



# How Spirent\* Meets Lifecycle Test Needs of 5G Wireless Networks

5G network deployment will take place in waves and will depend on virtualization, and that changes testing needs. Spirent provides test solutions for lab and operational network deployments to design in peak performance and assure it throughout the lifecycle of the service.



5G networks are coming to market much faster than initial plans, but the roll out will be a complex process as 5G technologies represent multiple wireless technologies that serve different market needs. 5G services will depend on network functions virtualization (NFV) to deliver agility and lower cost. This network reality changes the testing dynamics for communications service providers (CommSPs) who must rapidly validate their network equipment in virtualized environments across the service lifecycle—from design to operation. Intel® Network Builders partner Spirent\* offers its Landslide\* and VisionWorks\* Mobility Service Assurance (MSA) products to emulate network traffic and test the performance of 5G network functions in virtualized environments in both the lab and the operational network.

## The Path to 5G Starts Now

The original industry target for the first commercial deployments of 5G was 2020, but demand for new, higher bandwidth services has accelerated the timeline. This acceleration is driven by new opportunities, such as wireless fixed access, where there is an opportunity to potentially replace services offering fiber to the home or business.

To support these networks, the 3GPP\* industry standards organization released the first standard (Release 14) for the 5G New Radio using the 4G network core at the end of 2017. Later in 2018, Release 15 is expected, which promises several 5G workplans and standards. There's healthy competition to drive this acceleration as many countries strive to be early adopters of 5G networks.

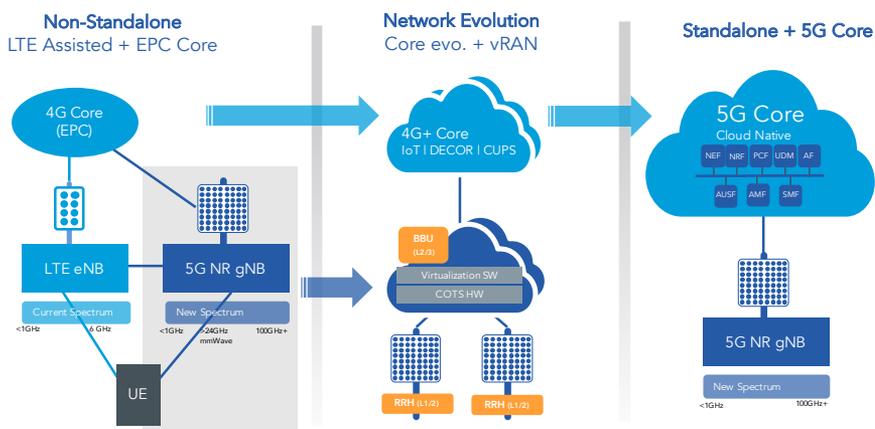


Figure 1. 5G network rollout<sup>1</sup>

## Moving to 5G Means Virtualization

5G needs successful virtualization because the network needs to be flexible, fast, and able to scale up and down on demand to allow service providers to provision services to accurately match demand. The business case for 5G is still emerging, which means service demand expectations can vary, which puts an emphasis on the network efficiencies and remote scalability that virtualization provides.

Two key areas that are important for successful 5G networks are virtualization of the core network and the radio access network (RAN). The network core is where the evolved packet core (EPC) resides to process all of the data from the RF network, inspect for malware, apply policies, and then switch the data onto the carrier's backbone network. Sitting at this network intersection makes the EPC a critical and high-volume component of the network. Recently, several EPC systems developers have made vEPC options available with the features and performance necessary for 5G networks.

Virtualizing the RAN (vRAN) entails taking the base band unit (BBU) functionality out of the base station and placing it in a shared IT infrastructure somewhere in the network or in a data center or in a multi-access edge computing (MEC) server. While this helps networks to scale more efficiently, the infrastructure must meet strict latency and throughput demands.

The multi-faceted nature of 5G and need to build out a virtualized infrastructure mean the network buildout will take place in waves. A carrier may choose to launch a high-bandwidth, fixed wireless service in one community and then later offer a 5G new radio (NR) cellular service in that community. This ongoing rollout places a much higher need on the CommSP to continually test the network to ensure high performance. Spirent, an Intel Network Builders partner, has two products designed to help keep 5G networks operating at peak performance.

## The Solution

5G networks have a need for both lab testing and validation along with ongoing mobility service assurance. Two product families from Spirent offer these testing capabilities.

### Spirent Landslide\*

The Spirent Landslide is a 5G infrastructure test platform that emulates 5G devices and network functions to validate new 5G mobile and core nodes, ensuring their readiness to deliver high-quality 5G services. Landslide delivers network testing capabilities that expand through various 3GPP releases (Release 13 and onward), and the Landslide 5G testing feature set supports validation needs for the entire network system path to 5G.

Spirent Landslide is designed to emulate millions of devices of all types communicating with the network at rates of tens of thousands of events per second and traffic of Gigabits per second.<sup>2</sup> With its unique dynamic testing capability, Landslide can test 4G and 5G infrastructure nodes in isolation and subsequently change the testing topology to progressively incorporate more nodes to the testbed for full end-to-end network or slice validation.

Complex 5G call modeling scenarios can be created that include specific 5G devices in various stages of activation,

deactivation, dual connectivity, handovers, and 5G data transfers. Carriers also can capture measurements in the live 5G network and replicate them in the lab with Landslide for increased realism in the testbed.

### Spirent VisionWorks\* MSA

For operational network testing of 5G networks and services, Spirent offers its VisionWorks mobility service assurance (MSA) solution. VisionWorks MSA utilizes network emulation combined with virtual test agents running as virtual network functions (VNFs) to validate 5G during turn-up and on demand after the network is operational. VisionWorks delivers a number of analytics features that include service assurance for enterprise mobile VPNs, assurance for data services, and VoLTE / IMS service assurance.

The ongoing use of VisionWorks helps CommSPs to proactively discover and resolve issues before customers are affected. These functions include:

- detecting problems before services go live
- monitoring quality and performance 24/7 even if there is no usage
- isolating root causes by testing end-to-end and each network segment in-between
- supporting virtual and physical active test agents

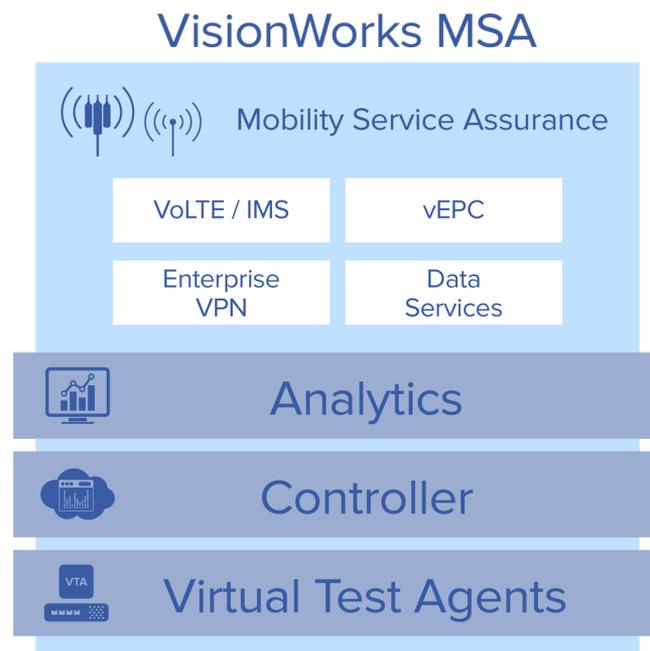


Figure 2. Block diagram of Spirent VisionWorks MSA functionality

VisionWorks is able to test any layer of the protocol stack anywhere in the network because the virtual test agents can be programmed to emulate network functions as needed and perform active tests of layer 2 through 7 protocol performance and service layer quality of experience (QoE). By testing end-to-end and across segments in between end points, complex root causes of service degradations can be rapidly isolated and fixed.

## High Performance Compute and Networking from Intel

Both Spirent solutions are compatible with Intel-based servers and are dependent on Intel® network interface cards (NICs). The Spirent solutions leverage the Intel® Ethernet Converged Network Adapter X540 (Intel® Ethernet CNA X540) and the Intel Ethernet CNA X710.

The Intel Ethernet CNA X540 is a 10 GBASE-T converged network adapter that works with Gigabit Ethernet (GbE) switches and CAT-6a cabling. It includes Intel® Virtualization Technology (Intel® VT) for connectivity to deliver I/O virtualization and quality of service (QoS) features.

The Intel Ethernet CNA X710 family includes dual- and quad-port 10/40 GbE adapters with hardware optimization and offloads for the rapid provisioning of networks in an agile data center. It addresses the demanding needs of the next-generation agile data center by providing unmatched features for both server and network virtualization, flexibility for LAN and SAN networks, and reliable performance.

## Conclusion

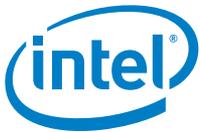
The way forward for 5G networks is to embrace continuous testing of services starting with pre-deployment while the equipment is in an engineering lab then, once deployed, continuously assuring that the network and service delivers on quality and performance. Utilizing Spirent Landslide and Spirent VisionWorks, CommSPs have consistent and continuous feedback across the network and service lifecycles that will be critical for enabling the transition to 5G.

## About Spirent

Spirent is a global leader with deep expertise and decades of experience in testing, assurance, analytics, and security, serving developers, service providers, and enterprise networks. We help bring clarity to increasingly complex technological and business challenges. Spirent's customers have made a promise to their customers to deliver superior performance. Spirent assures that those promises are fulfilled. For more information about Landslide and VisionWorks, visit <https://www.spirent.com/Solutions/Service-Assurance>.

## About Intel® Network Builders

Intel Network Builders is an ecosystem of infrastructure, software, and technology vendors coming together with communications service providers and end users to accelerate the adoption of solutions based on network functions virtualization (NFV) and software defined networking (SDN) in telecommunications and data center networks. The program offers technical support, matchmaking, and co-marketing opportunities to help facilitate joint collaboration through to the trial and deployment of NFV and SDN solutions. Learn more at <http://networkbuilders.intel.com>.



<sup>1</sup> Figures provided courtesy of Spirent.

<sup>2</sup> Testing conducted by Spirent. Configurations: 2.6 GHz, 16-core Intel® Xeon® processor E5 with minimum of 126 GB and max of 504 GB of DDR4 2400 MT/s RAM.

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