Operations | Telecom | Network optimization | Linear / Non-Linear

Sustainability Analytics - Lowering Emissions With Operational Efficiency

BUSINESS PROBLEM

Verizon faces significant overcapacity in their central offices. Historically a standard, T1 copper lines now are challenged by technological shifts towards fiber and broadband. With customer migration, many T1s remain underutilized. (max 24 channels per circuit) Presently, manual methods identify "zero-fill" and "low-fill" devices, constituting >60% of central offices. Without strategic equipment consolidation, energy and cost-saving opportunities are lost. Amidst rising T1 costs, there's a pressing need to strategically decommission outdated T1s, addressing underutilization and conserving energy loads.

APPROACH

Start with data from a single central office's Excel file as a pilot. Using Jupyter, process and analyze this data. With insights from the pilot, develop initial, scalable Python scripts for multiple central offices. Engage with Network teams to identify and enhance optimization pathways. The strategy will serve as a blueprint, highlighting gaps, required data, and steps for team continuity.

DATA SOURCES

Using Excel files provided by the decommissioning team for each central office. Aim: Obtain direct read-only database access that feeds the iEN Legacy DCOMS dashboard, bypassing manual Excel extraction. The dashboard pulls data from the NAR (Network Analytics and Reporting) database.

Data Types and Format

Relational Databases. Excel.

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IMPACT

Business and Sustainability Impact of the Solution Verizon, one of the top five corporate electricity users in the U.S., incurs over $1 billion in annual electricity expenses. Much of this is due to outdated, inefficient tech like the 1/0 DCS and D4 channel banks. Decommissioning these systems, especially zero-fill and low-fill T1 circuits, can cut power consumption significantly, thereby reducing operational costs and CO2 emissions. The transition from these energy-guzzling systems can lessen power usage by up to 70% per subscriber and shrink Verizon's carbon footprint substantially. This not only bolsters Verizon's sustainability initiatives but also curtails scope 2 emissions. Moreover, modernizing equipment means heightened reliability with fewer breakdowns in remote Central Offices. This efficiency reduces both operational challenges and costs, ensuring superior service quality. Strategically, pivoting from copper to fiber showcases innovation and future readiness. Such a shift attracts investor confidence, with fiber-centric companies often achieving higher valuations. The proposed solution promises financial savings, environmental responsibility, and enhanced reliability, aligning Verizon's operational goals with global sustainability benchmarks.

DRIVERS

The catalyst for Verizon's solution was the challenge of aging legacy equipment, particularly D4 Channel Banks, which were inefficient in terms of electricity demand and utilization for the diminishing customer base.

BARRIERS

Barriers included the complexity of decommissioning decisions, the necessity to maintain operational integrity, and the need to consolidate underutilized equipment without significant capital investment.

ENABLERS

Features that enabled the project included Verizon's commitment to operational efficiency and sustainability, access to robust network infrastructure data, and collaboration with the Network Decom team.

ACTIONS

We developed an optimization framework using integer linear programming, employed the Gurobi optimizer, and engaged in collaborative problem-solving with Verizon's analytics teams.

INNOVATION

Innovative aspects of the solution were the creation of a detailed optimization model tailored to network equipment decommissioning and the strategic use of analytics to integrate sustainability into operations.

IMPROVEMENT

The final improvement provided by the solution included a significant reduction in the operational footprint of a representative central office's D4 Channel Banks by up to 40.8%, translating into annual cost savings between $16,000 and $41,000. Beyond financial savings, there is significant environmental benefit by reducing electricity demand, and thereby avoiding related carbon emissions.

BEST PRACTICES

Best practices involved engaging with operational teams for insights, utilizing robust optimization models for decision-making, and considering both financial and practical constraints in decommissioning.

OTHER APPLICATIONS

Other potential applications of the solution include applying the optimization framework to other types of legacy network equipment across the network, thereby expanding the model to address different operational challenges. Driving sustainability goals through operational efficiencies is applicable across industries.