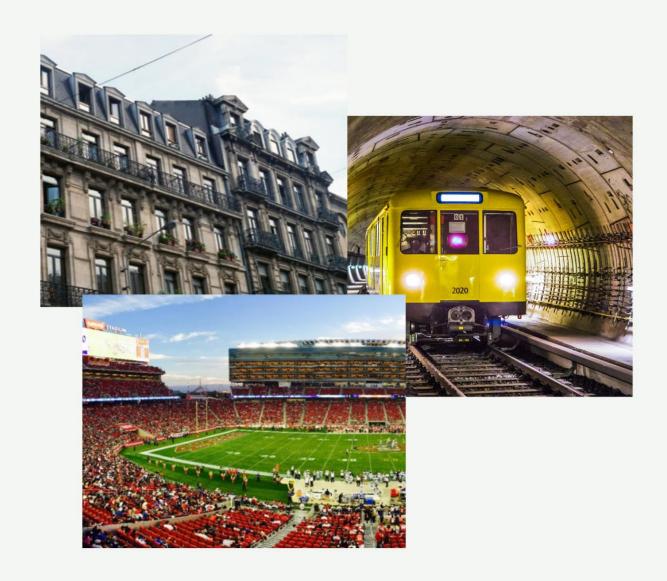
Millimeter Wave 2024



Abstract

A complete view of 5G mmWave from end to end, including architectural details for networks, CPEs, and UEs. Key details of Massive MIMO implementation for high power/long range as well as indoor and repeater solutions are laid out. RF implementation details are illustrated for both RU and handsets, and detailed power consumption and cost analysis shows the likely choices of OEMs. Cost estimates for network and handset/hotspot implementation show the direction for operators. A forecast through 2029 includes RU deployment (macro and small cell), as well as CPEs, repeaters, mobile handsets, hotspots, tablets, and IoT devices.

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New in this year's report:

- --Analysis of the AT&T / Ericsson deal and what it means for vRAN
- --Fresh forecasts of vRAN adoption through 2032
- --Operational efficiency and its role in vRAN adoption
- --Life cycle cost analysis including anticipated 6G deployment

5G Millimeter Wave 2024: Radio Architecture and Outlook

MEXP-5G MMWAVE-24 April 2024

Cover Photos: Pexels.com

RELATED RESEARCH BY MOBILE EXPERTS

Mobile Experts conducts research covering all the aspects of licensed spectrum. Below is a list of related subject areas of research offered by Mobile Experts. An abstract and Table of Contents for each of these reports (and many others) are available at www.mobile-experts.net

- <u>Semiconductors for BBU/DU/CU</u>
- RAN Revenue and CAPEX
- ORAN
- Virtual RAN
- Small Cells
- Fixed Wireless Access
- Private Network Services
- Industrial Private Cellular
- Enterprise Private Cellular
- C-IoT
- Satellite Broadband

METHODOLOGY

For our 5G mmWave analysis, we balance multiple methods to arrive at the most likely scenario for future deployment. In particular, we investigated in these ways:

- 1. We interviewed operators and major OEMs to understand the status of trials and early commercial shipments. Both performance and business metrics are evaluated in these interviews to get an estimate of market maturity and direction.
- 2. We collect shipment data from key component suppliers to determine the exact number of radio units deployed so far.

We interviewed more than 25 OEMs and component suppliers to understand the tradeoffs for various semiconductor approaches, beamforming options, and other technical factors. Coupled with cost analysis and ROI calculations for the operators, we use this technical information to predict the type of products to be deployed over the next five years.

Category	Function	Description
Network	Outdoor gNodeB	Radio Unit with output power > 5odBm
	Indoor gNodeB	Radio Unit with output power ~35-43 dBm
	Repeater	Unit that extends the reach of a gNodeB
		(controlled by an operator)
	IAB	Radio that transmits data to end users and also
		provides a data link to other gNodeBs.
End User	CPE	Product that is either attached to the outside of a
		home/building or is in a fixed location inside. (can
		include consumer-controlled units that 'repeat' the
		mm-wave signal)
	Handset	Mobile device
	Hotspot	Mobile device, often used to distribute a cellular
		signal to near-by users

Figure 1. Definitions of Base Band, Repeater, IAB, CPE, Hotspot

Source: Mobile Experts