KXEN Analytics reduce analysis time by 90%

Cellular radio networks are complex, heterogeneous, adaptive systems that cover hundreds of square miles and support millions of users. When performance drops the finger-pointing between stakeholders — subscribers, service providers, network operators, handset OEMs, and network OEMs — begins. Often the first step is to identify the vital few key drivers of the performance indicator that dropped, so that systems engineers can develop hypothesis about root causes. KXEN was applied to such a problem and demonstrated a 90% reduction in the time to identify the vital few key drivers.

What was analyzed?

Cellular networks are comprised of a grid of cells operating on a hierarchy of components:

- Sites contain a group of antennas and often are at the intersection of three cells. The picture here is a site with three cells.
- Cells are a geographic area covered by an antenna. A network may contain different kinds of cells depending on the technology and protocols used.
- Neighbors are adjacent cells
- Channels are a section of the radio frequency spectrum
- Bands are a range of channels
- Carriers are radio waves having at least one characteristic, such as frequency, amplitude or phase.

We aggregated data from 24 hours of operation of a large urban network. The data included 40 million rows and over 1000 variables:

Network component	Number of variables
cell	540
channel	370
carrier	80
site	30
neighbor	30
band	20

The data was analyzed using KXEN Robust Regression, which automatically reduced the 1000 variables to the vital few key drivers.

Results

A systems engineering team had previously spent man-years analyzing a major drop in performance. KXEN found the same top three key drivers… in just four days.

Future directions

Data warehousing and predictive analytics technologies now make it cost-effective to collect, store, aggregate, and analyze performance data on hundreds of thousands of network components every day. Use the KXEN Analytic Framework to automatically monitor multiple key performance indicators for every site, cell, and carrier in a market, using hundreds of input variables. Report components with low performance in executive dashboards and balanced scorecards, while taking into account traffic, season, day-of-week, and any other significant variables. Report top-10 key drivers for

> **"KXEN found what we found and we spent man-years on it."**
>
> — OEM analytics manager

each performance indicator in an engineering dashboard. Update both performance indicators and key drivers daily.

Benefits

The hard benefit of using KXEN to analyze network performance is straight-forward: reduce staff hours. However the soft benefits may even be greater:

- Meet service-level agreements
- Reduce false warnings of poor performance by taking into account hundreds of variables, thus allowing management and top engineering resources to focus on what really matters
- Reduce time-to-market for performance enhancements
- Increase customer satisfaction

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About KXEN

KXEN provides next generation business analytics software to drive better corporate decisions. KXEN's unmatched speed, ease of use and scalability enable leading companies around the world to expand the use of predictive analytics and enhance corporate performance. Based on breakthrough mathematical theory, KXEN's products offer reliable predictions and deep insight for achieving critical business goals. The company partners with leading systems integrators and software vendors to integrate advanced analytics into enterprise applications and business processes. Founded in 1998, KXEN is headquartered in San Francisco, California, with offices in the USA, UK, and France, and distributors throughout the world. Visit the KXEN Web site at **www.kxen.com**

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