Global Progress to Voice over New Radio (VoNR)

October 2021

GSA
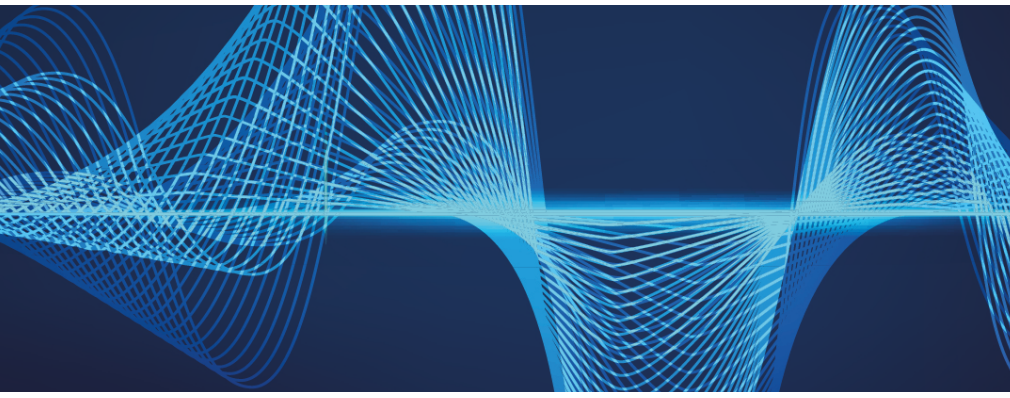
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GSA Market Report - October 2021

Introduction

The provision of voice services has evolved since the launch of mobile phones, from being the primary purpose of a mobile device, to one of many important purposes, and has evolved from an analogue technology to a digital technology, from a circuit-switched approach to a packet-switched system over IP in the form of VoLTE (using IP Multimedia Subsystem, IMS). New codecs (such as AMR-WB and EVS) have also been introduced along the way to improve call quality.

With the introduction of the 5G non-standalone networks, voice services were enabled by continued use of LTE and 2G/3G infrastructures, but 5G standalone networks (public and private) require a new approach. They need to be able to carry QoS-guaranteed voice services (as opposed to over-the-top voice applications), but there is no legacy infrastructure to fall back on.

Voice over New Radio (VoNR) is designed to meet this challenge. VoNR is also expected to bring improvements in latency, call quality and improved integration with applications and services using 5G data at the same time. VoNR is anticipated to drive innovation in conferencing, augmented and virtual reality applications over 5G networks.

Additionally, there needs to be a mechanism for devices to use to LTE, or 2G/3G voice networks when outside the coverage of a 5G standalone network. EPS Fallback (EPS-FB) is an early introduction step to VoNR until sufficient NR low-band or low mid-band coverage has been deployed.

Chipset and device vendors have already brought products to market that are announced as VoNR- capable and public network operators are now actively experimenting with, and in a few cases starting to deploy, the technology. Experimentation with VoNR in private 5G networks is also just beginning (it will be especially important for mission-critical 5G standalone networks).

GSA is actively monitoring the progress of the VoNR market and this paper highlights its current state of development, including a review of chipset availability, device availability and progress in terms of testing and deployment of VoNR within networks.

Device chipsets supporting VoNR

GSA has identified 40 announced 5G chipsets with stated support for VoNR from four vendors. This includes five discrete modems and 35 mobile processors/platforms. Of these, 36 are known to be commercially available, including four discrete modems and 32 mobile processors and platforms. Chipsets are commercially available from Mediatek, Qualcomm, Samsung and UNISOC.

Table 1: Chipsets identified as supporting VoNR

Vendor	Chipset Name	Chipset Type	Availability
Dimensity 1000+	MediaTek	Mobile processor/platform	Commercially available
Dimensity 1000C	MediaTek	Mobile processor/platform	Commercially available
Dimensity 1000L	MediaTek	Mobile processor/platform	Commercially available
Dimensity 1100	MediaTek	Mobile processor/platform	Commercially available
Dimensity 1200	MediaTek	Mobile processor/platform	Commercially available
Dimensity 700	MediaTek	Mobile processor/platform	Commercially available
Dimensity 720	MediaTek	Mobile processor/platform	Commercially available
Dimensity 800	MediaTek	Mobile processor/platform	Commercially available
Dimensity 800u	MediaTek	Mobile processor/platform	Commercially available
Dimensity 810	MediaTek	Mobile processor/platform	Commercially available
Dimensity 820	MediaTek	Mobile processor/platform	Commercially available
Dimensity 900	MediaTek	Mobile processor/platform	Commercially available
Dimensity 920	MediaTek	Mobile processor/platform	Commercially available
Helio M80	MediaTek	Discrete Modem	Pre-commercial
Kompanio 1300T	MediaTek	Mobile processor/platform	Commercially available
Kompanio 900T	MediaTek	Mobile processor/platform	Pre-commercial
M70	MediaTek	Discrete Modem	Commercially available
Snapdragon 865, 865+, 870 (with X55)	Qualcomm	Mobile processor/platform	Commercially available
Snapdragon 888, 888+ (with X60)	Qualcomm	Mobile processor/platform	Commercially available
Snapdragon 780G, 778G (with X53)	Qualcomm	Mobile processor/platform	Commercially available
Snapdragon 768G, 765G, 765, 750G (with X52)	Qualcomm	Mobile processor/platform	Commercially available
Snapdragon 690, 480 (with X51)	Qualcomm	Mobile processor/platform	Commercially available
Snapdragon X65	Qualcomm	Discrete modem	Commercially available
Snapdragon X62	Qualcomm	Discrete modem	Commercially available
Snapdragon X60	Qualcomm	Discrete modem	Commercially available
Snapdragon X55	Qualcomm	Discrete modem	Commercially available
Exynos 2100	Samsung	Mobile processor/platform	Commercially available
T740 (formerly T7510)	Tsinghua Unigroup (UNISOC, formerly Spreadtrum)	Mobile processor/platform	Commercially available
T760	Tsinghua Unigroup (UNISOC, formerly Spreadtrum)	Mobile processor/platform	Pre-commercial
T770 (formerly T7520)	Tsinghua Unigroup (UNISOC, formerly Spreadtrum)	Mobile processor/platform	Pre-commercial
V510 (also known as Ivy V510)	Tsinghua Unigroup (UNISOC, formerly Spreadtrum)	Discrete modem	Commercially available

Device supporting VoNR

Availability of devices supporting VoNR is also advancing rapidly. GSA's GAMBoD database has catalogued over 1000 announced 5G devices to date. Of those, GSA has so far identified 42 announced devices that are stated to support VoNR, with at least 25 of those understood to be already commercially available. The table below lists the devices identified by GSA to date.

Table 2: Devices catalogued as supporting VoNR

Vendor	Device Name	Device Type	Availability
Conquest	S20 5G	Phone	Commercial
Fiberstore	5G CPE Wireless Router	Indoor CPE	No data
Fibocom	AN958-EAU	Module	Pre-commercial
Global Telecom	G5G-X55Q	Module	Commercial
Guangzhou Tozed Kangwei Technology	5G Indoor CPE ZLT X21	Indoor CPE	Commercial
Guangzhou Tozed Kangwei Technology	5G Outdoor CPE ZLT X11	Outdoor CPE	Commercial
Hocell	5G CPE M131	Indoor CPE	No data
Hocell	5G CPE M111	Indoor CPE	No data
Hocell	5G CPE IM730	Outdoor CPE	No data
Hocell	5G CPE IM710	Outdoor CPE	No data
Hongdian	A50E	Indoor CPE	Commercial
MeiG	SRM815-EA (LGA)	Module	Commercial
MeiG	SRM825W-NA	Module	Commercial
MeiG	SRM825W-KR	Module	Commercial
MeiG	SRM815-NA (LGA)	Module	Commercial
MeiG	SRM815-EA (M.2)	Module	Commercial
MeiG	SRM815-NA (M.2)	Module	Commercial
MeiG	SRM825W-EU	Module	Commercial
Oppo	Find X2 Pro	Phone	Commercial
Oppo	Reno 4Z 5G	Phone	Commercial
Quectel	RG500U-CN	Module	No data
Realme	GT Neo 5G	Phone	Commercial
Samsung	Galaxy S21	Phone	Commercial
Samsung	Galaxy S21 Ultra	Phone	Commercial
Samsung	Galaxy S21+	Phone	Commercial
Seiko Solutions	5G CPE	Indoor CPE	Pre-commercial
Sunsea AIoT (Longsung, Simcom)	Simcom Wireless SIM8200G	Module	Commercial
Sunsea AIoT (Longsung, Simcom)	Simcom Wireless SIM8300G-M2	Module	Commercial
Sunsea AIoT (Longsung, Simcom)	Simcom Wireless SIM8200EA-M2 (6 antennas)	Module	Commercial
Sunsea AIoT (Longsung, Simcom)	Simcom Wireless SIM8200EA-M2 (4 antennas)	Module	Commercial
Sunsea AIoT (Longsung, Simcom)	Simcom Wireless SIM8800CE	Module	No data
Telit	FN980	Module	Commercial
Telit	FN980m	Module	Commercial
Wavetel Technology	W4310	Indoor CPE	
Wuhan Da Ta Technologies	BRAX FA5532-N54(E)	Outdoor CPE	Pre-commercial
Wuhan Da Ta Technologies	BRAX FA5532-N51(E)	Outdoor CPE	Pre-commercial

Vendor	Device Name	Device Type	Availability
Wuhan Da Ta Technologies	5G CPE Lite BRAX FA523-N51	Indoor CPE	Pre-commercial
Wuhan Da Ta Technologies	5G CPE Std BRAX FA535-N51	Indoor CPE	Pre-commercial
Wuhan Da Ta Technologies	5G CPE Std BRAX FA535-N11	Indoor CPE	Pre-commercial
Wuhan Da Ta Technologies	5G CPE Pro BRAX FA556-24	Indoor CPE	Pre-commercial
Wuhan Da Ta Technologies	5G CPE Pro BRAX FA556-21	Indoor CPE	Pre-commercial
Xiaomi	Mi 11 Lite 5G	Phone	Commercial

In addition to those in Table 2, Oppo has used the Find X 2 Pro (with Snapdragon 865 plus X55) and Reno 3 devices in trials of VoNR, although it is unclear if those phones currently support VoNR as standard. T-Mobile in the US also tested VoNR and ViNR using an unnamed commercial smartphone from OnePlus.

The most common commercially available types of devices with stated support for VoNR are modules, followed by indoor CPE. Of the 25 commercially available devices with announced VoNR support, 14 are modules, eight are phones.

Operator investment in VoNR

GSA is tracking operator investment in VoNR, including evaluation/testing/trialling and deployment of the technology within commercial networks.

So far, GSA has catalogued 16 operators publicly announced as investing in VoNR in some way or another. Of those, eight are evaluating/testing/trialling, three are understood to be planning to deploy, three are deploying the technology, one has soft-launched VoNR services and one is offering limited VoNR as part of a market trial of its new 5G SA network.

Figure 2 plots their investments on a map, showing the most advanced deployment status in any country/territory.

Perhaps unsurprisingly, the countries/territories with more advanced plans also happen to be many of those where 5G Standalone Networks have been launched already: China, Hong Kong, Kuwait, Saudi Arabia, Singapore and USA.

Beyond those publicly announced, GSA is aware that vendors are working with many CSPs globally on using IMS to enable voice in 5G networks, with extensive preparations for EPS-FB, to be followed by VoNR once there is sufficient low-band coverage.

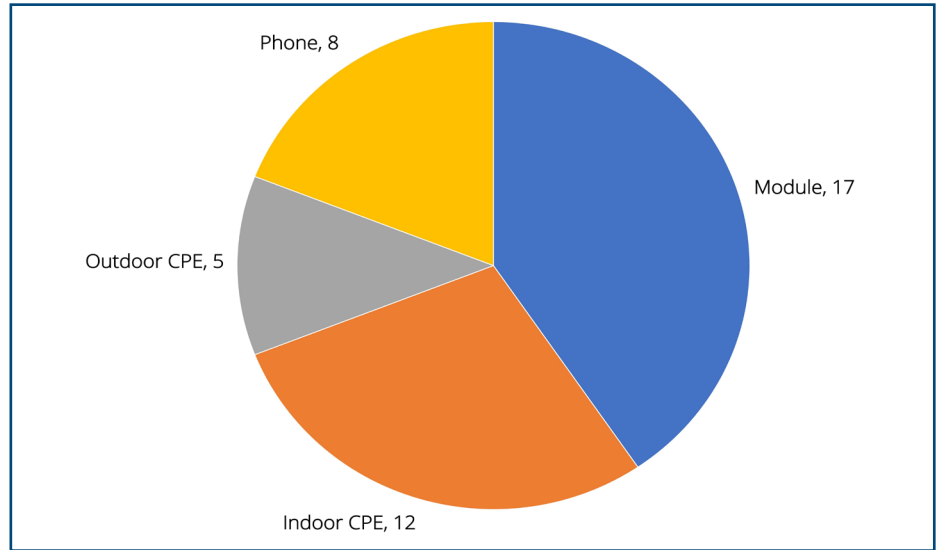**Figure 1: Announced 5G devices with stated VoNR support, by type**

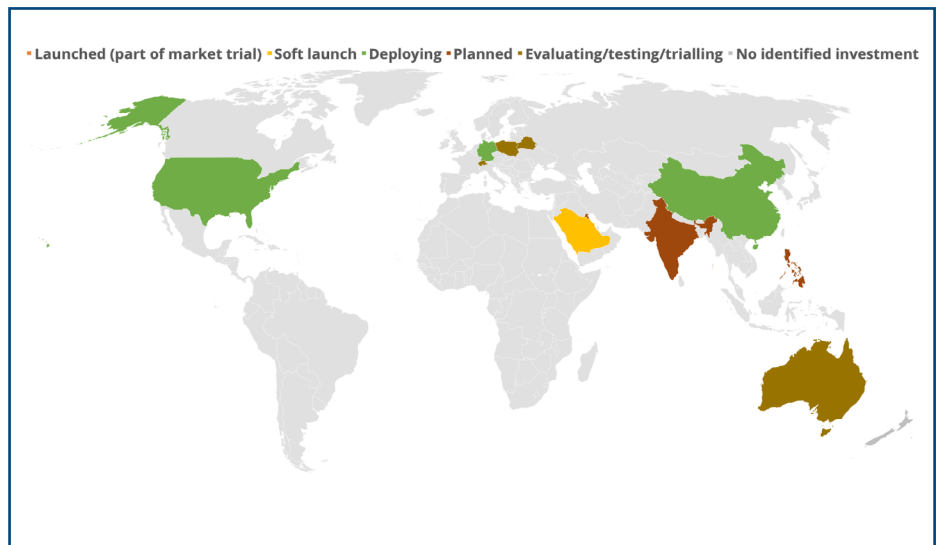**Figure 2: VoNR deployment status by geography – most advanced network per country/territory**

Launched (part of market trial) Soft launch Deploying Planned Evaluating/testing/trialling No identified investment

Table 3 Operator investments in VoNR

Country	Operator	Status	Date
Australia	Optus	Evaluating/testing/trialling	May 2021
Belarus	Velcom	Evaluating/testing/trialling	May 2020
China	China Mobile	Deploying (in Jinan)	July 2021
China	China Telecom	Evaluating/testing/trialling	Jan 2019
China	China Unicom	Evaluating/testing/trialling	May 2021
Hong Kong SAR	China Mobile Hong Kong	Evaluating/testing/trialling	Dec 2019
Germany	O2	Deployed in Munich and Potsdam	September 2021
Germany	T-Mobile	Evaluating/testing/trialling	June 2021
Poland	Deutsche Telekom	Evaluating/testing/trialling	Feb 2021
India	Reliance Jio Infocomm	Planned (testing underway)	Aug 2020
Kuwait	STC	Planned	May 2021
Philippines	PLDT/Smart	Evaluating/testing/trialling, deployment planned	September 2021
Saudi Arabia	STC	Soft launch	July 2020
Singapore	M1	Launched as part of M1's market trial of 5G SA. Service initially available on three devices.	July 2021
Switzerland	Swisscom	Evaluating/testing/trialling	Dec 2020
United States	T-Mobile	Deploying – third party reports of unannounced activation in selected areas; and of firmware-upgraded T-Mobile locked Samsung handsets supporting VoNR being introduced into the market.	Jan 2021

Market prospects

Given that only a fraction of the more than 80 public mobile network operators identified as investing in 5G SA have yet publicly announced investments in VoNR, we can expect to see the numbers of operators piloting and deploying VoNR grow. In addition, operators are already beginning to look beyond plain vanilla VoNR and to consider the potential for value-added services. For instance, in September 2021, China Mobile launched a new 5G VoNR+ (New Calling) Working Group along with 10 other partners to promote VONR+ new calling standards and technologies.

There is also already a strong base of supporting chipsets and a rising number of devices capable of supporting VoNR services (typically after an over-the-air upgrade). We are clearly only at the start of the VoNR story.

GSA is going to continue to monitor the development of this important market, to help you understand this next important evolution in the story of mobile voice services.

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