ORAN 2023



Companies that buy this research will learn:

- The size of the Open RAN opportunity;
- Future Trends in Open RAN deployment through 2028;
- How the operators are using the Open RAN interfaces to advantage;
- What is holding back the expected Open RAN market growth;
- How the RIC and app software will change the game in private networks;
- Cost comparisons of Open RAN and single-vendor RAN; and
- Profiles of 48 companies participating in the Open RAN scramble.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	6
MARKET DRIVERS AND CHALLENGES	8
Disaggregation	8
Cost Reduction	10
Open RAN Software: Market Drivers	12
Open RAN Software: Big Challenges	13
Challenge: The RIC can be just another form of vendor lock-in	14
Geopolitics: Both a Driver and a Challenge	17
Challenge: Who's handling System Integration?	18
COST/BENEFIT ANALYSIS	20
TCO Analysis	20
Cost per GB of capacity	21
Cost per square km of coverage	22
Future Scenario with RIC and app benefits	22
MARKET FORECAST	24
Overall Open RAN Revenue	24
ORAN in macro base stations	25
Open RAN in Small Cells	26
ORAN in 5G mm-wave networks	27
ORAN in Private LTE and Private 5G networks	29
Outlook for DU and CU software	31
Outlook for RIC and xAPP, rAPP software	31
KEY COMPANIES	36
Software Vendors	36
Aarna Networks	36
Accedian	36
Acceleran	36
Airhop	36
AiVader	36
ASOCS	36
Capgemini	37

Cohere	37
Deepsig	37
Juniper	37
Lions Technology	37
Mavenir	37
Parallel Wireless	38
Pegatron	38
Phluido (Commscope)	38
Radisys (now part of Reliance Industries)	38
Rakuten Symphony (formerly Altiostar)	38
Red Hat	38
Rimedo Labs	39
Sterlite (STL)	39
VMware	39
Wind River	39
Radio Vendors	39
Accton	39
Arcadyan	39
AW2S (Serma)	40
Azcom	40
Baicells	40
Benetel	40
Celona	40
Comba Telecom	40
Commscope	40
Corning	41
Ericsson	41
Fujitsu	41
GXC	41
Huawei	41
Jabil	42
Microamp	42
MTI	42
NEC	42
NewEdge	42
Nokia	42
Parallel Wireless	42
Samsung	43
Sercomm	43
Sunwave	43
Tecore	43
ZTE	43
GLOSSARY	44
METHODOLOGY	46

CHARTS

Chart 1:	Forecasted revenue for ORAN hardware and software, 2021-2028	7
Chart 2:	Overall Open RAN Revenue, 2021 to 2028	24
Chart 3:	High Power O-RU shipments purchased separately, 2021-2028	25
Chart 4:	Macro Base Station ORAN-procured RU shipments by world region	26
Chart 5:	Low Power Open RAN Small Cell Shipments, 2021-2028	27
Chart 6:	Low Power Open RAN RU Shipments, by region, 2021-2028	27
Chart 7:	5G mm-wave RU shipments, with separate DU and CU, 2021-2028	28
Chart 8:	Open RAN 5G mm-wave RU procurement, by world region	29
Chart 9:	Private O-RU Shipments, 2021-2028	30
Chart 10:	Private Open RAN RU Shipments, by world region, 2021-2028	30
Chart 11:	ORAN DU and CU software revenue, 2021-2028	31
Chart 12:	RIC Instances 'shipped', non-RT and near-RT, 2021-2028	32
Chart 13:	RIC Software Revenue, non-RT and near-RT, 2021-2028	33
Chart 14:	xApp Software Revenue, 2021-2028	34
Chart 15:	rApp Software Revenue, 2021-2028	35
Chart 16:	RAN Optimization Software Revenue, Open RAN vs. non-standard	35

FIGURES

Figure 1.	Overall Open RAN architecture9
Figure 2.	CAPEX for a single ORAN base station vs. single-vendor 5G base station .10
Figure 3.	Steps to Developing a RAN software ecosystem14
Figure 4.	Today's ecosystem with silos for vRAN and RIC/Apps15
Figure 5.	The Open vRAN ecosystem with fragmented RIC16
Figure 6.	A better Open vRAN ecosystem captures a larger enterprise market 17
Figure 7.	Cost per GB for ORAN vs. 'Vendor Optimized' Networks, urban scenario 21
Figure 8.	Cost per square kilometer for ORAN vs. 'Vendor Optimized' Networks,
rural scer	nario22
Figure 9.	Cost per GB comparison, Single Vendor vs. ORAN with app optimization 23
rigure 9.	cost per GB comparison, single vendor vs. ORAN with app optimization.

METHODOLOGY

Mobile Experts collects shipment data from RF component vendors and other suppliers in the industry to keep an accurate count of base station and RU deployment. Our overall research relies on data inputs from more than 40 companies to keep track of macro, massive MIMO, small cell, mm-wave, and other radios.

In addition to tracking the components, we surveyed CTO-level experts at leading operators, Tier One OEMs, and emerging suppliers of hardware and software for Open RAN. We spend a lot of time with these contacts in reviewing cost analysis and performance benchmarks to fully understand the benefits of Open RAN and how they expect to take advantage of the benefits. We contrasted the inputs that we received from the major OEMs (negative on ORAN) to the positive comments from operators and smaller suppliers to arrive at an independent conclusion.

In each of our market segments, we estimate the adoption of Open RAN procurement strategies based on the strength of the Open RAN driving forces for each segment individually. This guides our long-term projections as to how the Open RAN architecture will be adopted widely. In particular, we rely on opinions of leading operators in the software area for our long-term forecast related to adoption of RIC and applications.