5G IS COMING; DO YOU HAVE THE CRITICAL VISIBILITY YOU NEED TO ASSURE YOUR NETWORK?

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5G is coming. In fact, it may have already arrived in your network with lab testing, early field trial, or initial rollout in the US, Asia, Europe, or elsewhere. But do you have the tools that provide visibility to 5G, for interoperation and lab testing, to monitor and troubleshoot your 5G networks?

For Network Operations and Engineering personnel who are tasked with its operation, the 5G network will be unlike any network before. There are new radios with millimeter wave, Cloud RAN (C-RAN), control messaging running over 4G and user plane running over 5G, Figure 1 - 5G Initiative Non Stand-Alone (Option 3x), the expected introduction of containers for Mobile Edge Computing (MEC) and network slicing, orchestration/automation, and a plethora of new and unknown IoT devices and services coming onto it.

For Communications Service Providers (CSPs) to successfully rollout this next-generation mobile network, they must have complete visibility into this new infrastructure. Having the visibility baked into 5G plans now, avoids problems later for Engineering and Operations to monitor, run analytics, and ensure security of the network.

Defining the 5G Service Assurance Experience

Explosion of small cells - Massive MIMO offers multiple streams using multiple antennas directed to many devices. Given that many 5G deployments will be in higher bands, 5G radios are expected to be massive MIMO systems. It will be like having 128 ears to listen to the mobile communications. To better plan and design for this new 5G network experience mobile operators will need new geo spatial propagation modeling tools to help determine how to most efficiently and cost effectively deploy (micro) cells.

Right Tools to optimize cells - Beamforming will be utilized in 5G to focus the signal to the intended recipient while minimizing noise. Key benefits of this technology are improved coverage for cell-edge users and reducing overall interference. The RAN Operation team will need RF monitoring tools to assure that the cells are delivering expected latency, bandwidth, and connectivity for individual subscribers and devices as well as to continually optimize the cells as traffic patterns and topology change.

Visibility into virtual resources - Network slicing is the logical partition of a network utilizing virtual resources that enables the service provider to provision a "network" with specific attributes (such as ultra-low latency and/or ultra-high bandwidth, high density of devices etc.) that can better serve a specific application, customer, or class of IoT devices and services. The ability to see and monitor these virtual network slices to assure quality of service will be indispensable for Network Operations teams.

Automate and orchestrate - In 5G networks, virtual resources like containers that serve microservices at the edge will need to be dynamically spun up or down as needed. To respond in real-time to rapidly changing traffic and device density with on-demand virtual infrastructure mobile operators must employ orchestration. And to achieve this level of automation, the orchestrator will need real-time Smart Data to inform it.

Generate New Revenue - Finally, to leverage this new 5G network, mobile operators will want to monetize these new virtual network resources by providing service level guarantees for an application or class of devices and to gain knowledge of new revenue-generating services from analytics. To do that, they will need 7 x 24 visibility and reporting to assure and validate delivery with the customer.

5G Phased Approach

For some mobile operators the 5G network will be implemented in two phases. The first phase, called Non-Stand-Alone (NSA), **Figure 1** leverages the existing 4G network (primarily for the control plane) and the new 5G network for the user plane traffic. The second phase, or Stand-Alone (SA), **Figure 2** is a completely new 5G network that handles both the control plane and user plane traffic. Some mobile operators are going directly to Stand-Alone 5G and bypassing the interim phase.

The NSA initiative (3GPP R15) offers three (Option 3/A/X) different implementations that all leverage the existing 4G/LTE network. These CUPS (Control User Plane Separation) Option 3 variations represent new modes of communication flows integrating two mobile network generations that must be stitched together for monitoring and troubleshooting mobile sessions. Performance monitoring solutions must support all the new 5G protocols in addition to those in 4G/LTE.

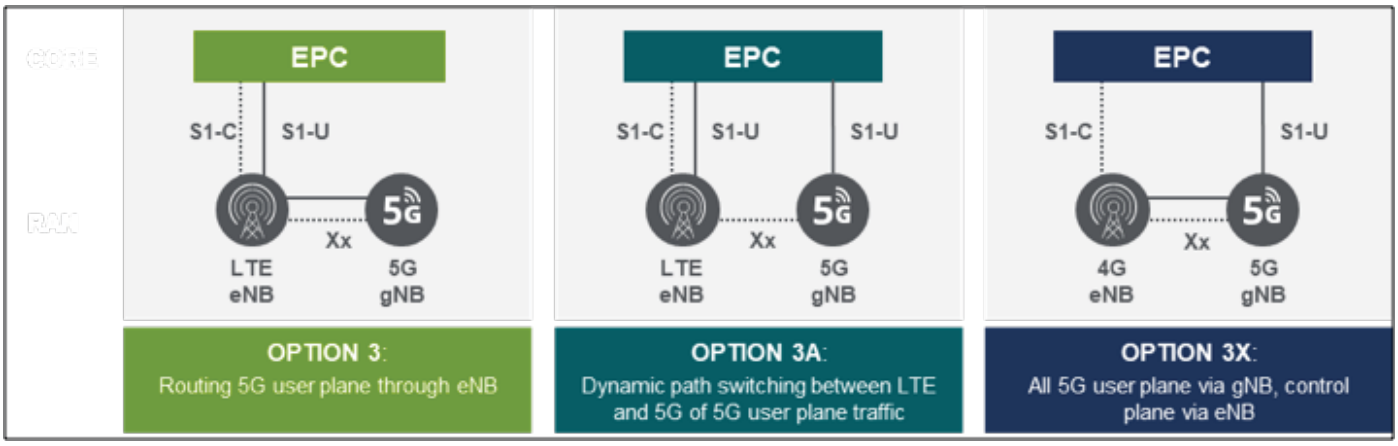

Figure 1 - 5G Initiative Non Stand-Alone

Figure 2- 5G Stand-Alone (SA)

For both Non-Stand-Alone and Stand-Alone versions of 5G, there will be new virtual infrastructure to manage in addition to the new network elements, protocols, and session flows. Furthermore, managing the transition from 5G NSA to 5G SA will be tricky for those mobile operators who deploy the interim phase as the SA version will take over all the control communications that were handled by the 4G network in the NSA phase.

5G offers more speed and new technologies that compels CSP's to seek fast and accurate solutions to deliver critical visibility and actionable insights into network scalability, reliability, latency, and troubleshooting for automated decisions.

For 5G deployments, NETSCOUT's carrier-grade monitoring solution that is designed for the cloud provides end-to-end visibility for any cloud, any network, and any workload; including Cloud, Virtual RAN, Virtual Core, and Edge Computing throughout the 5G life cycle.

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