Use Case Name:
End-to-End Lease Capacity Management with AI/ML

Summary

An MNO has capacity issues with variable band and frequency setups on sites. *These setups may differ even on the same sites on different cells*. It is difficult to track sites' changing setups before congestion and churns happens for the planning, optimization, and quality teams.

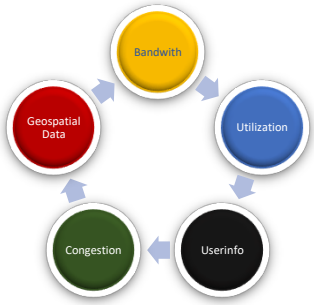
Actor
Mobile Network Operator.

Situation

Capacity planning in a telecommunication network is a solid task. Planning is made by considering some KPI's, such as congestion value of the cell. Congestion refers to a network connection in the network's directory where a node or connection carries too much data. In a congested network, response time slows down with low network throughput. Congestion occurs when bandwidth is insufficient and network data traffic exceeds capacity. Moreover, to handle such a problem in network capacity planning is needed.

Capacity planning in telecommunication networks is made by considering not only investment income but also considering customer focus. Insufficient network data throughput may cause customer churn. To solve this issue the Artificial Intelligence (AI) based Smart CAPEX model is proposed.

Solution and Benefit



Smart CAPEX includes 3 main steps, namely:

- forecast,
- data under congestion
- and grid-based calculation.

The model, forecasts the next 18 months data, calculates data under congestion and gives information about the capacity of grids which includes many cells.

AI/ML in Action

The model is built and implemented using the data of the Communication Service Providers (CSP) in Europe including 70.000 cell data.

The big data cluster has been used as a test environment which has Apache Spark and Hadoop platforms.

Forecasting methods have been compared with using the absolute deviation of cells which are in 10% range is marked as correctly predicted as shown below formula where D is deviation, C is actual, F is the forecasted, N is the number of predictions, A is the Accuracy Vector and Acc is corresponded the accuracy of the model.

$$,D\}, Di = \{ |Ci-Fi| / Ci\}$$
$$\text{and}$$
$$\forall i \in \{A, D\},\ Ai = \forall i \in A, Acc = 1 / N \times \sum Ai$$

$$\Big\} \quad 1 \quad Di < 0.1, 0 \text{ Otherwise}$$

Four different methods have been compared and SARIMA model gives the best result (68%)

All cells have different frequency, bandwidth and congestion levels; therefore, congestion levels have been calculated by using different sets of information. (Such as *KPI_Utilization*, *normalized_active_users*, *throughput, etc.*)

This model is extendable with combining external data such as the customer churn, price per gigabyte achieving different views as per the need of the operator.

The article may be found under www.sciencedirect.com 10.1016/j.procs.2018.10.328

By Smart Capex You Can

Use Artificial Intelligence (AI) to forecast demand: By using an AI-based model like Smart CAPEX, the operator can **accurately forecast** future demand and identify potential congestion points in their network.

Monitor network performance: By collecting data on network performance, the operator can **identify and address** areas of congestion.

Increase capacity: When congestion occurs, it may be necessary to invest in additional capacity to meet the demands of network. Knowing at where and not over dimensioning would make the difference in reducing your costs.

Optimize network resources: By analyzing network data, the operator can identify opportunities to **optimize** the use of existing resources and better utilize the capacity of the network.

Prioritize customer satisfaction: Ensuring that customers have a positive experience with the network is key to retaining their business. By addressing congestion and other performance issues, the operator can **minimize customer churn**.
Overall, implementing an AI-based capacity planning model like Smart CAPEX and taking steps to optimize network performance can help the operator improve efficiency and customer satisfaction while reducing CAPEX and OPEX