Semiconductors for Remote Radio Heads 2023

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Semiconductors for RRH 2023

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METHODOLOGY

To create estimates and forecasts for base station equipment shipments, Mobile Experts relies on direct input from more than 40 industry sources, including multiple top OEM vendors, mobile operators, and component suppliers.

Mobile Experts also used financial disclosures from publicly traded companies to assemble a quantitative view of the equipment market, and to establish estimates of the expected trends in the near future. While there will be increases in prices (and associated recognized revenue) due to rising costs of raw materials, the on-going impact of inflation is not yet explicitly factored into the Mobile Experts forecast. We have begun with an initial adjustment to our price erosion expectations for all semiconductor components in the 2022-2024 timeframe.

In particular, Mobile Experts uses a "top down and bottom up" approach to the base station transceiver forecast, in which inputs from the operators and OEMs are balanced against shipment data provided by key component suppliers. Several component suppliers participate in the Mobile Experts Data Sharing Program, in which they provide quarterly or annual shipment data on key components, which can help Mobile Experts to track shipments by frequency band.

The semiconductor content in the transceivers was assessed by interviewing multiple companies in each semiconductor segment, gathering information on application of the devices, performance trends, market shares, and costs. Each semiconductor type was assessed for the cost in single-mode and multi-mode radios, in each air interface standard, in order to determine the total market size for each semiconductor type across the total number of transceivers. Data for different components are compared to improve accuracy (i.e. the power amplifiers, processors, and data converters should all be aligned to the same total shipment numbers).

Transceivers are broken out by the physical configuration (2T2R, 4T4R, 64T64R) as well as by power level and by frequency band. A massive MIMO RRH with two 64T64R panels is counted as a single 128T128R in our forecast. Note that Mobile Experts uses ***transceivers*** as our primary tracking metric, not base stations, in order to have the most accurate forecast possible for RF devices.

In addition, multimode transceivers are listed according to the air interface standard used during initial deployment. (An HSPA/LTE capable transceiver that is shipped initially for 3G will be listed in the 3G category despite any plans for software upgrades to LTE in the future).

Processors are divided into "primary" and "secondary" categories according to the placement of the main-path RF processing. PHY processing and any main-path RF processing defines the "primary" processor in a split-baseband RRH.

Primary processor functions are comprised of Digital functions (CFR, DPD, DUC, DDC etc) and data converters (DAC, ADC functions). To avoid confusion, we have used the term 'data converter' to identify the integrated module that includes multi-channel DACs and ADCs. In contrast to the term 'transceiver' which we use to identify a single Tx/Rx signal path.

Power transistors are listed as either High Power, Medium Power or Low Power devices based on peak power handling capabilities.

Market shares, shipments and forecasts are reported by geographic region.

Region	Included Countries
North America (NA)	USA and Canada
Latin America (LatAm)	Mexico through South America, Including Caribbean
Europe (EU)	Western and Eastern Europe, Including Russia
China	China, including Hong Kong
Asia Pacific (APAC)	India through Australia/Micronesia, Excluding China
Middle East/Africa (MEA)	Pakistan and Turkey through Africa

Figure 1: Definition of Reportable Regions

Source: Mobile Experts