

Small Cell Solutions

A COMPLETE TURNKEY SMALL CELL SOLUTION



Black & Veatch offers a complete turnkey small cell service solution by leveraging our land services & acquisition, engineering, construction and project management.

INITIAL PLAN

Land services and site survey includes the following tasks:

- Data mining
- Contract execution
- Jurisdiction process: permitting, zoning, inspection
- Assessment of the existing macro network signal strength to determine optimal small cell transmit power and deployment location
- Define intended coverage areas
- Define capacity objective
- Define throughput objective
- Assessment required for each location and provide design
- Site design includes civil and RF design
- Collection of RF measurements as required
- FCC regulatory compliance

SMALL CELL RF DESIGN

Black & Veatch RF professionals are proficient RF designers. RF design ensures and includes, but is not limited to:

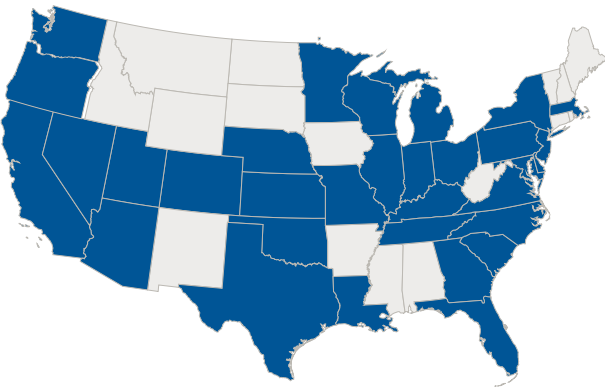
- Optimal signal distribution throughout the coverage area
- Coordination between indoor and outdoor RF environments when required
- Hand-off failures mitigation
- Interference mitigation
- Macro network integration when required
- RF testing
- Frequency coordination

BACKHAUL ANALYSIS AND DESIGN

Black & Veatch will perform design and analysis of backhaul and transport networks for optimal performance and cost.

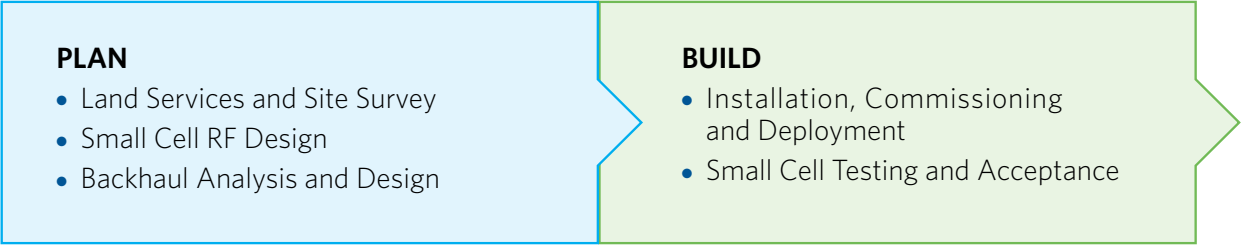
BLACK & VEATCH U.S. REGIONAL OFFICES

Black & Veatch has regional offices in 32 states plus the District of Columbia.



Arizona | California | Colorado | Delaware |
District of Columbia | Florida | Georgia | Illinois |
Indiana | Kansas | Kentucky | Louisiana |
Maryland | Massachusetts | Michigan |
Minnesota | Missouri | Nebraska | Nevada |
New Jersey | New York | North Carolina |
Ohio | Oklahoma | Oregon | Pennsylvania |
South Carolina | Tennessee | Texas | Utah |
Virginia | Washington | Wisconsin

BLACK & VEATCH SMALL CELL SERVICE OFFERINGS



BUILD

Black & Veatch has a dedicated team of experienced regional professionals that work to minimize installation and faster site acceptance.

INSTALLATION AND DEPLOYMENT

- Installation performed according to the original equipment manufacturer’s (OEM) instructions, RF design and backhaul design plans
- Ensure optimal signal distribution and coverage as designed
- Small cell operation validation:
 - Backhaul (fiber/microwave)
 - E911 call validation when required
 - Testing as required

SMALL CELL COMMISSIONING, TESTING AND ACCEPTANCE

With the latest data collection and post processing tools, Black & Veatch will perform commissioning as follows:

- Perform required test using appropriate tools and equipment
- Coverage and evaluation testing
- Perform validation as required
- Deliver small cell required closeout documentation

WHY BLACK & VEATCH FOR SMALL CELLS

Technology

- Deployment experience with all major wireless technologies
- Experience with fiber and microwave backhaul technologies and IP networks

Skills

- Professionals are proficient with site acquisitions, jurisdictional requirements, permitting, zoning, and both indoor and outdoor RF design, optimization and commissioning
- Professionals are trained on “end to end” small cells solutions and are Level 1 & 2 RF design certified

Experience

- One out of every four cellular sites in the United States designed, integrated or constructed by Black & Veatch
- Performed RF design networks on over 10 million wireless low powered mini radios for “smart metering” purpose
- Deployed outdoor small cell for major U.S. operators

