In today’s mobile networks, revenue per transported bit is constantly decreasing, while the complexity of the network and traffic volumes are increasing. Hence, driving operational efficiency and reducing OPEX are of paramount importance to evolving network operators. One of the key areas for gaining increased efficiency is network optimization and troubleshooting. The challenge is to improve the optimization process to cope with the increasing traffic volume and network complexity without significant manpower increase, and to focus the efforts on areas that will deliver the best measurable business value.

The traditional workflow in an optimization process has been to focus on sites having the most problems. Typically, site and cell-specific performance management counter data is used to get a network wide view of the problems and areas of optimization. This is the so called top offending site analysis method. The sites and cells with the most critical problems are then examined further by looking deeper into the performance counter data, configuration data, and hardware alarms. In some cases, drive test data from the problem area is used to capture further details of the problem at hand. But to minimize the need for costly and time consuming drive testing, call trace data collected from the network is increasingly used as the call level drilldown data source.

Today most mobile networks are built with equipment from multiple network equipment manufacturers (NEMs), and the data feeds listed above are all network vendor proprietary. NEMs typically have also optimization tools offered together with the network. This results in an inefficient optimization environment with a patchwork of different tools for different data feeds and network vendors.

Network vendors operate a substantial service business and running operator networks is one of the prime responsibilities. A network vendor is seldom the sole provider of network equipment to the operator, which further complicates the network optimization and troubleshooting environment. Cross-licensing optimization tools from competing network vendors is not always possible.
Vendor-agnostic, business value centric optimization flow in multi-vendor network

With Keysight’s Nemo Xynergy Geospatial Intelligence solution (Nemo Xynergy), the network performance and customer experience is determined by analyzing data extracted from the radio access network OSS (operations support system) interface. Each time a wireless terminal establishes or terminates either a circuit-switched or packet-switched connection, a call trace record is generated by the network OSS. These records contain user information (identifiers), traffic type and destination information, radio network quality parameters, and bearer type indicating the type of service used (streaming video, conversational, etc.). The call trace records do not, however, contain the GPS coordinates of the mobile terminal, so the exact location of the terminal is not known to the network. The solution presented in Nemo Xynergy uses a proprietary algorithm analyzing the radio network parameters to accurately estimate the actual physical location of the terminal, thus allowing the information from the call trace records to be placed on a map.

Figure 1. Geolocated call trace record information
Nemo Xynergy is able to extract OSS based call trace data from the equipment of multiple network vendors. Keysight has signed agreements with major network vendors under the OSSii initiative for the licensed processing of binary and proprietary call trace data. This makes Nemo Xynergy a future proof tool for call trace analytics instead of relying on the reverse engineering of proprietary call trace data.

In addition to call trace records, Nemo Xynergy utilizes performance management (PM), network configuration (CM), network hardware alarms (FM), and drive test data as supplementary data sources. Nemo Xynergy correlates the supplementary data feeds seamlessly with the call trace records in various workflows and analyses to provide deeper insight and root cause analysis for QoS issues seen in radio access networks. This leads to significant efficiency gain as the engineers do not have to use multiple tools to access all the necessary data feeds.

Nemo Xynergy allows the filtering and analyzing of call trace data based on individual subscribers and VIP users. This enables a paradigm shift in the whole optimization workflow - it is possible to focus on solving QoS issues perceived by the highest value subscribers first. For example, focusing optimization efforts on the 20% of subscribers bringing in the highest revenue will reduce the churn of this important customer segment more effectively in addition to yielding better business value from the optimization efforts for both operators and managed service providers.

Market-level analysis is possible on all call records enabling statistically relevant correlation of problems and traffic patterns against various factors, such as subscriber, handset model, network node, and time for quick root cause analysis. Additionally, instant drilldown to individual transactions is possible for in-depth troubleshooting and analysis of specific problems.
The geolocation of real subscriber data provides insight on traffic density based on actual geographical location. This information is crucial for deploying small/micro cells in optimal places. Evaluating the effect of traffic density and profiling the applications used (e.g. business vs. recreational) in various areas is important, but it is also valuable to understand where certain user groups are located and which services they are using in a given physical location. For VIP users, the office, home, and mobility application usage profiles are important, and for machine-to-machine communication, reliability and power consumption are the key parameters which also depend heavily on the physical location.

The handset model plays a major role in the QoS perceived by end-users as RF performance varies between different handsets due to the enclosure, antenna, and modem chipset. Interoperability between numerous handset variants and models and the networks poses a continuous challenge for maintaining good quality of service for all. Service providers have an increasing need for tools that enable them to correlate handset model information with network performance metrics.
Summary

Network operations face constant cost pressure. At the same time, the complexity of performing mobile network optimization is increasing due to a mixture of technologies, tools, network vendors, and subcontracting chains, and the ever-increasing traffic volume. Nemo Xynergy addresses these optimization challenges with vendor-agnostic analysis capabilities for call trace and other relevant RAN data feeds, significantly improving the efficiency of the optimization workflow. Nemo Xynergy enables focusing efforts on QoS issues perceived by high-value subscribers to reduce churn in this important customer segment, hence gaining the maximum business value from the optimization work.

Keysight Network Testing develops and sells RF measurement and analysis equipment under the Nemo brand. Nemo Xynergy analytics solution is used by operators on three continents for analyzing drive test, RAN, and subscriber data.
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