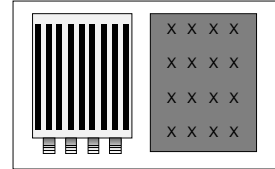


Earl J. Lum
+1-650-430-2221
elum@ejlwireless.com



2nd Edition

Global Macrocell RRU/ARS Market Analysis and Forecast, 2018-2022

April 2018



Entire contents © 2018 Ejl Wireless Research LLC. All Rights Reserved. Reproduction of this publication in any form without prior written permission is strictly forbidden and will be prosecuted to the full extent of US and International laws. The transfer of this publication in either paper or electronic form to unlicensed third parties is strictly forbidden. The information contained herein has been obtained from sources Ejl Wireless Research LLC deems reliable. Ejl Wireless Research disclaims all warranties as to the accuracy, completeness, or adequacy of such information. Ejl Wireless Research LLC shall bear no liability for errors, omissions, or inadequacies in the information contained herein or for the interpretation thereof. The reader assumes sole responsibility for the selection of these materials to achieve their intended results. The opinions expressed herein are subject to change without notice.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	5
2017 Review: Preparing for 4.5G and NB-IoT	5
RRU/ARS Forecast 2018-2022.....	7
Demand Drivers for Our Forecast	8
Summary.....	9
RESEARCH METHODOLOGY	10
CHAPTER 1: OVERALL MARKET PERFORMANCE.....	14
1.1 2017: Growth due to NB-IoT transition in China	14
1.2 OEM Analysis –Huawei Widens Market Lead.....	18
1.3 The Chinese Factor	19
1.4 RRU/ARS Forecast 2018-2022	20
1.5 Demand Drivers for Our Forecast	21
CHAPTER 2: 5G NR RRU/ARS	29
2.1 5G NR RRU/ARS Forecast 2018-2022	31
CHAPTER 3: 4.9G MASSIVE MIMO ARS	35
CHAPTER 4: 4G/4.5G RRU.....	38
4.1 4G/4.5G RRU Vendor Market Share	40
4.2 Low Band FDD gaining share due to NB-IoT.....	43
4.3 The Chinese Factor	44
CHAPTER 5: 1T2R RFM/RRU	49
CHAPTER 6: MULTI-BAND RRU	51
CHAPTER 7: GEOGRAPHICAL MARKET SHARE	54
China: Still the Market to be in.....	54
CHAPTER 8: NORTH AMERICA	57
8.1 United States	59
8.2 Canada	63
CHAPTER 9: LATIN AMERICA/CARIBBEAN	64
9.1 Mexico	66
9.2 Brazil.....	67
CHAPTER 10: EUROPE	69
CHAPTER 11: AFRICA.....	75
CHAPTER 12: THE MIDDLE EAST.....	78
CHAPTER 13: ASIA PACIFIC	82
13.1 Japan.....	86
13.2 South Korea.....	88
13.3 China	90
13.4 India.....	94
CHAPTER 14: RRU/ARS OEM COMPANY PROFILES.....	97
14.1 Ericsson	98
14.2 Huawei Technologies	101
14.3 Nokia Networks	104
14.4 Samsung Networks	107
14.5 ZTE	110

TABLES

Table 1: Global RRU/ARS Market Share by OEM, 2016-2017 (Units)	7
Table 2: Global Non-Massive MIMO RRU/ARS Market Share by Air Interface/Frequency Cluster, 2016-2017 (Units).....	16
Table 3: Global Massive MIMO RRU/ARS Market Share by Air Interface/Frequency Cluster, 2016-2017 (Units).....	16
Table 4: Global RRU/ARS Market Share by OEM, 2016-2017 (Units)	18
Table 5: Global RRU/ARS Market Share, Chinese vs. ROW, 2016-2017 (Units).....	19
Table 6: Global RRU/ARS Forecast by Air Interface, 2018-2022 (Units).....	24
Table 7: Global RRU/ARS Forecast by Air Interface, 2018-2022 (% Market Share)	24
Table 8: Global RRU/ARS Forecast by Air Interface, 2018-2022 (% YoY Growth).....	24
Table 9: Global RRU/ARS Forecast, Non-MM vs. MM, 2018-2022 (Units)	26
Table 10: Global RRU/ARS Forecast, Non-MM vs. MM, 2018-2022 (% Market Share)	26
Table 11: Global RRU/ARS Forecast, Non-MM vs. MM, 2018-2022 (% Growth)	26
Table 12: Global RRU/ARS Forecast by xTyR Configuration, 2018-2022 (Units).....	27
Table 13: Global RRU/ARS Forecast by xTyR Configuration, 2018-2022 (% Market Share)	27
Table 14: Global RRU/ARS Forecast by xTyR Configuration, 2018-2022 (% YoY Growth).....	28
Table 15: Global 5G RRU/ARS Forecast by Frequency Cluster, 2018-2022 (Units)	33
Table 16: Global 5G RRU/ARS Forecast by Frequency Cluster, 2018-2022 (% Market Share).....	33
Table 17: Global 5G RRU/ARS Forecast by Frequency Cluster, 2018-2022 (% Growth YoY)	33
Table 18: Global 4.9G MM ARS Shipments by Frequency Cluster, 2016-2017 (Units)	35
Table 19: Global 4.9G MM ARS Market Share, 2016-2017 (Units).....	36
Table 20: Global 4.9G MM ARS Forecast by Duplex Mode, 2018-2022 (Units)	37
Table 21: Global 4.9G MM ARS Forecast by Duplex Mode, 2018-2022 (% Market Share)	37
Table 22: Global 4.9G MM ARS Forecast by Duplex Mode, 2018-2022 (% Growth YoY)	37
Table 23: Global 4G/4.5G RRU Shipments by Duplex Mode, 2016-2017 (Units)	38
Table 24: Global 4G/4.5G RRU Shipments by xTyR Configuration, 2016-2017 (Units).....	39
Table 25: Global 4G/4.5G RRU Market Share, 2016-2017 (Units).....	40
Table 26: Global 4G/4.5G FDD RRU Market Share, 2016-2017 (Units).....	41
Table 27: Global 4G/4.5G TDD RRU Market Share, 2016-2017 (Units).....	42
Table 28: Global 4G/4.5G RRU Shipments by Frequency Cluster, 2016-2017 (Units)	43
Table 29: Global 4G/4.5G RRU Market Share, Chinese vs. ROW, 2016-2017 (Units)	44
Table 30: Global 4G/4.5G RRU Forecast by xTyR Configuration, 2018-2022 (Units).....	46
Table 31: Global 4G/4.5G RRU Forecast by xTyR Configuration, 2018-2022 (% Market Share)	46
Table 32: Global 4G/4.5G RRU Forecast by xTyR Configuration, 2018-2022 (% YoY Growth).....	46
Table 33: Global 4G/4.5G RRU Forecast by Frequency Cluster, 2018-2022 (Units)	48
Table 34: Global 4G/4.5G RRU Forecast by Frequency Cluster, 2018-2022 (% Market Share).....	48
Table 35: Global 4G/4.5G RRU Forecast by Frequency Cluster, 2018-2022 (% Growth YoY)	48
Table 36: Global 2G/3G 1T2R RRU Shipments, 2016-2017 (Units)	49
Table 37: Global 4G/4.5G FDD Multi-Band RRU Forecast, 2018-2022 (Units)	52
Table 38: Global 4G/4.5G FDD Multi-Band RRU Forecast, 2018-2022 (% Market Share)	52
Table 39: Global 4G/4.5G FDD Multi-Band RRU Forecast, 2018-2022 (% YoY Growth).....	52
Table 40: Global RRU/ARS Shipments by Region, 2016-2017 (Units).....	54
Table 41: Global RRU/ARS Shipment Forecast by Region, 2018-2022 (Units)	55
Table 42: Global RRU/ARS Shipment Forecast by Region, 2018-2022 (% Market Share).....	55
Table 43: Global RRU/ARS Shipment Forecast by Region, 2018-2022 (% YoY Growth)	55
Table 44: North America RRU/ARS Forecast by Type, 2018-2022 (Units)	58
Table 45: North America Non-Massive MIMO RRU Forecast, 2018-2022 (Units).....	58
Table 46: North America <6GHz Massive MIMO ARS Forecast, 2018-2022 (Units).....	58
Table 47: North America >6GHz Massive MIMO ARS Forecast, 2018-2022 (Units).....	58
Table 48: North America RRU/ARS Forecast by xTyR Configuration, 2018-2022 (Units)	59
Table 49: Latin America RRU/ARS Forecast by Type, 2018-2022 (Units)	65
Table 50: Latin America Non-Massive MIMO RRU Forecast, 2018-2022 (Units)	65
Table 51: Latin America <6GHz Massive MIMO ARS Forecast, 2018-2022 (Units).....	65
Table 52: Latin America >6GHz Massive MIMO ARS Forecast, 2018-2022 (Units).....	65
Table 53: Latin America RRU/ARS Forecast by xTyR Configuration, 2018-2022 (Units)	65
Table 54: Europe RRU/ARS Forecast by Type, 2018-2022 (Units).....	70
Table 55: Europe Non-Massive MIMO RRU Forecast, 2018-2022 (Units)	70
Table 56: Europe <6GHz Massive MIMO ARS Forecast, 2018-2022 (Units)	70
Table 57: Europe >6GHz Massive MIMO ARS Forecast, 2018-2022 (Units)	71
Table 58: Europe RRU/ARS Forecast by xTyR Configuration, 2018-2022 (Units).....	71
Table 59: Africa RRU/ARS Forecast by Type, 2018-2022 (Units)	76

Table 60: Africa Non-Massive MIMO RRU Forecast, 2018-2022 (Units).....	76
Table 61: Africa <6GHz Massive MIMO ARS Forecast, 2018-2022 (Units)	77
Table 62: Africa >6GHz Massive MIMO ARS Forecast, 2018-2022 (Units)	77
Table 63: Africa RRU/ARS Forecast by xTyR Configuration, 2018-2022 (Units)	77
Table 64: The Middle East RRU/ARS Forecast by Type, 2018-2022 (Units)	79
Table 65: The Middle East Non-Massive MIMO RRU Forecast, 2018-2022 (Units).....	79
Table 66: The Middle East <6GHz Massive MIMO ARS Forecast, 2018-2022 (Units)	79
Table 67: The Middle East >6GHz Massive MIMO ARS Forecast, 2018-2022 (Units)	79
Table 68: The Middle East RRU/ARS Forecast by xTyR Configuration, 2018-2022 (Units)	79
Table 69: Asia Pacific RRU/ARS Forecast by Type, 2018-2022 (Units)	83
Table 70: Asia Pacific Non-Massive MIMO RRU Forecast, 2018-2022 (Units)	83
Table 71: Asia Pacific <6GHz Massive MIMO ARS Forecast, 2018-2022 (Units)	83
Table 72: Asia Pacific >6GHz Massive MIMO ARS Forecast, 2018-2022 (Units)	83
Table 73: Asia Pacific RRU/ARS Forecast by xTyR Configuration, 2018-2022 (Units)	83
Table 74: Ericsson Non-Massive MIMO RRU Shipments by Frequency Bands/Air Interface, 2016-2017 (Units).....	99
Table 75: Ericsson Massive MIMO ARS Shipments by Frequency Bands/Air Interface, 2016-2017 (Units)	99
Table 76: Ericsson RRU/ARS Shipments by xTyR Configuration, 2016-2017 (Units)	99
Table 77: Huawei Non-Massive MIMO RRU Shipments by Frequency Bands/Air Interface, 2016-2017 (Units).....	102
Table 78: Huawei Massive MIMO ARS Shipments by Frequency Bands/Air Interface, 2016-2017 (Units)	102
Table 79: Huawei RRU/ARS Shipments by xTyR Configuration, 2016-2017 (Units)	102
Table 80: Nokia Networks Non-Massive MIMO RRU Shipments by Frequency Bands/Air Interface, 2016- 2017 (Units).....	105
Table 81: Nokia Networks Massive MIMO ARS Shipments by Frequency Bands/Air Interface, 2016-2017 (Units).....	105
Table 82: Nokia Networks RRU/ARS Shipments by xTyR Configuration, 2016-2017 (Units)	105
Table 83: Samsung Networks Non-Massive MIMO RRU Shipments by Frequency Bands/Air Interface, 2016- 2017 (Units).....	108
Table 84: Samsung Networks Massive MIMO ARS Shipments by Frequency Bands/Air Interface, 2016- 2017 (Units).....	108
Table 85: Samsung Networks RRU/ARS Shipments by xTyR Configuration, 2016-2017 (Units)	108
Table 86: ZTE Non-Massive MIMO RRU Shipments by Frequency Bands/Air Interface, 2016-2017 (Units)	111
Table 87: ZTE Massive MIMO ARS Shipments by Frequency Bands/Air Interface, 2016-2017 (Units)	111
Table 88: ZTE RRU/ARS Shipments by xTyR Configuration, 2016-2017 (Units)	111

EXHIBITS

Exhibit 1: Global RRU/ARS Market Share by OEM, 2017 (% Market Share).....	6
Exhibit 2: Global RRU/ARS Forecast 2018-2022, (% YoY Growth)	7
Exhibit 3: Global RRU/ARS Shipments, 2016-2017 (Units)	14
Exhibit 4: Global RRU/ARS Shipments, Actual vs. Forecast, 2017 (Units)	15
Exhibit 5: Global RRU/ARS Market Share by Technology Generation, 2017 (% Market Share).....	17
Exhibit 6: Global RRU/ARS Market Share by Air Interface, 2016-2017 (Units).....	17
Exhibit 7: Global RRU/ARS Market Share by OEM, 2017 (% Market Share).....	18
Exhibit 8: Global RRU/ARS Market Share, Chinese vs. ROW, 2016-2017 (Units).....	19
Exhibit 9: Global RRU/ARS Forecast 2018-2022, (% YoY Growth)	20
Exhibit 10: Global RRU/ARS Forecast, 2018-2022 (Units).....	22
Exhibit 11: Global RRU/ARS Forecast by Technology Generation, 2018-2022 (Units)	22
Exhibit 12: Global RRU/ARS Forecast by Technology Generation, 2018-2022 (% Market Share).....	23
Exhibit 13: Global RRU/ARS Forecast Prior vs. Current, 2018-2022 (Units).....	23
Exhibit 14: Global RRU/ARS Forecast, 2018-2022 (Units).....	24
Exhibit 15: Global RRU/ARS Forecast, 2018-2022 (% Market Share)	25
Exhibit 16: Global RRU/ARS Forecast, Non-MM vs. MM, 2018-2022 (Units)	25
Exhibit 17: Global RRU/ARS Forecast by xTyR Configuration, 2018-2022 (Units).....	27
Exhibit 18: Timing of 5G NR SA/NSA Specifications and 3GPP Timeline	29
Exhibit 19: 4G/4.5G/4.9G/5G Performance Comparison	30
Exhibit 20: Global 5G RRU/ARS Forecast by Frequency Cluster, 2018-2022 (Units)	32
Exhibit 21: Global 5G RRU/ARS Forecast by <6GHz vs. >6GHz, 2018-2022 (Units)	34
Exhibit 22: Global 4.9G MM ARS Market Share, 2017 (% Market Share)	36
Exhibit 23: Global 4.9G MM ARS Forecast by Duplex Mode, 2018-2022 (Units)	37
Exhibit 24: Global 4G/4.5G RRU Shipments by Duplex Mode, 2016-2017 (Units)	38
Exhibit 25: Global 4G/4.5G RRU Shipments by xTyR Configuration, 2017 (% Market Share)	39
Exhibit 26: Global 4G/4.5G RRU Market Share by OEM, 2017 (% Market Share)	40
Exhibit 27: Global 4G/4.5G FDD RRU Market Share by OEM, 2017 (% Market Share)	41
Exhibit 28: Global 4G/4.5G TDD RRU Market Share by OEM, 2017 (% Market Share)	42
Exhibit 29: Global 4G/4.5G RRU Shipments by Frequency Cluster, 2017 (% Market Share)	43
Exhibit 30: Global 4G/4.5G RRU Market Share, Chinese vs. ROW, 2016-2017 (Units)	44
Exhibit 31: Global 4G/4.5G RRU Forecast, 2018-2022 (Units)	45
Exhibit 32: Global 4G/4.5G RRU Forecast by xTyR Configuration, 2018-2022 (Units).....	47
Exhibit 33: Global 4G/4.5G RRU Forecast by Frequency Cluster, 2018-2022 (Units)	47
Exhibit 34: Global 4G/4.5G RRU Forecast by Duplex Mode, 2018-2022 (Units)	48
Exhibit 35: Global 2G/3G 1T2R RRU Shipments, 2016-2017 (Units)	49
Exhibit 36: Global 2G/3G 1T2R RRU Forecast, 2018-2022 (Units)	50
Exhibit 37: Global RRU/ARS Market Share by Region, 2017 (% Market Share).....	56
Exhibit 38: North America RRU/ARS Forecast by Type, 2018-2022 (Units)	57
Exhibit 39: Latin America RRU/ARS Forecast by Type, 2018-2022 (Units)	64
Exhibit 40: Europe RRU/ARS Forecast by Type, 2018-2022 (Units).....	70
Exhibit 41: Africa RRU/ARS Forecast by Type, 2018-2022 (Units)	76
Exhibit 42: The Middle East RRU/ARS Forecast by Type, 2018-2022 (Units)	78
Exhibit 43: Asia Pacific RRU/ARS Forecast, 2018-2022 (Units)	82
Exhibit 44: Japanese Mobile Operator CAPEX, FY15-9MFY17.....	86
Exhibit 45: Korean Mobile Operator CAPEX, FY14-FY18	88
Exhibit 46: China Mobile CAPEX 2016-2018.....	90
Exhibit 47: China Mobile 5G Deployment Timeline.....	91
Exhibit 48: China RRU Shipment Forecast 2018-2022 (Units)	93
Exhibit 49: India RRU Shipment Forecast 2018-2022 (Units)	96
Exhibit 50: Ericsson RRU Shipments by Mobile Generation, 2017 (% Market Share)	100
Exhibit 51: Ericsson RRU Shipments by xTyR Configuration, 2017 (% Market Share).....	100
Exhibit 52: Huawei RRU Shipments by Mobile Generation, 2017 (% Market Share)	103
Exhibit 53: Huawei RRU Shipments by xTyR Configuration, 2017 (% Market Share).....	103
Exhibit 54: Nokia Networks RRU Shipments by Mobile Generation, 2017 (% Market Share).....	106
Exhibit 55: Nokia Networks RRU Shipments by xTyR Configuration, 2017 (% Market Share)	106
Exhibit 56: Samsung Networks RRU Shipments by Mobile Generation, 2017 (% Market Share).....	109
Exhibit 57: Samsung Networks RRU Shipments by xTyR Configuration, 2017 (% Market Share)	109
Exhibit 58: ZTE RRU Shipments by Mobile Generation, 2017 (% Market Share)	112
Exhibit 59: ZTE RRU Shipments by xTyR Configuration, 2017 (% Market Share).....	112