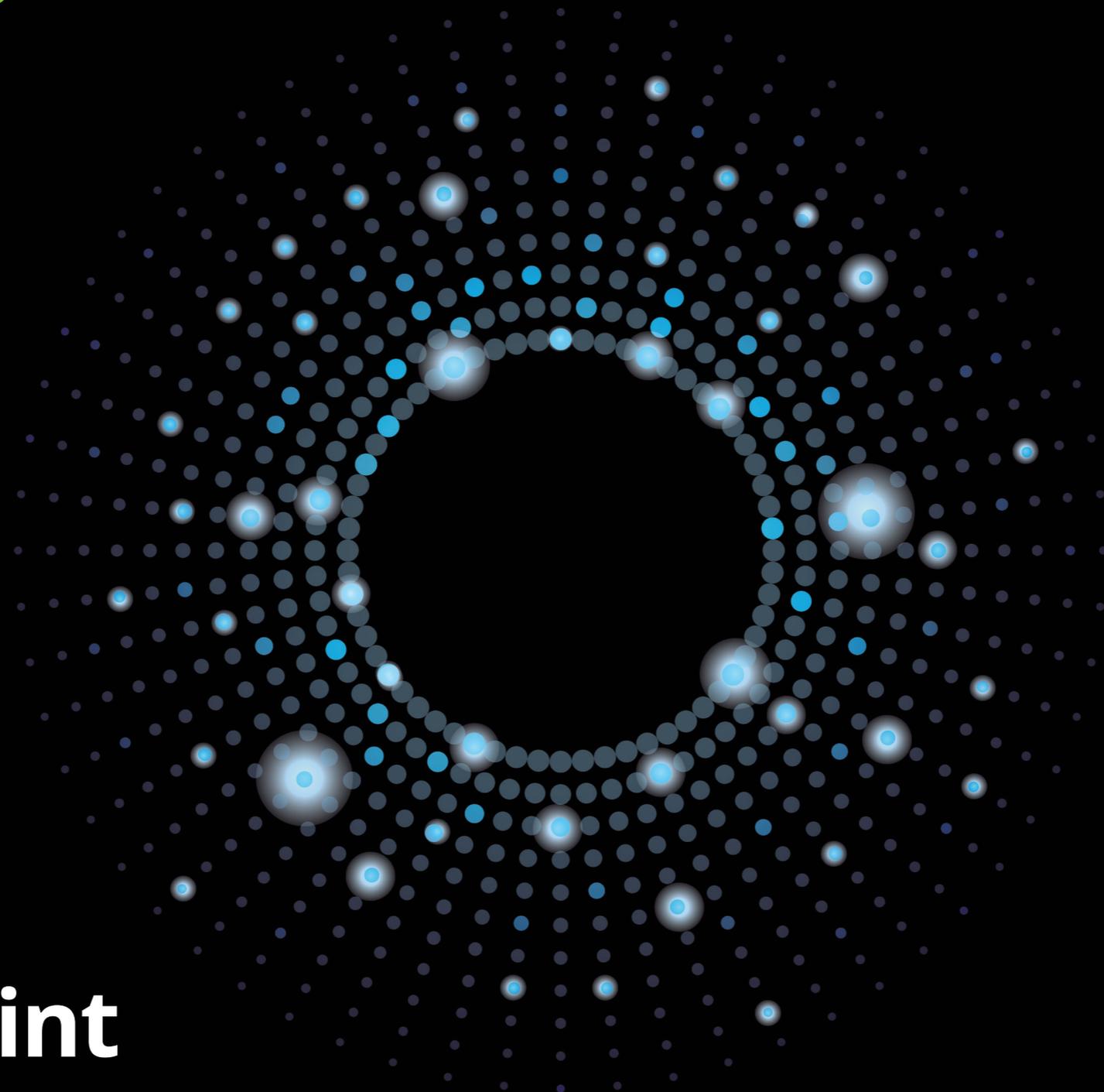# Deloitte.

Flashpoint
Small cells

Big promise in a small package

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If your company has an aggressive plan for deploying small cell solutions, you're not alone. Small cell solutions are rapidly moving beyond just providing coverage within buildings or arenas, to becoming enablers of outdoor network densification. All major communications service providers (CSPs) have announced densification plans, with some already deploying small cells into their networks.

About a third of small cells are now deployed in outdoor environments, and by 2019 global demand for outdoor small cell solutions is expected to grow by a factor of six—compared to fourfold growth for indoor small cells. As CSPs look to further fortify networks for 5G upgrades small cells are set to serve as a key component.

There are plenty of reasons for organizations to move forward aggressively. Small cells promise a cost-effective solution for filling coverage gaps, increasing bandwidth, and getting the networks ready for 5G without the need to build more expensive macro sites.

Indoor applications are obvious and plentiful. Small cells are ideal for use in places where macro antennas can't reach. They also offer a way to rapidly deploy the power of a network with precision and customization for outdoor environments—from sports venues and school campuses to downtown street "canyons" and rural neighborhoods. With

a small footprint of hardware, small cells attach discreetly to fixtures such as lampposts, signs, and other street furniture.

So what's the catch? The problem is small cells also bring additional complexity to the design of the network, and to the operational processes. To combat the increased complexity, manufacturers have built automated optimization and configuration tools into devices, and they have integrated multiple networking protocols and frequencies into a single package. However, those steps only go so far. Underestimate the scope of network and operational complexity, and you introduce the risk of higher costs and less flexibility with new applications. You also risk slowing your ability to react to changes in demand. How do you manage this transition to the future without sacrificing hard-fought gains in the performance of the existing network?

Two big shifts come into play for any organization developing a small cell strategy: a network design shift and an organizational shift.

Network design will involve moving from monolithic to multi-technology. To prepare for the future of 5G, an architecture that can seamlessly operate across multiple technology bases and between licensed and unlicensed spectrums is required. A nationwide macro environment contains thousands of cells to engineer, deploy, and maintain. A small

cell environment has hundreds of thousands. In addition to shifting from a "macro towers only" mindset to a "connect anything" strategy, networks must operate both transparently and securely across licensed and unlicensed spectrums.

You shouldn't underestimate the organizational shift required, either. Operational practices will need to shift from rigid to flexible and include dynamic toolsets. Light-touch "cookie cutter" processes will have to replace heavier, custom-engineered processes to control the cost and to speed up the delivery of those hundreds of thousands of cells. New ideas, tools, and organizational processes will be required to navigate the complexity of managing capacity and quality, even as the demand pattern remains essentially unknown and chaotic.

About *Flashpoints*

Every day brings new ideas and possibilities to the Technology, Media, and Telecommunications sectors. *Flashpoints* is your tool for gaining the context you need to make sense of these critical developments—as they emerge.

Key observations
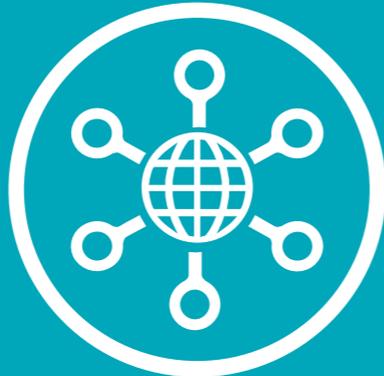
Why small cells now?

Achieving significant advances in capacity and network speed will require densification of networks consistent with a 5G strategy over both licensed and unlicensed spectrums. This is where small cells will come to play—to patch coverage holes, to optimize signal strength, and to increase capacity to meet consumer demand.

Impact on network design

Shifting from a "macro tower only" mindset to a "connect everything" mindset presents a new set of challenges that will require looking beyond conventional ways of thinking about network design and engineering, site selection, and deployment.

Evolving organizational capabilities

The processes and tools for overseeing conventional network deployment and rollout might not work so effectively in the new era of small cells. From process automation to reporting, a diverse and potentially new set of capabilities will be needed.

How innovation helps

Small cells give rise to several opportunities—both in terms of building and maintaining networks as well as the services delivered via those networks. They have the potential to offer speeds that pave the way for wireline broadband substitution and enable the creation of a mesh network, offering direct connectivity to the rapidly growing number of Internet of Things (IoT) devices. But to fully capitalize on the opportunity, processes and tools must be updated in lockstep.

Why small cells now?

Small cells can be nimble, quick to install, and in many ways more affordable than constructing large conventional towers. The "install (just about) anywhere" aspect of small cells helps to deal with limitations on available spectrum by leveraging higher frequencies for focused coverage and capacity requirements. Ultimately, small cells—by virtue of their pervasiveness—will assist in achieving densification in support of a 5G strategy, to make significant advances in capacity and network speed. The shift could drive wireline broadband substitution in densely populated metro areas while supporting the emerging IoT, in which more sensor-enabled wireless devices create a rich new world of connectivity and interactivity.

CSPs are beginning to view the solution as a strategic enabler rather than a tactical fix. For larger players, small cells can offer a strategic path to market solidification while helping to reduce costs associated with capacity growth in targeted areas with population density. For smaller CSPs, small cells offer a rapid and potentially cost-effective way to grow networks efficiently and strategically.

With the importance of small cells growing, you will likely want proactive and forward-thinking steps to position your organization for the future. Key activities will include identifying priority markets in which bandwidth could become an issue, deploying small cells prudently within those markets, and proactively assessing emerging deployment opportunities rather than reacting to coverage gaps as they occur. Moreover, you can take several "no regrets" moves to gain access to rights of way, power, and backhaul, which are often the most expensive and time-consuming barriers to small cell deployment.

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Impact on network design

Small cells represent a fundamentally different challenge compared to towers. While macro towers can be built based on conventional principles of network engineering and positioned in optimal places on the network, in the case of small cells, additional factors such as concealment will come into play. With small cells, the limiting factors are sometimes outside your control. Therefore, tools are needed to identify potential locations for small cells.

Network design teams need to be equipped with the right tools and information for identifying small cell site locations that have the highest chance of success when it comes to the permitting process, taking into consideration the location of existing fiber and the physical application of the small cell itself. Effective use of spare capacity on existing backhaul networks is paramount, as the costs of securing new rights of way and building a new backhaul link can quickly swamp the cost advantage of a small cell strategy. In addition to the wireless infrastructure, you should consider existing residential business fiber networks for potential use in small cell backhaul. Know that your team will need information on intergovernmental relationships and infrastructure usage restrictions, specifications on existing street furniture within jurisdictions, and information on available backhaul options and power options in every part of the network, not just the "wireless" network.
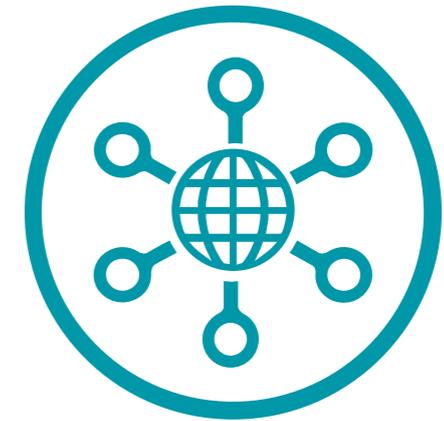
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Evolving organizational capabilities

The complexity involved in undertaking thousands of small cell projects across a nation or a continent will require a heightened level of organizational capabilities and governance. Working with thousands of new municipalities, layers of regulations, infrastructure partners, and technology vendors creates a new web of requirements and expectations. And as your coverage footprint grows denser, additional burdens emerge for managing equipment, logistics, and data. Operations and maintenance functions will have to work in harmony. You cannot presume existing organizational processes, tools, and infrastructure will support the intricacies and nuances associated with a small cell explosion.

The emergence of small cell solutions requires development and refinement of a diverse and potentially new set of organizational capabilities such as process automation, mobile apps to support field workers, regulatory processes, and real-time

performance monitoring and analytics, just to name a few. Reporting becomes especially critical amid the new, more complex landscape. And while real-time monitoring and analysis of networks is a strong suit for some companies today, there is room for improvement.

Having the right tools—such as repeatable templates, blueprints, and procedures for the new small cell model—can help automate and accelerate activities, minimize manual intervention, and maximize user productivity and, ultimately, speed of deployment.

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How innovation helps

As small cells promise denser networks, more pervasive services, and more reliable connectivity, new opportunities for innovation should begin to emerge. Innovation will continue in small cell technology itself, making it cheaper and increasing performance. This trend also lowers barriers to new market entrants and inflates the potential for other players to insert themselves between you and your customer. Innovation around the broader ecosystem— as well as in services that the network can deliver—will help inoculate you against these threats.

Collaboration with the entire ecosystem up and down the value chain can foster new business models and new service ideas. Innovating new tools for optimizing signal strength and hardware placement can help you to maintain a competitive position when it comes to cost and performance. Thoughtful placement of cells with respect to commercial centers can open opportunity for new advertising concepts, with more precise triangulation of user location.

Experience in prior technology cycles tells us that the more available connectivity becomes, the more users find ways to use it. If users can suddenly access content consistently from more locations, small cell explosion could open up more opportunities for over-the-top services, as well as new partnerships for delivering those services. Given the wide range of applications to be supported, small cell deployments will need to flexibly combine resources across licensed spectrum in low- and high-frequency bands, shared spectrum, and unlicensed spectrum. Embracing technologies such as License Assisted Access (LAA) that use carrier aggregation across different licensed and unlicensed bands to increase capacity of the cellular network can expand the market potential for new partnerships in offering over-the-top services. Introducing mesh small cell architectures similar to those used in some wireless utility networks or in home control networks could bring advantages for multi-device interaction or for managing peak traffic demands.

Small cells give rise to several opportunities—both in terms of building and maintaining networks as well as the services delivered via those networks. They have the potential to offer speeds that pave the way for wireline broadband substitution and enable the creation of a mesh network, offering direct connectivity to the rapidly growing number of Internet of Things (IoT) devices. But to fully capitalize on the opportunity, processes and tools must be updated in lockstep.

Let's talk

The potential for small cells is anything but small. Determining how to operate effectively amid this technology explosion requires a focus on developing a new strategic mindset. Want to sharpen that focus and explore some other big ideas about small cells? We should talk.

Contacts

Craig Wigginton
Vice Chairman
US Telecommunications Leader
Deloitte & Touche LLP
cwigginton@deloitte.com

Dan Littmann
Principal
Deloitte Consulting LLP
dlittmann@deloitte.com

Hanish Patel
Senior Manager
Deloitte Consulting LLP
hanpatel@deloitte.com

Ketan Marchant
Manager
Deloitte Consulting LLP
kemerchant@deloitte.com

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