COMMSCOPE®

What will 5G networks mean for your future? You have questions—CommScope has answers

5G: LOOKING TO THE FUTURE

Q. When will 5G really arrive?

A. The first phase of 3GPP 5G R15 standards was released in early 2018 by 3GPP, and 5G should be fully defined in 2019. The first implementations of 5G will utilize the LTE control channel and core, and will focus on enhancing mobile broadband. Commercial 5G deployments will follow in 2020. The standards will continue to evolve even after the technology is in the market.

Q. Does 5G mean I should avoid investment in LTE technologies?

A. No, but the approach of 5G should become an important part of your LTE strategy. According to Cisco's VNI report, demand for more capacity is expected to rise by 50 percent annually prior to the first possible 5G deployments, so LTE growth must continue in the years ahead. However, this growth should be guided by power, backhaul and site acquisition factors that will be critical to 5G as well as LTE. Since many bands currently used for 3G and LTE will be reallocated to 5G over the coming years, building a strong RF path today will ensure a solid 5G foundation tomorrow.

Q. What role will fiber play in the 5G network?

A. It will have a large role. Industry consensus is that 5G radio networks will opt for fiber as the preferred technology for backhaul and fronthaul wherever possible because of 5G's bandwidth requirements. The density of radios for 5G will drive the requirement for network convergence between wired and wireless traffic, increasing the requirement for fiber network solutions that focus on providing the density, accessibility and flexibility to support multiple applications needed for the future.

Q. How many fibers will 5G small cell sites require?

A. This remains an unresolved question at this time as standards and architectures develop, but the answer will likely be somewhere between two and 12 fibers per small cell site. Utilizing passive wave division multiplexing technology reduces the number of fibers required at each location by sending multiple signals along a single fiber at different wavelengths. These components allow capacity upgrades at a relatively low cost, without the costs and delays associated with adding capacity by way of new construction. WDM, packet-based fronthaul and bi-directional optics all can reduce the amount of fiber required at each cell site, while, at the same time, the new centralized unit/distributed unit split will increase the number of fiber interfaces needed.

Q. What about cloud-based radio access networks (C-RAN) and 5G?

A. Centralized RAN, where fiber fronthaul allows multiple cell sites to share remote baseband unit (BBU) resources, will eventually evolve to cloud RAN (C-RAN). In C-RAN architecture, the BBUs themselves will be virtualized in software running in data centers located at the edges of networks. The 5G architecture for C-RAN has the BBU splitting into two entities—the distributed unit and the centralized unit or unit. The virtualized distributed unit would be located near the edge and handle the real-time functionality of the radio whereas the centralized unit would be deeper in the network and support the non-real-time functionality across many distributed unit. In addition to the OpEx savings from centralizing physical (and, eventually, virtualized) assets, C-RAN and its fiber-based architecture will also enable greater energy efficiency, increased network capacity and lower latency than currently available—three improvements that are a prerequisite for the successful rollout of 5G-compliant networks.

Q. How will 5G evolve in the complex spaces in high-traffic venues and in difficult-to-cover buildings and mega-structures?

Indoor venues will be a critical part of 5G. Industry analysts claim that 80 percent of all mobile traffic originates indoors, which will include 5G traffic. In addition, emerging 5G-dependent IoT applications such as smart retail and connected health are concentrated in commercial buildings. So, 5G will need to perform indoors as well as outdoors.

This will require specialized indoor solutions. For example, 5G mm Wave are extremely suited for indoor deployments as they provide high capacity required for indoors, and also avoid external interference due to enclosed structures. 5G outdoors will use massive high-power antenna arrays, which are not practical for indoor deployments.

Q. How will 5G's move to the edge change power architecture?

A. Every edge device needs local power, which has traditionally involved ac power grid connections made by electrical contractors. Between labor availability and permitting hurdles, this can be a slow and expensive process, and provisioning conventional power may add as much as $15,000 to the cost of a single device connection.

A smart alternative is a hybrid cable solution that combines fiber optics and electrical power in a single cable run that doesn't require licensed electricians and streamlines permitting. In combination with high-efficiency dc-dc conversion technologies, this approach allows the centralization of power management and organization of central battery backups for a cluster of mission-critical edge devices, such as 5G small cells or fixed wireless radios.

5G small cells can also be powered using AC technology, as deployed by broadband CATV wireline operators today. Distributed power over coax has a long history and can be found on most streets today, ready to provide power and backhaul.

Q. What is 5G crosshaul?

A. 5G crosshaul is an integrated infrastructure solution for both fronthaul and backhaul applications. We expect that 5G crosshaul will be Ethernet-based, supporting the tens of Gbps required by 5G networks.

Q. Is Massive MIMO mandatory for 5G deployment?

A. Massive MIMO is an essential technology for 5G deployments in mmWave bands where a large number of antennas are used to compensate for the propagation losses inherent to those high frequencies. However, in 5G deployments below 6GHz, Massive MIMO is optional and operators are still evaluating where and when to deploy these solutions effectively. The additional capacity usually comes at the expense of a significant additional CAPEX (and OPEX) investment compared to traditional radio+passive antenna solutions. Therefore, multiple operators are looking at xTxR radios and passive antennas are their de-facto 5G deployment option (from 600MHz to 4.5GHz bands), complemented with Massive MIMO where the business case makes sense.

Q. Will 5G RAN architecture allow open interfaces?

A. Traditionally RAN has been a closed architecture where the Base band and Radio are required to be from the same manufacturer, in order to be inter-operable. 5G RAN architecture has decomposed the RAN into three parts – Centralized Unit (CU), Distributed Unit (DU) and Radio Unit (RU) and 3GPP has specified the interface between DU and CU for multivendor scenarios (F1 interface). There is a massive interest in the industry to make the interfaces between these three functional units open. Notable being "ORAN Alliance" that has already specified an open fronthaul interface between the RU and the DU so that multivendor networks are enabled at all levels in the RAN. Open standardized interfaces will drive innovation in the industry and will allow multi-vendor implementations, enabling flexibility and programmability in networks.

Q. Is TDD preferred for 5G?

Most initial 5G deployments, both in sub 6GHz and mm Wave, will be based on TDD. The key advantages of TDD is that it allows dynamic sharing of Uplink and Downlink resources, thereby addressing the asymmetry in UL/DL traffic. TDD also provides increased efficiency for massive MIMO technology by exploiting channel reciprocity. TDD also allows un-utilized unpaired spectrum to be efficiently used, which otherwise would not have been possible if pairing was mandatory.

CommScope draws on decades of innovation and ingenuity to provide our partners and customers with insights that really matter. With the incredible potential of 5G networks on the horizon, the value of a good solutions partner has never been greater—and neither has CommScope's commitment.

Contact us now to participate in a 5G workshop, learn more about our 5G solution portfolio or get a quote. We're ready to share the future with you.

COMMSCOPE®

commscope.com

Visit our website or contact your local CommScope representative for more information.

CO-112011.3-EN (12/18)