then relegated to a supporting role, filling in the gap when Wi-Fi is not available.

For Wi-Fi First's supporters, the idea is simple: capabilities and availability have advanced to the point where Wi-Fi is now a viable alternative to traditional mobile networks. What's more, Wi-Fi's advantages in pricing make the technology a compelling alternative for consumers. Thus fixed providers—both utilizing their own networks and working with mobile virtual-network operators (MVNOs)—could offer mobile services, and new players, such as the Internet giants, could more easily enter the mobile space. The result: industry disruption that would threaten mobile-only providers and integrated telcos.

A number of MVNOs, such as Republic Wireless, are already using Wi-Fi as their default mobile-network technology, falling back on cellular only when necessary. At the same time, some of the larger cable companies, such as Comcast in the US and Liberty Global in Europe, are offering customers easier access to Wi-Fi outside their homes—setting the stage for expansive, mobile-like Wi-Fi networks. The online players entering the fray include Google, whose Project Fi uses Wi-Fi with cellular backup for voice and data service.

To be sure, some customers are embracing this new model: the subscriber base for Republic Wireless, the leading Wi-Fi First player, tripled in 2014. But does Wi-Fi First truly herald wide-scale disruption for traditional cellular carriers?

We don't think so—at least, not if carriers respond carefully and smartly. In our view, Wi-Fi First represents more of a fine-tuning than a sea change for the mobile industry. Yes, it will create certain risks for today's cellular providers. But the model has a

long way to go before it pulls the rug out from under them. For example, Republic Wireless, despite fast growth, still had fewer than 1 million customers at the end of 2014. AT&T, by contrast, had 121.7 million wireless customers in the first quarter of 2015, and Verizon had 108.5 million. What's more, Wi-Fi presents opportunities for cellular carriers, too.

So what *really* is the outlook for Wi-Fi First, and what are the implications for key players? The answers require a look beyond the hype and a close examination of this new model's potential gains—and threats.

Wi-Fi Is Getting Bigger and Better

There's no doubt that Wi-Fi already handles the bulk of mobile data. A recent BCG research study—which captured real-time usage data for some 1,500 mobile-phone users in the US—found that for particular carriers and customer segments, more than 80% of traffic is off-loaded to Wi-Fi. (See *Uncovering Real Mobile Data Usage and the Drivers of Customer Satisfaction*, BCG Focus, November 2015.) The study also showed that although mobile customers are generally technology agnostic, they will avoid paying higher prices by off-loading to Wi-Fi. For example, consumers on capped plans, with the meter running, are much more likely to use Wi-Fi. Unlimited plans, however, did not increase usage but simply shifted it to cellular.

Wi-Fi accessibility is improving as well: according to the Wireless Broadband Alliance, the number of public Wi-Fi access points around the world will have increased to 5.8 million in 2015 from 1.3 million in 2011. And the new Hotspot 2.0 standard (also known as Wi-Fi Certified Passpoint) brings cellular-like authentication, security, and roaming capabilities to Wi-Fi.

Finally, there is cost—potentially Wi-Fi First's trump card. Wi-Fi that piggybacks on fixed broadband can be provided at practically no marginal cost. If cable companies and other fixed-network providers can acquire cellular backup capacity at a

sufficiently low cost via favorable MVNO contracts, they could offer full-blown mobile service at sharply reduced prices. Such an inviting proposition for consumers would make Wi-Fi First an attractive business model for companies to pursue.

Yet Success Is Not a Given for Wi-Fi First

Landing favorable MVNO contracts is not guaranteed, however. And that highlights a key point about Wi-Fi First: its wide-scale success depends on some rather big *ifs*.

While Wi-Fi's footprint is expanding, the technology is not yet, even now, truly ubiquitous. Cellular backup is therefore vital: a service that is available even 90% of the time is not enough to attract droves of customers. But if Wi-Fi First providers pay too much for that cellular capacity, the anticipated cost advantages—and the attractive pricing they can offer customers—won't materialize.

The economics for incremental data for MVNOs differ from those for traditional mobile-network operators (MNOs), which build and operate their own infrastructure. MVNO deals of at least \$10 per GB are not uncommon, while MNO costs are typically just a fraction of that amount. To reduce their network costs to the absolute minimum and be able to price plans so low that even the more loyal—and lucrative—MNO customers can be wooed, Wi-Fi First providers need to secure wholesale prices that are closer to \$3 to \$4 per GB. And that's just today. As technology evolves, the per-GB cost for MNOs will inevitably fall over time, lowering their cost base even further, and Wi-Fi First players will need to keep pace. Some MVNO deals, particularly within the European Union, may already be in the \$3 to \$4 per GB range, but even those may soon prove unable to sustain a Wi-Fi First business.

It's worth noting, too, that many of the more desirable wholesale deals that MVNOs have scored have been forced upon MNOs by regulators looking to sustain a certain level of retail competitive-

ness in a market after a merger. In markets with little or no consolidation, such deals are far less likely to occur.

Another market-specific variable also impacts the equation: despite Wi-Fi's growth, many markets are still not positioned to provide an end-to-end high-speed experience. Low broadband penetration could hinder attaining the nearly ubiquitous coverage required by the Wi-Fi First model. Or the available broadband might not be sufficiently reliable. Whatever the problem, if users can't readily turn to Wi-Fi for their mobile usage, too much cellular backup will be required for the model to work. Even with favorable wholesale deals, Wi-Fi First providers won't be able to offer sufficiently low prices to compete with cellular.

Finally, the jury is out on whether Wi-Fi will truly be able to match cellular in performance. While Wi-Fi can offer a superior experience on uncrowded home networks, its speed and reliability are often lackluster on heavily used public-access points. In such cases, a cellular long-term evolution (LTE) connection may well be faster and more robust. Moreover, Wi-Fi signals often degrade significantly as users move around, which is less than ideal for mobile use. Indeed, this problem has become large enough that some companies are working to mitigate it. Apple, for example, has developed a new Wi-Fi Assist feature for iOS 9 that automatically switches users to cellular when a Wi-Fi signal degrades.

Yet even as evolving technology and standards improve the suitability of Wi-Fi for mobile use, the performance gap could well remain. For one thing, cellular technology is improving. Some carriers, such as Verizon in the US, are already gearing up to test new 5G standards, which are expected to dramatically increase bandwidth. And emerging technologies that utilize unlicensed spectrum—such as LTE-U and License Assisted Access (LAA)—could provide better coverage and greater bandwidth than Wi-Fi.

Cellular's forays into unlicensed spectrum have sparked some debate within the in-

dustry, particularly in the US. Wi-Fi advocates argue that peaceful coexistence isn't possible, and that Wi-Fi performance—and customers' interests—will be negatively affected if carriers deploy their new technologies on the same spectrum. In response to such concerns, the US Federal Communications Commission is currently reviewing comments from parties on both sides of the issue. Our own take is that Wi-Fi's future is unlikely to be jeopardized. Key industry players, such as Qualcomm Technologies and Verizon, are already working on interoperability, and Wi-Fi's massive installed base virtually ensures that the technology is not going to disappear. Notably, when the influential industry-trade organization 4G Americas announced its support for "continued innovation in unlicensed wireless spectrum" in October 2015, it explicitly cited—and endorsed—the need for new technologies to work cooperatively with Wi-Fi.

Implications for the Key Players

Given this more nuanced view of Wi-Fi First, it is not surprising that the opportunities and the challenges it presents will vary for different players within the mobile industry.

Fixed Providers. Wi-Fi First offers fixed providers a chance to extend their offerings beyond TV and broadband and into mobile voice—a stepping stone to a full range of mobile services. Fixed providers with high market share could build an expansive Wi-Fi network by opening in-home routers to all customers within range. Creating such networks would not only improve Wi-Fi accessibility for subscribers but also make the providers attractive roaming partners for other fixed operators. Roaming agreements—such as the one announced in 2014 between Comcast and Liberty Global—would help providers extend their Wi-Fi footprints even further.

MVNO deals do more than give fixed providers the cellular backup they need; they also provide control of the SIM card, enabling providers to push data usage onto their broadband networks whenever they

can. Still, there is a caveat: MVNO-based models only really work in markets where cellular service is a commodity. Low wholesale prices are less likely to be found in areas with capacity constraints or strong differentiations in quality. That said, fixed providers do have one potentially potent bargaining chip when negotiating MVNO deals with mobile-only players: the ability to offer backhaul over their fixed networks and thereby help cellular carriers reduce their own costs. By stressing that benefit, fixed providers might be able to land lower per-GB prices for cellular availability.

Integrated Providers. Historically, integrated providers haven't demonstrated much enthusiasm for incorporating Wi-Fi in their networks. When compared with cellular, Wi-Fi has provided limited support for quality-of-service guarantees and delivered generally inferior customer experiences, particularly in busy locations. Operators have also struggled to monetize Wi-Fi traffic. More recently, however, some players have changed their tunes, actively pursuing Wi-Fi integration as a way to off-load data, reduce strain on their cellular networks, and—not insignificantly—decrease the levels of investment needed for capacity expansion.

BCG research shows that these efforts are paying off. In our recent study, the carrier with the highest level of off-loading to Wi-Fi excelled in proactively converting in-home Wi-Fi routers to hotspots and entering into Wi-Fi roaming agreements. Indeed, this operator was so successful at spurring off-loading that its unlimited-plan customers were just as likely to off-load as its capped customers. Meanwhile, new developments—such as Hotspot 2.0 and improvements in cellular-to-Wi-Fi handoffs—may well reduce, or even eliminate, the challenges of Wi-Fi off-loading.

All of this presents an opportunity for integrated providers: by aggressively incorporating Wi-Fi, they can lower their cost base and provide improved indoor coverage. This will put pressure on mobile-only competitors that don't have access to their own Wi-Fi access points.

But what about the pressure that integrated telcos themselves will face from Wi-Fi First providers? Here, the key is to maintain—or, ideally, increase—cellular's performance and quality advantages over Wi-Fi. To that end, technologies utilizing unlicensed spectrum can play an important role. Heterogeneous networks incorporating LTE-U or LAA, as well as Wi-Fi, can help integrated providers pull off a mobile-network hat trick: offer robust performance everywhere, including deep inside buildings and in crowded public spaces; maintain a seamless one-network experience, even for data-intensive activities such as watching video; and expand capacity while minimizing the need for expensive new infrastructure, which helps to keep prices low—possibly even lower than those offered by Wi-Fi First providers.

Mobile-Only Providers. Wi-Fi First presents more acute risks for mobile-only providers. Operators will face competition from fixed providers entering the mobile business and greater pressure from integrated players utilizing Wi-Fi to lower their costs and improve service where spectrum is limited. Compounding matters, mobile-only players face hurdles in incorporating Wi-Fi into their own businesses. Each of the two main ways to do so—via new infrastructure or through partnerships—come with caveats. Building infrastructure is expensive and time consuming, while partnerships with fixed operators, in which the mobile operator serves as an MVNO host, can potentially shift power to the fixed side. Indeed, given fixed providers' need for favorable cellular wholesale deals, and the challenges in getting them, Wi-Fi First could even be a catalyst in the consolidation of fixed and mobile-only players. For some mobile-only players, then, partnering with Wi-Fi aggregators—such as Boingo Wireless and iPass—might make more sense. In effect, mobile operators would be gaining the benefits of a fixed network without working with a fixed provider.

But perhaps the best solution is to develop superior network assets, such as spectrum and capacity, whenever possible. Here again, LTE-U and LAA, used in small cells

in heterogeneous-network deployments, can play a key role. Other enabling technologies—such as self-optimizing networks, virtualization, and big-data analytics—can also improve end-to-end network performance.

EVEN IF THE success of Wi-Fi First is by no means assured, one thing is certain: those championing it—from fixed providers to new industry players—will try to put pressure on the prices and market shares of traditional mobile-network operators.

For both integrated and mobile-only players, the key defense—and offense—will be differentiation of network quality: utilizing both licensed and unlicensed spectrum to maintain, and even widen, cellular’s performance edge over Wi-Fi.

Though Wi-Fi First is likely to impact competition and price levels in the mobile industry, particularly in developed countries with strong fixed-broadband competition, it doesn’t have to be disruptive. And if mobile-network operators respond wisely, it won’t be.

About the Authors

Heinz Bernold is an associate director in the Zurich office of The Boston Consulting Group. You may contact him by e-mail at bernold.heinz@bcg.com.

Alexander Dahlke is a partner and managing director in the firm’s Hamburg office. You may contact him by e-mail at dahlke.alexander@bcg.com.

Rüdiger Schicht is a senior partner and managing director in BCG’s Zurich office. You may contact him by e-mail at schicht.ruediger@bcg.com.

Maikel Wilms is an associate director in the firm’s Amsterdam office. You may contact him by e-mail at wilms.maikel@bcg.com.

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