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1st Edition

**Global In-Building Wireless BTS/Controller-based Small Cells
Market Analysis and Forecast, 2017-2021**

June 2017



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EXECUTIVE SUMMARY

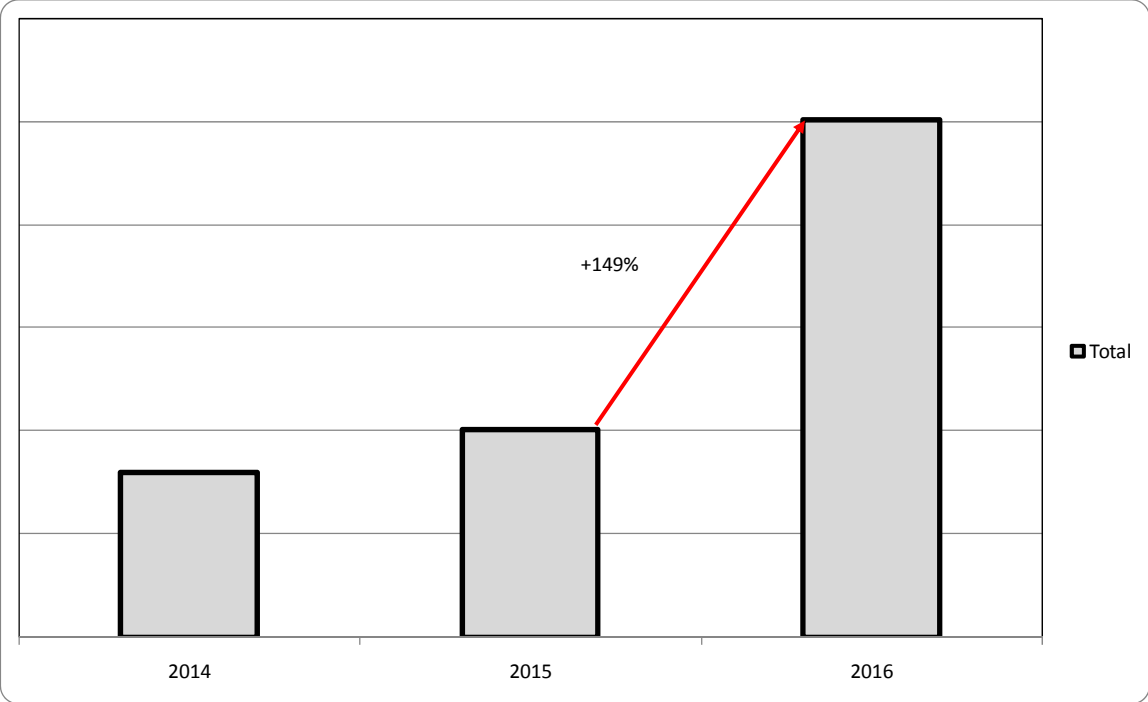
This report is solely focused on in-building wireless small cell solutions that are based on a controller or NodeB/eNodeB architecture that address the enterprise market. The report DOES NOT focus on standalone small cells that are backhaul connected via an S1/X2 interface or an Iub/Iuh interface including femto/pico/microcells. Additionally, the report only focuses on in-building solutions and DOES NOT address outdoor small cell solutions.

Please see the Research Methodology chapter for a more detailed explanation.

2016 Review: Reaching the 1 Million Unit Mark

We estimate that global shipments for BTS/controller-based small cells reached one million units in 2016, up 149% from 2015 and having a break out year, finally.

Exhibit 1: Global In-Building BTS/Controller Small Cell Shipments, 2014-2016



Source: EJM Wireless Research LLC (June 2017)

While these types of solutions have been available in the market for several years now (see introduction dates), the medium and large enterprise markets have not been able to accept the value proposition of these solutions when compared with other in-building wireless alternatives. The BTS/controller-based solutions are not without their deployment and market risks (see Research Methodology section).

The solutions from Ericsson, Huawei Technologies & ZTE require a NodeB/eNodeB to implement while the other vendor's solutions require a direct core network connection via a gateway/controller unit.

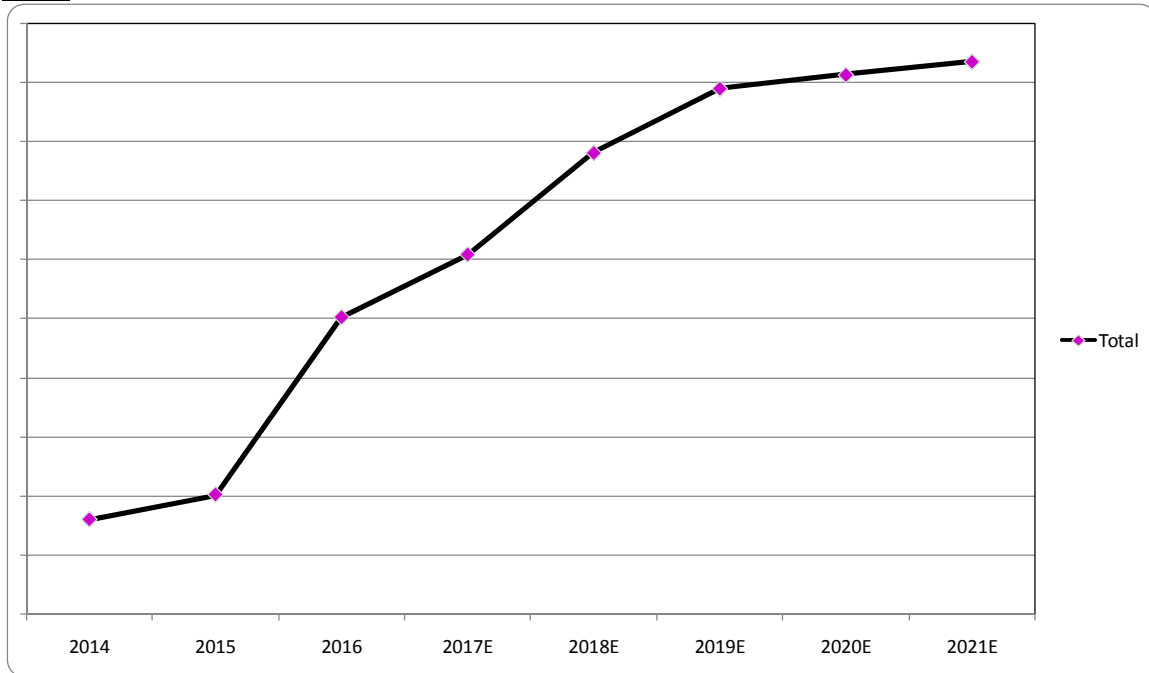
- 📶 Comba Telecom iCell (2015)
- 📶 CommScope/Airvana OneCell (2014)
- 📶 Ericsson Radio Dot (2013)
- 📶 Huawei Technologies LampSite (2013)
- 📶 Nokia Flexi Zone/Flexi Cluster (2012/2016)
- 📶 SpiderCloud Wireless E-RAN (2013)
- 📶 ZTE Qcell (2014)

2017-2021 Forecast

We forecast that the market for BTS/controller-based small cells will continue to see strong growth from 2017-2019 as demand is essentially being driven by China. While historically, the in-building wireless market has been focused on North America and LTE led network requirements for DAS, we believe that the market has quickly shifted to China and will continue to be focused on China throughout the forecast period for the BTS/controller-based small cells segment.

We estimate a 9% CAGR for the 2017-2021 period regarding unit shipments.

Exhibit 2: Global In-Building BTS/Controller Small Cell Shipments Forecast, 2017-2021



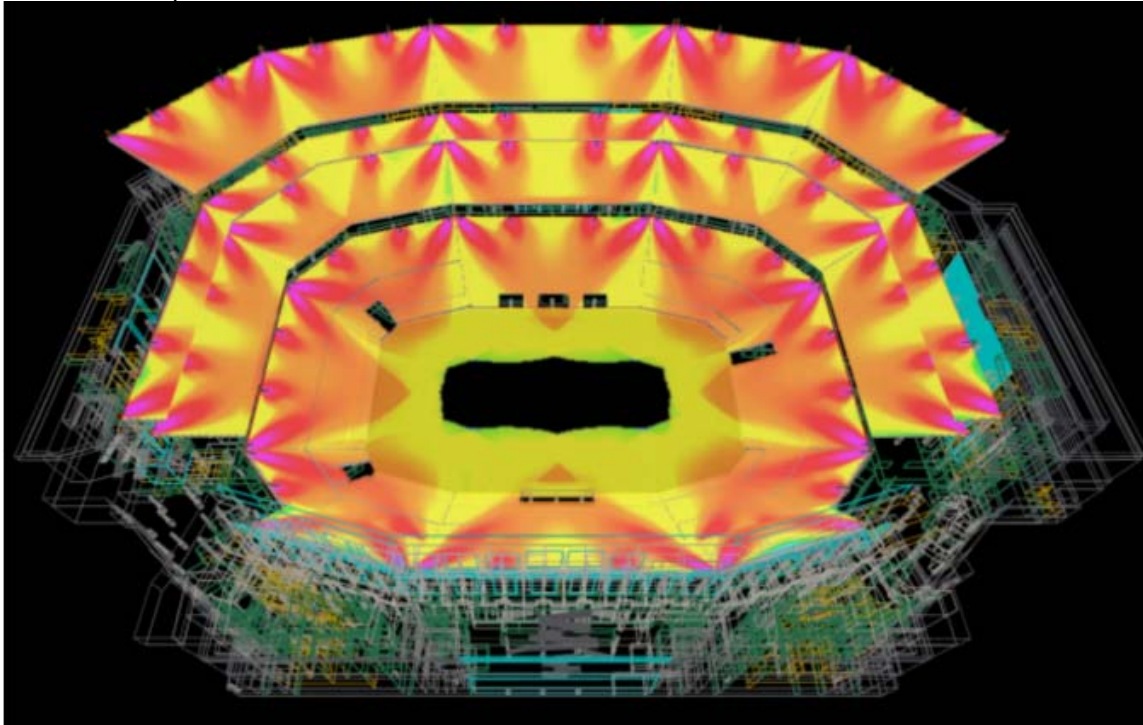
Source: EJL Wireless Research LLC (June 2017)

Exhibit 3: In-Building Wireless Solutions by Building Size/Operator Support

Single Operator	Single/Multi-Operator	Single/Multi-Operator	Building Size
Enterprise Microcells 512-1000 users	BTS/Controller Small Cells System >1000 users	Active Distributed Antenna System >1000 users	100-500k sq.ft.
Enterprise Picocells 128-256 users		Passive Distributed Antenna System <1000 users	15-45k sq.ft.
Enterprise Femtocells 16-64 users			5-15k sq.ft.
Residential Femtocells 8-16 users			<5k sq.ft.

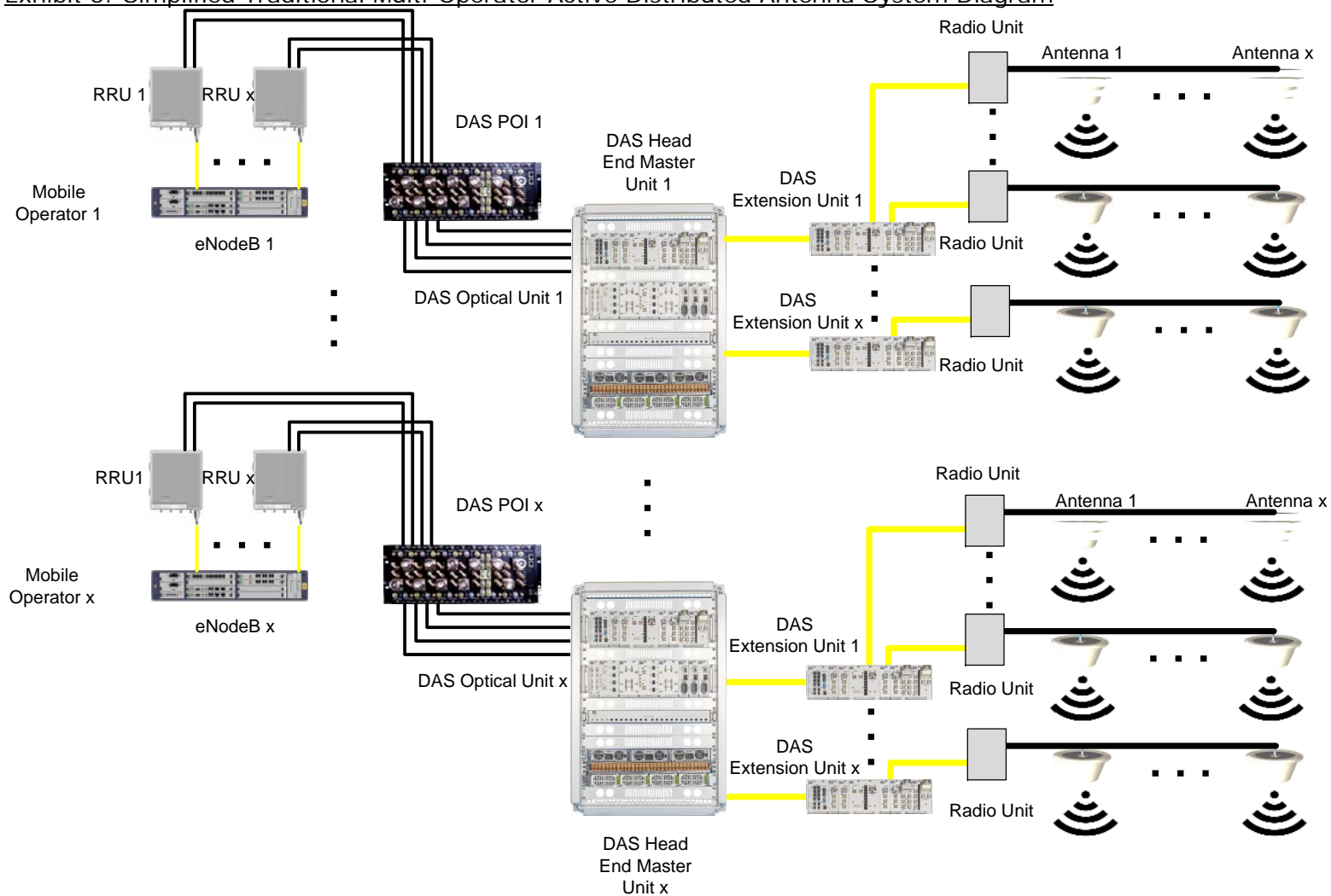
Source: EJM Wireless Research LLC (June 2017)

Exhibit 4: Super Bowl 50 Levi's Stadium Santa Clara, CA USA



Source: JMA Wireless

Exhibit 5: Simplified Traditional Multi-Operator Active Distributed Antenna System Diagram



Source: ZTE, JMA Wireless, EJM Wireless Research LLC (June 2017)