LITEPOINT

5G opportunities: Q&A with LitePoint president Brad Robbins

Sponsored content / Thursday 14 January 2021

Brad Robbins, president of LitePoint

LitePoint, a US-based wireless test solution provider, offers turnkey over-the-air test solutions from development to production, combined with software automation that makes testing of FR2 devices easy in both characterization as well as volume manufacturing.

In a recent interview, Lite-Point president Brad Robbins, talks about the development of the 5G market, and what it means for the wireless test solutions sector.

Q: As more 5G phone models become available in the market, what do you see the development of 5G market today?

A: Despite COVID-19's unprecedented disruption on a global scale, in 2020 we saw 5G adoption rates grow dramatically. While the total number of mobile shipments decreased in 2020, 5G mobile shipments grew from just over 10 million units in 2019 to 180-200 million units in 2020. We are very early in the global deployment, but 5G is living up to its promise of better mobile access. In existing sub-6GHz (FR1) spectrum, 5G operates more efficiently, providing more capacity for operators in their existing spectrum. This results in a better user-experience for the end-user, particularly in densely-populated urban areas

where LTE capacity is strained. As mobile operators enable more "mid-band" spectrum and MIMO, 5G devices really start to deliver on the promise of faster connectivity.

The most dramatic demonstration of the power of 5G is in the mmWave (FR2) 5G spectrum, where >1 Gbps data connections are being achieved. Apple's recent product introduction shows that mmWave is practical to add to a handset, though the deployment of mmWave networks is currently contained to somewhat narrow areas of urban centers. As the build out of mmWave networks continues, this will provide the next major leap in available data capacity, allowing carriers to move beyond the mobile phone and broadly deploy fixed-wireless to offices and residences. We are still early in the roll out of 5G, but the adoption rate is growing faster than what we saw with 4G.

Q: There are several testing solution companies with general purpose test and measurement solutions. What makes LitePoint testing solutions so unique compared to others?

A: Achieving optimized production economics requires a test system that is optimized for production. 5G device production requires both an optimized solution for the sub-6GHz (FR1) band, where the calibration and testing is primarily performed in a conducted (cabled) environment, as well as the mmWave (FR2) band, where testing is performed over-the-air (OTA). For FR1 devices, LitePoint's production solutions provide industry-leading performance in power accuracy, signal quality, and spectrum bandwidth.

LitePoint's offerings additionally cover the upcoming 5G NR-U and Wi-Fi 6E frequencies up to 7.3GHz, with a future proof 200 MHz of bandwidth to cover mid-band carrier aggregation scenarios. For FR2 mmWave devices, LitePoint provides the simplest solution for manufacturing compared to other offerings, with the entire solution integrated into a single box with a calibrated interface. This greatly simplifies the setup, maintenance, and reliability on the production floor, enabling device manufacturers to ensure that they deliver high yield with high up-time in manufacturing. Additionally, LitePoint offers turnkey over-the-air test solutions from development to production, including test chambers, antennas, and switching accessories, combined with software automation that makes testing of FR2 devices easy in both characterization as well as volume manufacturing.

Q: As mid-price or lower cost sub-6 GHz 5G phones get more popular in the market, manufacturers are facing the challenges of testing time increasing and slow down the big volume production, what do you think how to help them to resolve the impacts?

A: In addition to ensuring shipment qualify, test time is, of course, one of the next biggest focuses for production testing. One technique that we have been pioneering at LitePoint is providing solutions that test multiple devices at the same time with a single tester. This effectively enables the per-device test time to reduce, providing a lower cost per unit. Additionally, as a leader in production testing, we work very closely with the chipset providers to help develop or deploy new techniques to optimize test times. An example of this is the trend towards Sequence Based Test, which dramatically reduces the number

of required communication transactions between the device under test (DUT) and the test solution. Instead of having one setup command per test, which occurs hundreds of times, a pre-defined list of setups can be loaded and setup before performing hundreds of measurements. Reducing this communication time provides an impressive reduction in the test time, potentially delivering up to 70% improvement over traditional test methodologies.

Q: On the other hand, the OTA test for 5G phone in the mass production lines, will the testing chambers require the new arrangement of production lines? What do you see the OTA test challenges in big volume production?

A: The concept of performing OTA testing on the production line is not new. In 4G LTE devices, it is common to perform some simple OTA testing of the phone at the end of the line. This test ensures that the final assembly of the phone, including the antenna and embedded software, have been correctly installed. This testing is performed in the near field and typically has relatively loose PASS/FAIL limits. For 5G, the addition of mmWave technology requires phone makers to provide a higher-quality OTA test with tighter PASS/FAIL limits. One advantage to mmWave technology is that the far field distances are significantly shorter than for sub-6GHz frequencies, making the size of production test chambers practical for the manufacturing floor. For example, the far field measuring distance for a typical mmWave antenna array for a phone can be

There are technical challenges that must be addressed to efficiently perform high-quality OTA testing in the manufacturing environment. First, the setup and calibration of the OTA chamber must be accurate and repeatable. mmWave antennas are highly directional, requiring the mechanical alignment to be very precise. For the measurement antenna setup, this can involve the use of a laser alignment tool to ensure that the antenna is focused on the center of the DUT antenna array. To ensure repeatable placement of the DUT antenna array, custom milled DUT holders are required which enable subsequent placements of devices to reliably return to the expected location in the test chamber. Another challenge in 5G OTA testing is overcoming the significant path loss - the decrease in the signal power between the DUT antenna and the tester connection. It is very common to see >50 dB of path loss in a 5G OTA setup - compare this to

Q: Both Qualcomm and MediaTek launched silicon chips for Millimeter Wave (mmWave) 5G devices. And both are investing more resources in ramping up mmWave development as they plan to roll out their respective next-generation 5G chips. What do you see the further challenges for mmWave testing solution?

A: Though mmWave is new to consumer products, the technology is well-understood from its military and aerospace roots. The main challenge is scaling from "boutique" low volume to mass-market high volume. To enable this, an area of focus for LitePoint has been simplicity. Multi-component test setups in the lab can be powerful and flexible, but they are complicated and time consuming to setup, require specialized knowledge, and are very problematic to repeatably deploy on a large number of test stations on a manufacturing floor. The LitePoint approach was to develop an optimized tool for the production

environment: fully-integrated, simple to setup, and delivers repeatable results without the need for highly-skilled technicians. For mmWave technology to become widely deployed in consumer products, the manufacture and test of these products needs to be as simple as the sub-6GHz wireless technologies. Our DNA is simple, robust, and repeatable equipment for manufacturing.