

5G AND BEYOND: HYBRID NETWORKS ARE HERE TO STAY

By Monica Paolini, Senza Fili

Virtualization, digital transformation and 5G are taking us on a path towards hybrid networks, in which convergence, integration, and coexistence among the different components is more than a way to protect legacy and ensure service continuity: the networks of the future are going to be hybrid because the legacy infrastructure will continue to have a crucial role, and because monolithic and homogeneous networks are no longer capable of addressing our growing and increasingly diverse connectivity needs.

Coexistence in the long term

The long-term need for coexistence is driven by the wider role that wireless connectivity has in our society and economy. Mobile phones are still the main personal device for most of us and voice calls are still an essential part of the wireless plan, but our wireless connectivity depends more and more on a set of complementary devices, which may be at home, in the workplace or in a public venue, or which we carry with us. Enterprise IoT further expands the range of devices and services that wireless networks must support. These new devices and services increase the value and relevance of wireless connectivity, but also create a varied set of requirements that legacy networks cannot support on their own, but that they contribute to supporting within hybrid networks.

Rising complexity

In our previous blog, we looked at how complexity is growing with the evolution of technology – as illustrated by the adoption of massive MIMO, for instance. At the same time, newly introduced technologies are deployed in networks that continue to operate, thus creating hybrid networks in which multiple technologies and layers – old and new – will coexist in the long term. This further increases the complexity of wireless networks beyond the initial transition, with hybrid networks becoming the new normal.

More Than One Dimension

While there is wide agreement that we are moving towards hybrid networks, there are different views of what hybrid networks look like. This is because there are multiple dimensions which contribute to the networks' heterogeneity:

- Multiple access interfaces will continue to exist side by side to provide the coverage and capacity that operators need for consistent service across their footprint. As we get ready for wide 5G deployments, 2G and 3G networks still operate, and 4G will continue to carry most of the traffic for many years in most markets. With SD-WANs, operators can go further and create hybrid networks in which MPLS is tightly-integrated with LTE now, and eventually with 5G. And Wi-Fi is set to complement cellular access, by carrying most of the traffic to mobile devices, especially from residential and work indoor environments.
- In the core, NFV and SDN create networks in which physical and virtualized components coexist. The transition to virtualized networks is gradual and incremental. Some functions continue to rely on legacy technologies and may do so for quite some time. In addition, virtualization encourages a transition from centralized architectures to distributed architectures which rely on edge and cloud infrastructure.
- In the RAN, the transition to virtualized, cloud RANs will be gradual and include different types of RAN topologies, with varying degrees of functionality located at the antenna site and remotely.
- In the transport network, wireline and wireless will continue to coexist to meet the traffic demands in a cost-effective way in different environments. Fiber is spreading out more, but there are still locations where it is too expensive or not critical to meet the traffic requirements.

Orchestration

If the different network components function in isolation from each other, operators cannot effectively optimize the use of available resources. Orchestration is key in managing hybrid networks and in optimizing the use of available resources for different use cases. Because of the multiple dimensions along which networks are becoming hybrid, orchestration must cover the end-to-end network, to ensure that the customer experience is the best that the network can provide. Without robust orchestration, stand-alone network components may all work according to specifications, but the overall performance from the user or device perspective may be disappointing, because the interactions across parts of the network are not managed correctly. The quality of experience is more than the sum of its parts.

Agility

Agility is a crucial feature of good orchestration in hybrid networks. A combination of real-time analytics, closed-loop AI and machine learning, and automation provides the foundation for agile orchestration, because it enables operators to extract value from the dynamic nature of their networks. It empowers operators to nimbly manage network traffic changes through time and location – the amount of traffic, the device mix, the applications and services used, not to mention the service requirements for these – by optimizing the allocation of available resources.

Service Assurance and Security

Hybrid networks require a new approach to service assurance. At a top level, network operators need visibility to be able to monitor end-to-end network performance and customer quality of experience and service. But they also need to be able to drill down into their networks to get more granular insight into the causes of degraded performance or into possible ways to optimize the allocation of network resources. This calls for a more proactive approach to service assurance, which with the emergence of AI and machine learning will evolve into predictive service assurance, aimed at identifying network anomalies early, before they affect the network and the user experience.

In hybrid networks that are multi-domain, multi-layer, virtualized and distributed, going deeper in the network means exploring in multiple directions and at multiple levels, and analyzing how different parts of the network interact with each other. For instance, this approach gives operators a higher level of precision when trying to identify root causes, which in turn makes remedial actions better targeted, and hence less disruptive and more effective. A parallel and related change towards a multi-dimensional, multi-level approach in service assurance is required to retain security – a non-negotiable feature for wireless networks – across hybrid networks.

Hybrid networks give operators the opportunity to continue to benefit from the existing infrastructure while they transition to their 5G, virtualized and digitalized networks, to combine the advantages that different network components and architectures bring to the table. With hybrid networks, evolution to new technologies is not about rip and replace: it is about flexible and dynamic integration and coexistence. Holistic planning for the assurance of this evolving network now will smooth the introduction and operation of these new technologies later.

NETSCOUT

Corporate Headquarters
NETSCOUT Systems, Inc.
Westford, MA 01886-4105
Phone: +1 978-614-4000
www.netscout.com

Sales Information
Toll Free US: 800-309-4804
(International numbers below)

Product Support
Toll Free US: 888-357-7667
(International numbers below)

NETSCOUT offers sales, support, and services in over 32 countries. Global addresses, and international numbers are listed on the NETSCOUT website at: www.netscout.com/company/contact-us