CORPORATE ENGINEERING

ESG

CASE STUDY

NETWORK DESIGN FOR MANAGING CAPEX

Delivering services and technical evaluations for operators

Qualcomm Corporate Engineering's ESG provides guidance and recommendations to help operators design optimal networks while also improving their bottom line.

SITUATION

Maximizing network efficiency

Driven by coverage and capacity requirements, network design is heavily dependent on the quality of inputs into the design tool. Also, network traffic growth assumptions and parameters can cause design variations. Therefore it is critical to develop an accurate network design that ensures a high-quality user experience while minimizing CAPEX/OPEX for the operator.

CHALLENGE

Decrease number of new cell sites in vendor-proposed design

A CDMA operator in North America hired a vendor to perform RF propagation model tuning and prepare a detailed network design for two greenfield markets covering a total population of 2.3 million subscribers. The vendor proposed adding a large number of sites; a solution that would far exceed the operator's budget.

The operator engaged Qualcomm ESG to verify the design and proposed site additions.

SOLUTION

A new perspective from ESG

Qualcomm ESG collaborated with the operator to understand the process and constraints for the proposed design. Analysis showed that the existing design was based on omni-antenna propagation model tuning. Failure to include a vertical pattern resulted in a conservative RF propagation model (reflecting a smaller coverage span), especially in the operator's frequency band.

Further analysis revealed that the proposed design relied on a single-slope model, which underestimated near-cell coverage and overestimated far-cell coverage. The design also used multiple models per clutter category with individual data sets, averaging the coefficients to yield a single representative model.

Together these factors produced very conservative RF propagation models, poor mean error and standard deviation, resulting in excessive cell sites and rising CAPEX / OPEX costs for the operator.

COMPANY

- CDMA operator in North America
- Project targeted two markets (subscriber base 2.3M)

SITUATION

- **Needed greenfield network design**
- **Vendor-proposed network design exceeded operator budget**

SOLUTION

- **Analyze proposed network design**
- **Look for inconsistencies in the RF propagation model-tuning process**
- **Recommend improved network design and propagation model-tuning process**

RESULTS

- **Reduced required site count by 33%**
- **Potential CAPEX/OPEX annual savings of $34M**

CASE STUDY

NETWORK DESIGN FOR MANAGING CAPEX

Qualcomm replicated and reviewed the RF propagation models and network design, applying their internal guidelines and best practices. This involved correction for antenna vertical pattern, use of a breakpoint model, and developing a single representative model per morphology using the entire set of Continuous Waveform (CW) data.

Qualcomm's assessment yielded more realistic propagation models and significantly reduced the estimated site count. The step-by-step process for the entire project is presented in Figure 1.

RESULTS

Reduced CapEx and future OpEx

Qualcomm recommended a propagation model-tuning process and design-procedure best practices for future network designs, enabling the operator to use more realistic propagation criteria.

Based on the improved process and propagation model, the operator was able to reduce the overall site count by approximately 33% (see Figure 2), resulting in potential CAPEX / OPEX saving of approximately $34 million per year

Figure 1: Network Design Optimization for CAPEX Savings

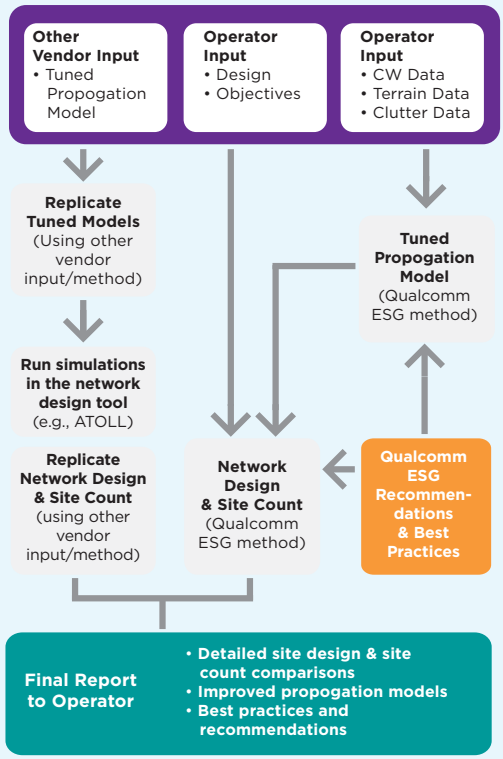
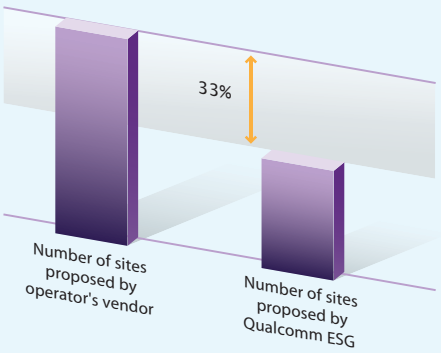


Figure 2: Reducing Number of Sites = Potential Cost Savings (example)



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