Cloud-Native IMS: Critical for Mobile Operators

White Paper

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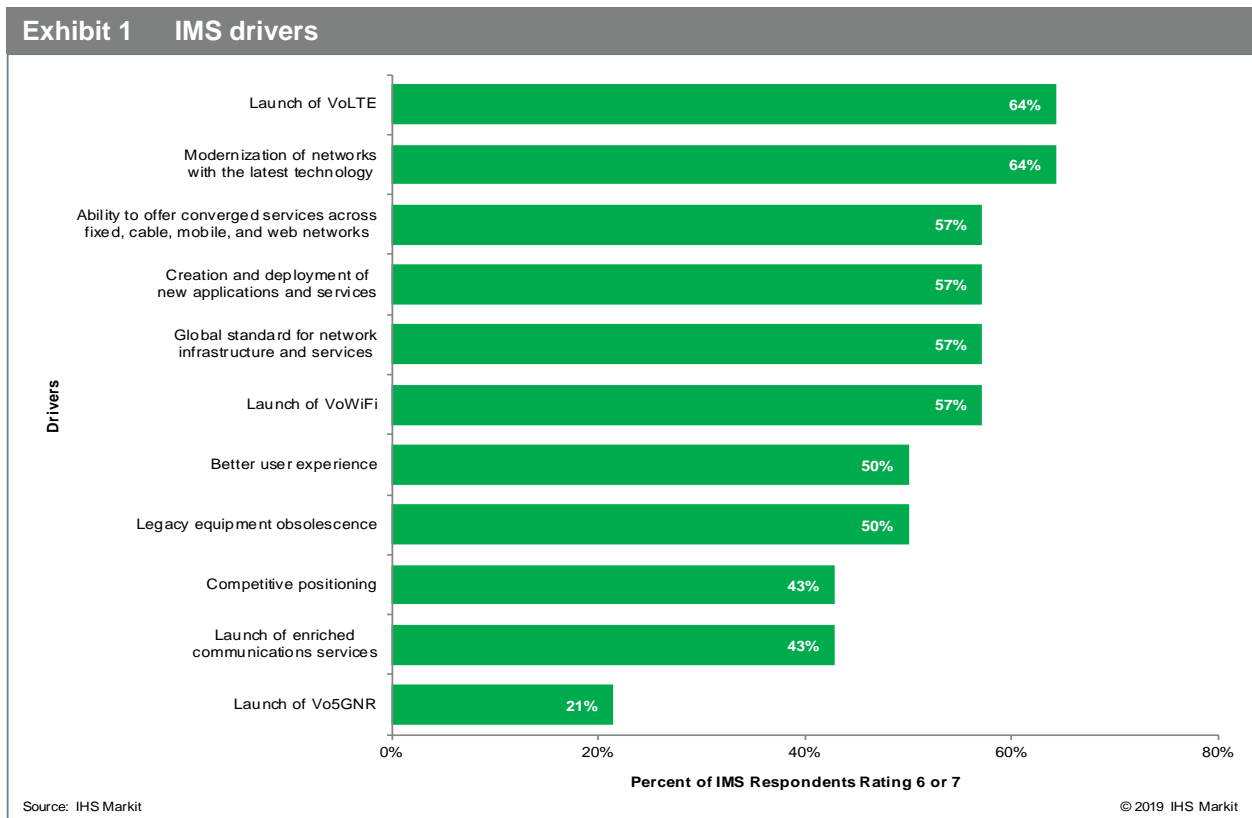IHS Markit Technology | **White Paper**

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Status of the IMS market

IMS is the underlying standard for IP voice supported by vendors and operators worldwide. It is the foundation for IP-based services including fixed-line consumer voice, VoLTE, VoWiFi, and Rich Communication Services (RCS), as well as 5G voice and messaging. The growth of IMS has increased with the launch of VoLTE across all regions in the past five years and as operators worldwide continue the move to IP and large network modernization projects. There continues to be a significant base of fixed-line subscribers, but expansion with mobile operators through VoLTE and VoWiFi is fueling the growth of IMS today and the migration to 5G voice and messaging will fuel continued growth.

On the mobile front, there is still a long ramp to get all subscribers onto IMS. According to the GSA, as of July 2019, 185 operators have commercially launched VoLTE services across 93 countries. Of the 7.9 billion mobile subscribers worldwide today, just shy of **50% are on LTE and fewer than 20% are utilizing VoLTE**. **IMS will be the service engine for 5G voice as it is today for VoLTE**, ensuring IMS will continue as the core voice network for some time. However, there is still a lot of network deployment and expansion to get there as only a fraction of operators have launched 4G or VoLTE.

In our June 2019 *IMS and SBC Strategies and Vendor Leadership Service Provider Survey*, we asked 21 operators from around the world a number of questions pertaining to IMS, including what drives them to deploy IMS networks and what services they have running over those networks. As in surveys from recent years, we found that VoLTE continues to be the number-one driver for IMS deployments. In this year's study, VoLTE again came out on top with 64% of respondents rating it as the number-one driver, followed by network modernization. This reflects the universal choice of IMS as the core infrastructure for voice across wireline and wireless operators and the movement of operators to virtualized and cloud-native networks. VoWiFi is a bit further down the list with 57% of respondents rating it a driver. VoWiFi is widely seen as a complement to VoLTE traction, with 78 commercial launches.

Following VoLTE and network modernization is a broad list of drivers including the convergence of services and the deployment of new applications and services; additionally, IMS as a global standard with voice over 5G new radio (Vo5GNR) is becoming a consideration. Operators see a need to extend the IMS network for services beyond voice, and they are considering enhanced messaging like RCS, business services such as unified communications, and open APIs.
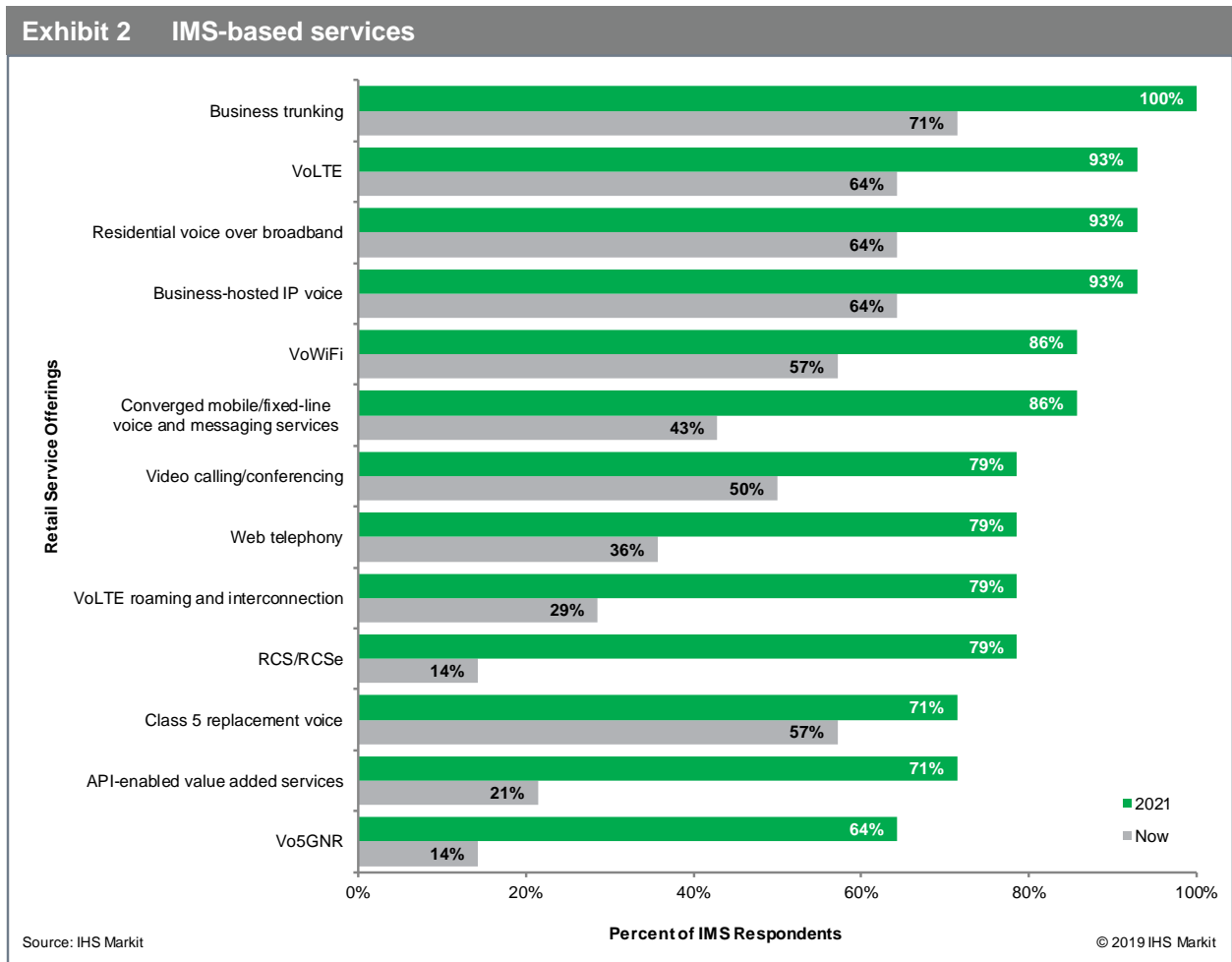

Exhibit 1   IMS drivers

In the same survey, we asked operators what services they currently run over their IMS networks and what they plan by 2021. By 2021, 93% of respondents plan to have residential voice over broadband and VoLTE deployed over IMS, growing from 64% each today.

While VoLTE is deployed by mobile operators, VoWiFi is being offered by a variety of operator types, and 57% of respondents have already deployed it, jumping to 86% by 2021. The broad support for VoLTE and VoWiFi by device manufacturers has been the catalyst for wide service deployment.

There are a few other noteworthy IMS-based services being deployed by respondents:
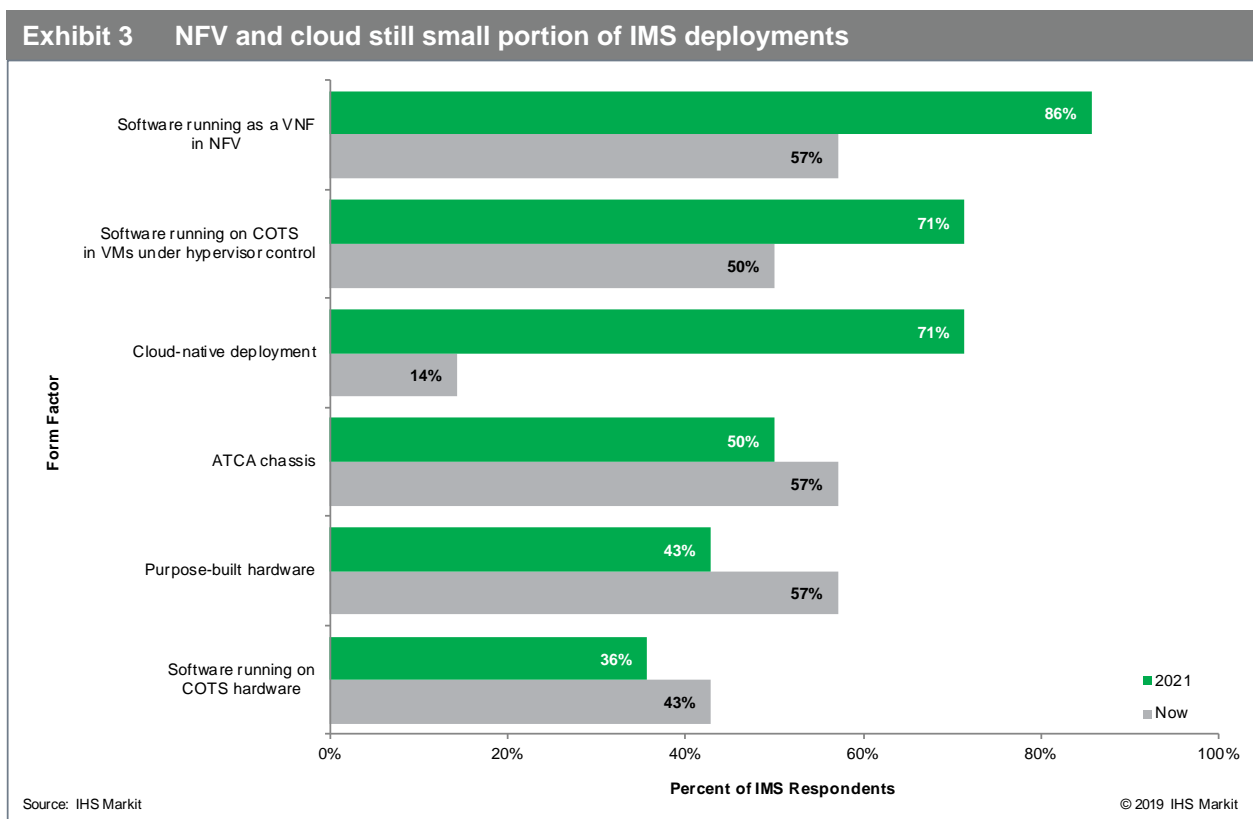
- VoLTE roaming and interconnection has only been established by 29% of respondents today, which dovetails with limited global VoLTE roaming. 79% of respondents plan to have VoLTE roaming deployed by 2021.

- Voice over 5G new radio will be the next wave of wireless voice activity driving IMS deployments. Most current 5G activity is not on new radio but rather repurposes 4G radio with the goal of moving to 5G radio. **The need for IMS does not go away with 5G**. In both cases, there remains a requirement for IMS. With 4G radio, voice will run over the VoLTE network, and as operators move to 5G new radio, voice will continue to run over an IMS core.

Exhibit 2   IMS-based services

The majority of operational IMS networks today run over purpose-built hardware, which is representative of the legacy of over 10 years of implementations. However, operators must shift to software-based networks using virtualization and cloud-native designs to become nimble and competitive with new service creation. **For those operators moving to 5G, virtualization and cloud-native networks are a requirement**. The risk in the future for those that don't modernize their networks is the inability to compete with other operators and technology giants that are fighting for subscribers and service revenue.

Today, slightly more than 50% of operators with IMS networks are running some network components over software in a virtualized environment with the expectation that the proportion will grow over the next two years as they continue to migrate to virtualized and cloud-native networks. The move to virtualized networks varies by network element. For example, an SBC may be deployed with purpose-built hardware, and the telephony application server may be software deployed on a stand-alone server—so we see a true mix in respondent form factors. Today, operators can utilize all the necessary IMS network elements available as virtualized software and, with some solutions, into cloud-native environments. **There is nothing from the technology enablement side that should be holding operators back from migrating to virtualized and cloud-native IMS**.

By 2021, we expect over 85% of operators with IMS to deploy some level of software running as a virtualized network function (VNF) in an NFV environment along with cloud-native deployments and software running on COTS in a VM environment. **If vendors have not started to implement plans to migrate products to software and then to virtualized servers, they will miss the next phase of IMS deployments.**

Exhibit 3   NFV and cloud still small portion of IMS deployments

Source: IHS Markit   © 2019 IHS Markit

The cloud-native IMS path forward

IMS has become the global standard for voice communications across wireline and mobile operators worldwide, and there is still much expansion to be done with operators, including tier two and three operators, that are lagging with deployments.

The utilization of IMS for VoLTE and 5G voice provides a number of benefits including more efficient use of spectrum, eliminating the need for voice on one network and data on another, rapid call set-up times, allowing for fully interoperable video calling across operators, and enabling richer services.

Although IMS has seen a rise in adoption through the deployment of VoLTE, we expect further growth of new IMS networks worldwide, which range from completely new implementations to upgrades from first-generation IMS networks. In the case of both new networks and upgrades, **the path to IMS is with virtualized or cloud-native networks** as illustrated below. Most new IMS network deployments are coming from mobile operators that have not yet implemented VoLTE, but with 5G on the horizon, there is a new urgency to move lest they get left behind. Along with brand new IMS networks, providers will need to differentiate themselves while taking advantage of web-scale infrastructure that allows them to get into the market competitively.

Exhibit 4   Moving IMS to the cloud

Source: Mavenir

Legacy IMS upgrades

Operators that deployed early IMS networks, predominantly for fixed-voice networks on older purpose-built hardware, present an area of new activity. As seen in Exhibit 3, over 50% of IMS networks still run solutions over purpose-built hardware and ATCA chassis. Ultimately, operators need to get to fully virtualized, cloud-native networks to remain viable and competitive in the long term. This isn't an easy process as providers must deal with legacy equipment, operating systems, and ultimately customer migrations. However, there are operators that see the long-term value and are moving through the upgrade cycle for IMS through virtualization and cloud projects as part of larger network transformation projects that give them more control and reduced costs.

Although not yet 5G, what Verizon built for its mobile prepaid Visible brand gets to the heart of what operators aim to build with cloud-native, web-scale software with high levels of automation. In 2018, Verizon launched Visible, a prepaid, no contract service for $40 USD per month of unlimited calls, texts, and data over Verizon's 4G LTE network. In order to launch and for the service to be profitable, Verizon needed a lower cost and faster time to market than the traditional approach to launching a network. For this model, it needed to react quickly to changes, especially because the plan was to operate with a web-scale pace for service availability.

To accomplish these goals, the Verizon team went with a completely cloud-based operation that did not require any hardware elements. All the elements from the IMS to the OSS/BSS systems are in the cloud. Visible customers' communications travel off Verizon's RAN to a cloud-based instance of Mavenir's core platform running in Verizon's cloud and are then handled by a cloud-based version of Vlocity/Salesforce for ordering.

The solution Verizon implemented from Mavenir is a pre-integrated network service that is a bundle of carrier-grade software functions that allow operators to launch separate network slices for specific user groups **while mitigating the impact to existing business**. For the Visible solution, this included IMS with EPC, including packet gateway (PGW), HSS, and evolved packet data gateway (ePDG). Interconnection with the PSTN and other carriers is supported, as well as connection with provisioning and billing interfaces. Using a pre-integrated solution such as this requires no multi-vendor integration and allows for flexibility and agility for operators with rapid spin-up deployment.

Adil Belihomji, head of engineering at Visible, explains it best: "It's built in a way that's truly digital-native. There is no doubt in my mind that this is the way of the future." After all, Visible has no legacy customers to transition to its new platform. "It really didn't make sense for me or the technology team to have reams and reams of hardware just loaded up for scale when we don't have the scale, or don't need the scale," said Belihomji. "Scaling with our customers makes much more sense than just rolling in millions and millions of dollars spent on hardware."[1]

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[1] *Verizon Quietly Builds a Completely Cloud-Based Wireless Service*, Light Reading, 29 January 2019

Greenfield IMS

For brand new networks, or greenfield networks, the current wave of infrastructure centered on virtualized software and the cloud is opening doors for new networks that were previously unattainable. We see the opportunity as ideal for MVNOs, which have a brand presence in a given market. We expect new operators to emerge, taking advantage of the cloud to exploit faster time to market and cost of operation advantages. Not weighed down by existing infrastructure and outdated ways of doing business, these providers offer us an unencumbered path forward with pure virtualized, cloud-native IMS networks.

5G core preparation with virtualized IMS

Just as the migration to VoLTE has driven mass adoption of IMS, the mobile services platform is shifting again in anticipation of
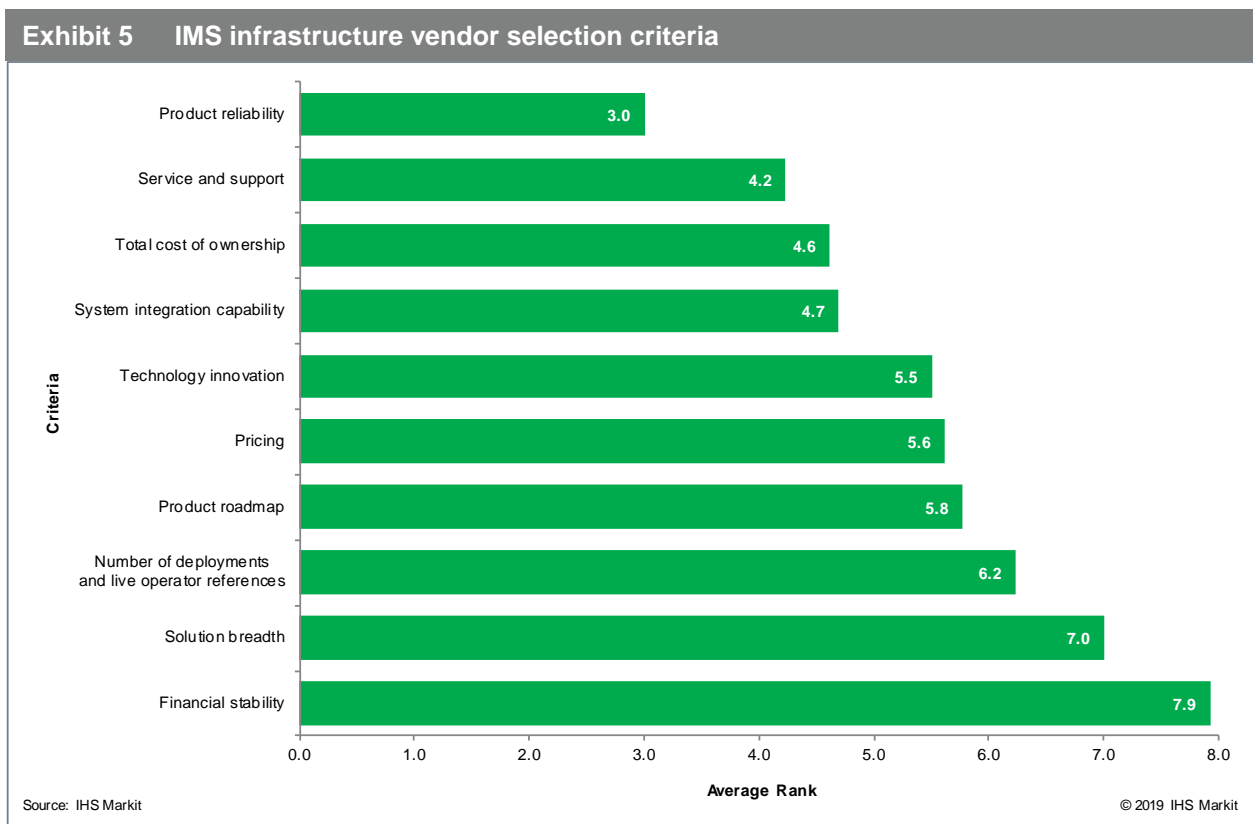
Rakuten in Japan is a prime example of a greenfield operator migrating from an MVNO to MNO with a fully virtualized, end-to-end cloud-native mobile network from the ground up. Rakuten's mobile network will initially utilize 4G and WiFi to serve customers by October 2019, with 5G planned for 2020. The network, which includes IMS for voice and messaging, is being built with a host of partners including Nokia, Intel, Cisco, Red Hat, NEC, Qualcomm, Mavenir, and others. **The benefits associated with cloud-native architecture for an operator like Rakuten include rapid service delivery, common service orchestration, common VNF manager, and analytics—all at a lower cost and investment risk than is offered by legacy hardware platforms**. We can look to Rakuten's network as a vision for the future as other operators upgrade their networks in preparation for 5G.

As part of its network, Rakuten will utilize RCS over the IMS core network with Mavenir's virtualized RCS application server and client for consumers to enable enhanced messaging, as well as least-cost roaming for voice and messaging as an OTT application. The application is cloud-based with full NFV being deployed on the Rakuten cloud platform, which integrates with Rakuten ID single sign-on. Rakuten will be able to use the RCS solution as messaging as a platform (MaaP) to build upon for business capabilities such as rich business messaging and unified communications as the Rakuten cloud platform is built on microservices, enabling the development team to deploy and scale services independently. **Rakuten wanted voice and messaging systems that consisted of cloud-native software that was flexible, agile, cost effective, and could work in a multivendor environment today rather than sometime in the future**.
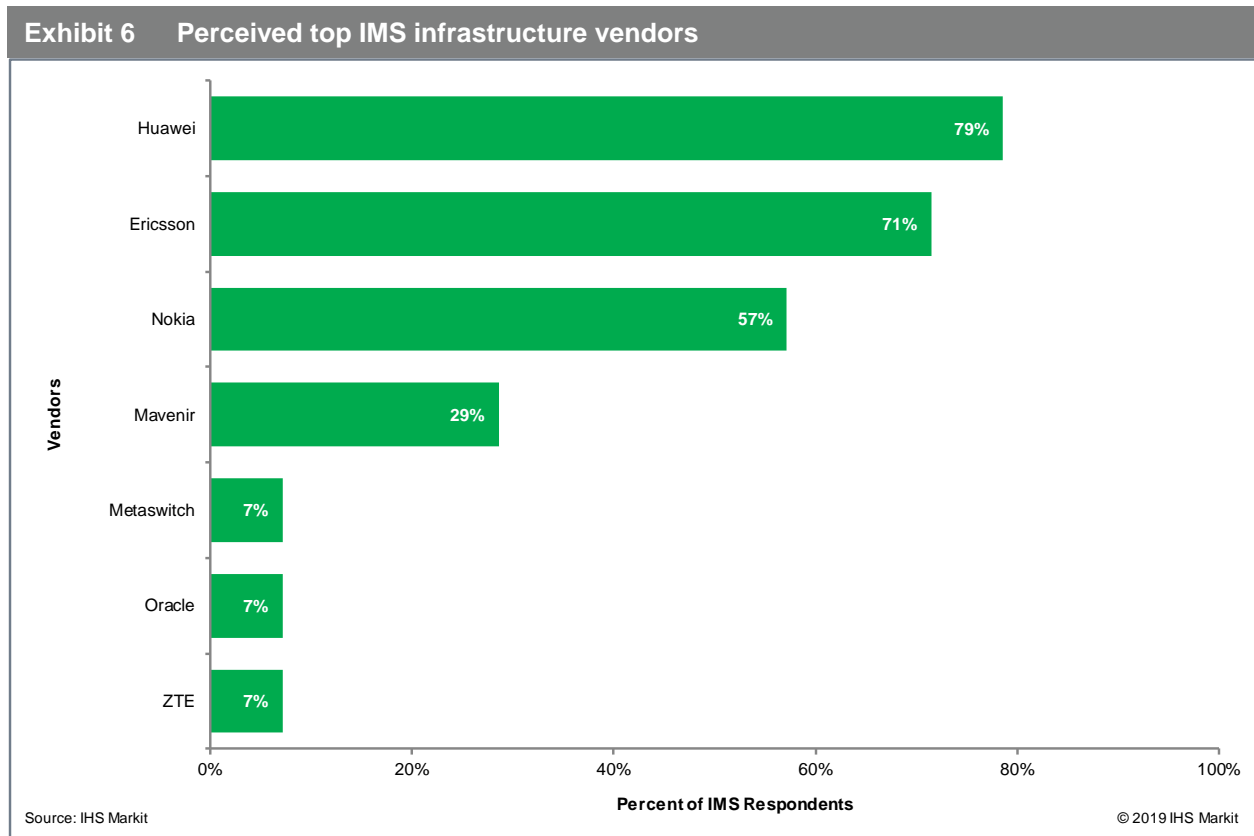
5G. One of the key network concepts of 5G is supporting and enabling network slicing, optimized for specific applications or services. The ultimate goal behind this network transformation is to allow operators to support a wide variety of services and customers in a flexible way. **Full network slicing will require a virtualized, software-driven network, a 5G radio, and a new virtualized IMS core to meet these requirements**.

For mobile operators, there is an urgency around network transformation to start planning and deploying 5G. For some operators that haven't yet deployed VoLTE and feel the push to 5G, there is movement to get VoLTE up and running with 5G-enabled IMS as described above in order to utilize the same IMS core for both LTE and 5G.

The most efficient approach to 5G is to utilize the existing VoLTE network for voice while repurposing the network when an operator moves to 5G new radio. This migration entails moving to a microservices architecture built on virtualized software, which should allow operators to utilize the same IMS core for VoLTE and 5G voice while offering a more efficient deployment of new services.

Value in IMS beyond voice

Although VoLTE may be the number-one driver for IMS deployments, **there is upside potential to utilize IMS for enhanced services beyond voice**. There is a cross section of consumer and enterprise services being delivered over IMS networks today, but it only scratches the surface on the mobility front. Although some operators are delivering enhanced services beyond voice including RCS and RCS Business Messaging (RBM), it remains a small percentage for now. **By extending service capabilities beyond pure consumer voice into rich messaging and business services, mobile operators can capitalize on IMS assets through new revenue streams and stickier customer services.**

RCS has evolved to the point where it is the standardized evolution of SMS at its core but offers operators the ability to extend the capabilities to a host of higher value services, particularly for business customers. And for operators to gain the value of enhanced services such as RCS, it's critical to have a network based on IMS rather than run and operated by third-party brands such as Google that pull subscriber value away from the operator.

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One example of where operators can utilize the IMS network and RCS assets to drive enhanced value is through business services. Through an RCS client, operators can offer businesses not only rich messaging but a host of other features such as audio and video conferencing, screen sharing, online meetings, and visual voicemail, taking advantage of the native client as the interface to its UC offerings.

Key evaluation criteria

We know operators are looking to IMS vendors that have a product roadmap that helps them migrate to virtualized, cloud-based networks—and in the case of mobile operators, to ease the migration of the IMS core to 5G. **Aside from product evaluations, the most important vendor selection criterion for our survey respondents is product reliability, followed by service and support and total cost of ownership**. The IMS network is the heart of the next-generation voice network, and operators need it to be highly reliable. Total cost of ownership is also important on the operational front and an important driver for the move to virtualized and cloud-based infrastructure.

Exhibit 5   IMS infrastructure vendor selection criteria

Criteria	Average Rank
Product reliability	3.0
Service and support	4.2
Total cost of ownership	4.6
System integration capability	4.7
Technology innovation	5.5
Pricing	5.6
Product roadmap	5.8
Number of deployments and live operator references	6.2
Solution breadth	7.0
Financial stability	7.9

Source: IHS Markit   © 2019 IHS Markit

In an open-ended question we asked operators for their perception on who the top three IMS vendors are. Naturally Huawei, Ericsson, and Nokia rise to the top as they are the IMS market share leaders with a number of commercial networks worldwide. Outside the expected leadership of the three large vendors, Mavenir has worked hard to establish itself as a valid option, particularly with virtualized solutions.

Exhibit 6	Perceived top IMS infrastructure vendors

Source: IHS Markit

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Takeaway

Although IMS has been deployed in various networks for over 10 years, it wasn't until mobile operators moved to 4G and IMS became the standard for VoLTE that large volumes of subscribers started to run over IMS. As operators begin the move to 5G, IMS will remain more important than ever. With 5G, voice will run over the IMS core network—initially using 4G radio, and then operators will move to 5G new radio.

At the end of the day, operators benefit now from IMS for VoLTE and enhanced services such as RCS and will need virtualized or cloud-native IMS for 5G. The 5G network will require a cloud-native core and edge to handle increasingly complex connectivity and service demands on the network. IMS will be a critical network for mobile operators moving forward.

This report, which offers an independent assessment of the IMS market, was produced as custom research at the request of Mavenir. IHS Markit is exclusively responsible for this report and all of the analysis and content contained herein. The analysis and metrics developed during the course of this research represent the independent views of IHS Markit and Diane Myers, Senior Research Director.

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