National Instruments Committed to End-to-End 5G Interoperability

Executive Summary

Despite the fact that both 4G and 5G network topologies are IP-based and backend compatible, the transition to next-generation wireless wide area networking (WWAN) brings with it a host of operator, carrier, telecom equipment, chipset, and OEM device manufacturer challenges. Among them, network function virtualization (NFV) and software-defined networking (SDN) deployment to support:

- Network slicing and new service monetization opportunities
- Core to edge computing aimed at improving quality of service (QoS)
- On-going operational support for the adoption of open source platforms aimed at improving agility as well as lowering operating expense (OpEx)
- A growing demand for white box infrastructure that can support multiple workloads aimed at lowering capital expense (CapEx).

Device manufacturers and infrastructure providers are individually certifying products based on Third Generation Partnership Project (3GPP)5G ratified standards, but in order to address the challenges in overall deployment, interoperability from device to base station to network is key. Interoperability encompasses design, prototyping, testing, and measurement, and we believe National Instruments has the experience and capability to ensure next generation 5G wireless network interoperability.

Why Is Interoperability Important?

Cost and Scarcity of Spectrum

Governmental auctions are driving an escalation in the cost of spectrum on a global basis. T-Mobile paid close to a staggering $8 billion at a Federal Communications Commission (FCC) auction in 2017 and parent company Deutsche Telekom AG appealed to the German government to intervene and help mitigate similar circumstances in the European market[1] in the spring of 2018.

[1] T-Mobile Online Newsroom, April 12, 2017; DT Annual Shareholders Meeting, May 17, 2018

Given the high investment levels in spectrum, operators must maximize utilization in every band. Spectrum shortages also motivate operators and equipment providers to investigate spectrum in both the unlicensed and mmWave bands for 5G deployment. Unanswered technical questions around propagation of mmWave challenge its adoption. Further investigation is required to determine its financial viability and commercialization requirements.

An Unprecedented Infrastructure Transition

There is a growing emphasis on the part of operators to deploy software-defined networking (SDN) and virtualization to facilitate 5G scale and adaptability. Network slicing will aid in the guarantee of QoS for new services and over the top (OTT) applications. These initiatives present a new infrastructure comprehension challenge to operators of every size. Open source deployment still requires validation and operational support despite efforts of the Linux Foundation's OpenCompute, Open Networking Automation Platform (ONAP), and other projects that enable operator agility and cost containment for NFV and SDN implementations.

Moving from 4G to 5G brings with it an unprecedented flexibility and at the same time an opportunity to address a diverse set of use cases and applications. The transition will require researchers to develop new technologies, algorithms, and communication protocols. Design, prototyping, testing, and measurement are all critical in ensuring the future 5G network ecosystem performs flawlessly from device to base station to network core and edge.

CONSIDER NATIONAL INSTRUMENTS FOR 5G INTEROPERABILITY

There are only a handful of test and measurement companies that understand the complexities of 5G device and core infrastructure deployment. What separates National Instruments from others is a deep knowledge base garnered through years of collaboration with both academic and industry researchers that enable these stakeholders to achieve breakthrough innovations that help shape the standard. One example of this ground-breaking effort is National Instruments development of the world's first real time mmWave prototyping system. By employing a software-defined radio (SDR), the company is able to allow researchers and engineers to deploy, iterate, and optimize designs quickly and easily with its mmWave Transceiver System.

In order to maintain and extend its leadership, National Instruments also makes substantial research and development (R&D) investments on a complete platform basis that leverages a large community, strategic partnerships, and support base. The

company earmarks 18 percent of total annual revenue towards research efforts and maintains 14 R&D centers around the world. Among numerous partnerships, National Instruments entered into an alliance with device and network test services provider Spirent Communications in June 2018. The collaboration is significant in that it allows 5G chipset and manufacturers of 5G New Radio (NR) smartphones and Internet of Things (IoT) devices the ability to validate their products without the need to access expensive and complex 5G base stations. This should accelerate time-to-market and reduce overall costs associated with certification efforts.

National Instruments has consistently demonstrated its capabilities with respect to ensuring wireless wide area networking interoperability with large infrastructure providers that spans past 2G to present-day 4G topologies. As a proof point today for 5G, National Instruments and Samsung announced a collaboration in early 2018 to develop 5G test user equipment (UEs) for 5G NR. This is significant in that the partnership claims to validate NR-based 5G technologies and systems for commercialization for both sub 6 GHz and mmWave frequencies. The resulting impact has the potential to expand the available spectrum footprint for 5G deployment, accelerate its densification, and deliver positive operator economics.

Call to Action

Stakeholders are all betting big on 5G to address declining wireless subscriber revenue with new services that take advantage of consistently higher WWAN throughput and lower latency. The key technology considerations around 5G network interoperability span not only device to device, but also device to base station and base station to network. Subsequently, individual device certification is not enough. Interoperability is mission critical to ensure successful 5G network deployments and on-going operational success.

National Instruments is shaping 5G NR commercialization though its interoperability capabilities. Beyond individual device certification, which is certainly important, interoperability has the potential to improve the speed and agility of WWAN deployment, mitigate operator OpEx, ensure higher QoS, and improve overall network reliability. National Instruments has a proven track record in design, prototyping, and testing platforms; a deep knowledge in 5G technology through years of collaboration with academic and industry researchers; and significant R&D investment that has extended its industry leadership and strategic partnerships that validate its position. Put simply, we believe the company should be considered for 5G interoperability services.

IMPORTANT INFORMATION ABOUT THIS PAPER

CONTRIBUTOR
Will Townsend, Senior Analyst at Moor Insights & Strategy

PUBLISHER
Patrick Moorhead, Founder, President, & Principal Analyst at Moor Insights & Strategy

INQUIRIES
Contact us if you would like to discuss this report, and Moor Insights & Strategy will respond promptly.

CITATIONS
This paper can be cited by accredited press and analysts but must be cited in-context, displaying author's name, author's title, and "Moor Insights & Strategy". Non-press and non-analysts must receive prior written permission by Moor Insights & Strategy for any citations.

LICENSING

DISCLOSURES
This paper was commissioned by National Instruments. Moor Insights & Strategy provides research, analysis, advising, and consulting to many high-tech companies mentioned in this paper. No employees at the firm hold any equity positions with any companies cited in this document.

DISCLAIMER
The information presented in this document is for informational purposes only and may contain technical inaccuracies, omissions, and typographical errors. Moor Insights & Strategy disclaims all warranties as to the accuracy, completeness, or adequacy of such information and shall have no liability for errors, omissions, or inadequacies in such information. This document consists of the opinions of Moor Insights & Strategy and should not be construed as statements of fact. The opinions expressed herein are subject to change without notice.

Moor Insights & Strategy provides forecasts and forward-looking statements as directional indicators and not as precise predictions of future events. While our forecasts and forward-looking statements represent our current judgment on what the future holds, they are subject to risks and uncertainties that could cause actual results to differ materially. You are cautioned not to place undue reliance on these forecasts and forward-looking statements, which reflect our opinions only as of the date of publication for this document. Please keep in mind that we are not obligating ourselves to revise or publicly release the results of any revision to these forecasts and forward-looking statements in light of new information or future events.