MULTIBAND RF MODEL TUNING

CASE STUDY: Precision RF Model Tuning for Multi Band Mobile Networks
Client Challenge

At A Glance

Locations:

Asia

Sector:

Mobile Network Infrastructure

Services Provided:

End-to-end Managed Services for RF model tuning, including drive test validation, data cleaning, analysis, and model development

PROJECT OVERVIEW

SBYSOFT

Project Background & Challenges

Tangent was engaged by a global mobile operator to update RF models for 4G and 5G rollouts across Asia and particularly Bangladesh.

Our Solution / Approach

Tangent deployed RF a leading consultant to lead a high-precision model tuning project. The objective was to re-tune the predictive parameters used in the client's Planet tool, aligning it with real-world signal propagation for 11 environmental cluster types (urban, suburban, rural, indoor, etc.)

Delivered accurate coverage predictions across four frequency bands (900–2300 MHz) to meet strict regulatory targets and support cost-efficient network planning.
Enabled better investment decisions through updated propagation models that reduced redesigns, improved prediction accuracy, and optimized base station deployment.

Key steps Included

Key steps included:
Conducted continuous wave and drive testing to collect real-world signal data across all frequency bands.

Combined CW and drive test data to maximize model accuracy and reliability.
Applied scientific data cleaning techniques to improve input quality.

Built custom Python tools for data cleaning, analysis, and regression modelling.
Used statistical or ray tracing models depending on frequency and geography.

Applied a layered, automated tuning process based on performance metrics to improve prediction accuracy.

Tailored models for each frequency band and cluter type to reflect unique characteristics.
Delivered updated models, reports, and visual overlays comparing predictions with real-world data.

TECHNICAL OVERVIEW

SBYSOFT

Technical Highlights

Multi-band tuning: Each frequency band required its own tuned model due to different propagation behaviors.

Real-world validation: Drive test data highlighted major discrepancies between the client's outdated models and actual signal coverage.

Python automation: Bespoke data science scripts were used to handle large volumes of signal data efficiently, accelerating delivery time.

Single-consultant delivery with agile support: While one of our experts led the project solo, the framework is scalable — Tangent can quickly build expert teams as needed.

Specialist Skills & Team Approach

Engineers with a solid understanding of electromagnetics, RF planning, and mobile network knowledge (from 2G to 5G) were key for accurate predictions and optimization. Scripting and data analysis skills were essential for processing large datasets and automating tasks. Extensive data science and data processing skills were crucial, especially for handling complex datasets. A scientific background was needed to analyze statistical concepts and ensure robust model tuning.

The last project was delivered with minimal manpower thanks to the strategic use of AI-assisted processes and automated workflows. Most targets were met ahead of schedule due to effective planning, smart resource allocation, and close collaboration with contracted partners.

The resulting models were delivered with three highly detailed and clear reports: Executive summary reports were clear, concise, and focused on key results.

A detailed report for the technical team, split into two parts: one with visual materials for presentation, and the other containing statistical test results and data analysis.

CHALLENGES & RESULTS

CHALLENGES

Delivered a remote RF model tuning project across 900 to 2300 MHz frequency bands.

Optimized network clusters using real-world data to improve accuracy and performance.

Enhanced planning efficiency in both Planet and Atoll environments.

RESULTS

Tangent applied a tailored, scientific approach to deliver faster, more accurate results.

Automated tools cleaned, corrected, and validated large datasets efficiently.

Engineers could inspect and refine drive test data using custom-built tools.

Internal models and workflows offered flexibility and independence from generic software.

Combined technical expertise with bespoke processes to reduce turnaround times, cut manpower needs, and deliver better models.
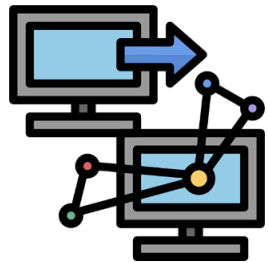
IDEAL SCENARIOS

Greenfield deployments
in new areas.

New frequency or bandwidth
introductions.

Changes in digital maps
or urban landscapes.

Periodic updates (every ~5
years) due to evolving
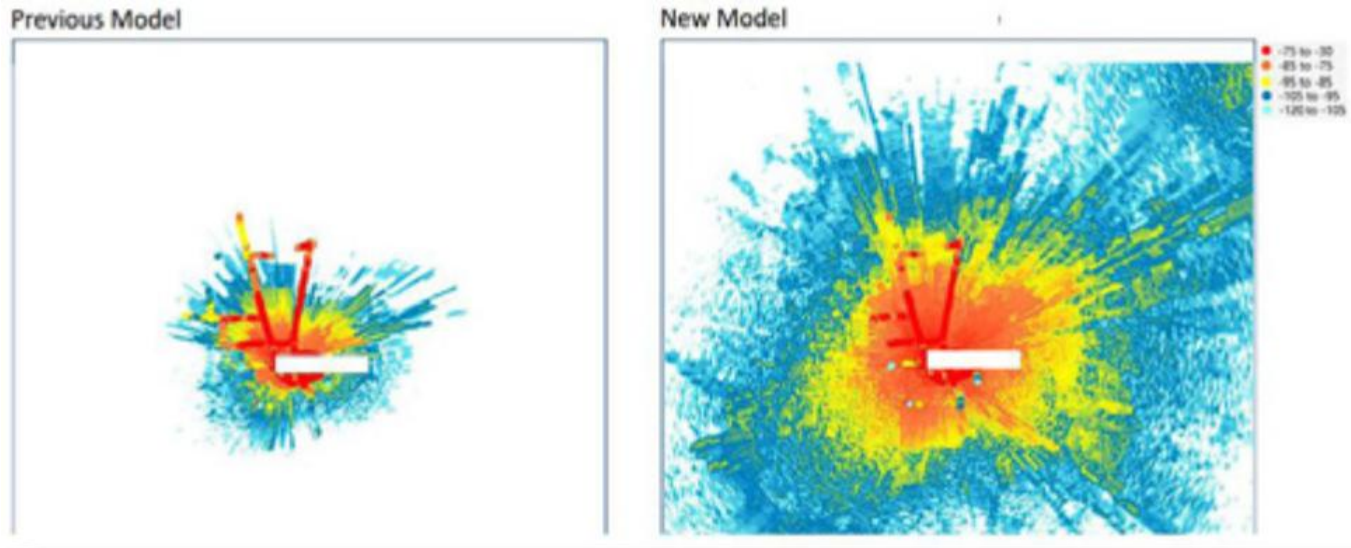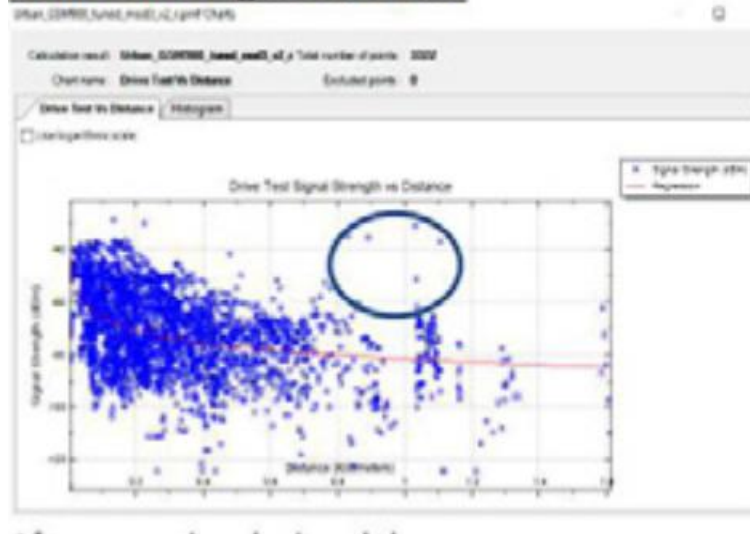environments.

REPORT DATA

Figure 1: Coverage comparison in dense urban area — The previous RF model (left) under estimated actual coverage, leading to overshooting and interference. The tuned model (right) aligns closely with drive test results, improving accuracy, capacity, and quality predictions.
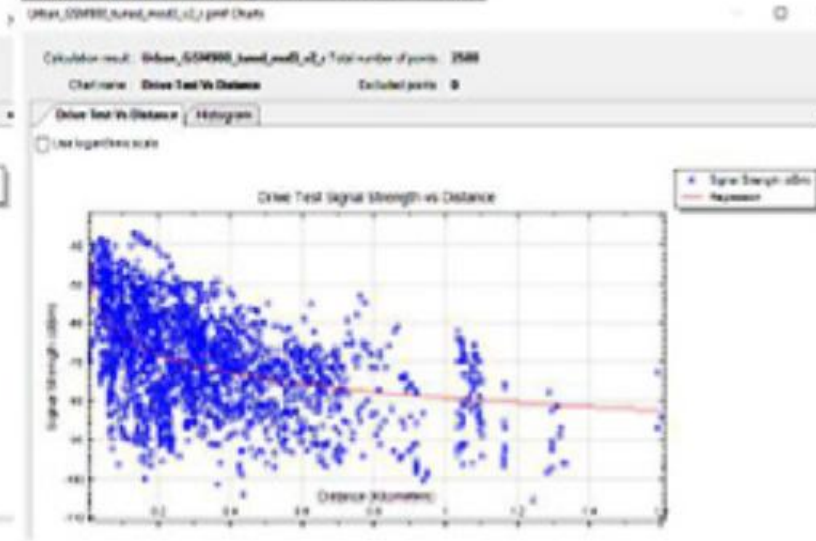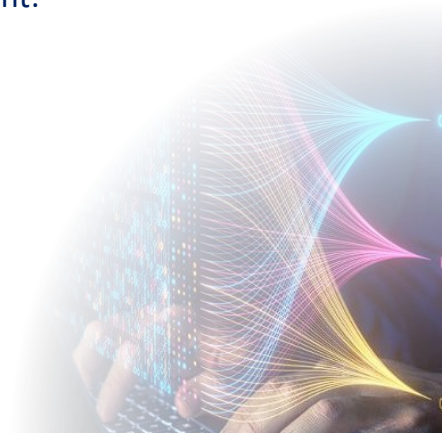
REPORT DATA

Figure 2: Figure 2: Impact of outliers on model accuracy — In the circled area, outlier drive test points distort the regression line and compromise model reliability. Left: regression before removing outliers. Right: regression after statistical cleaning using a threshold-based method.
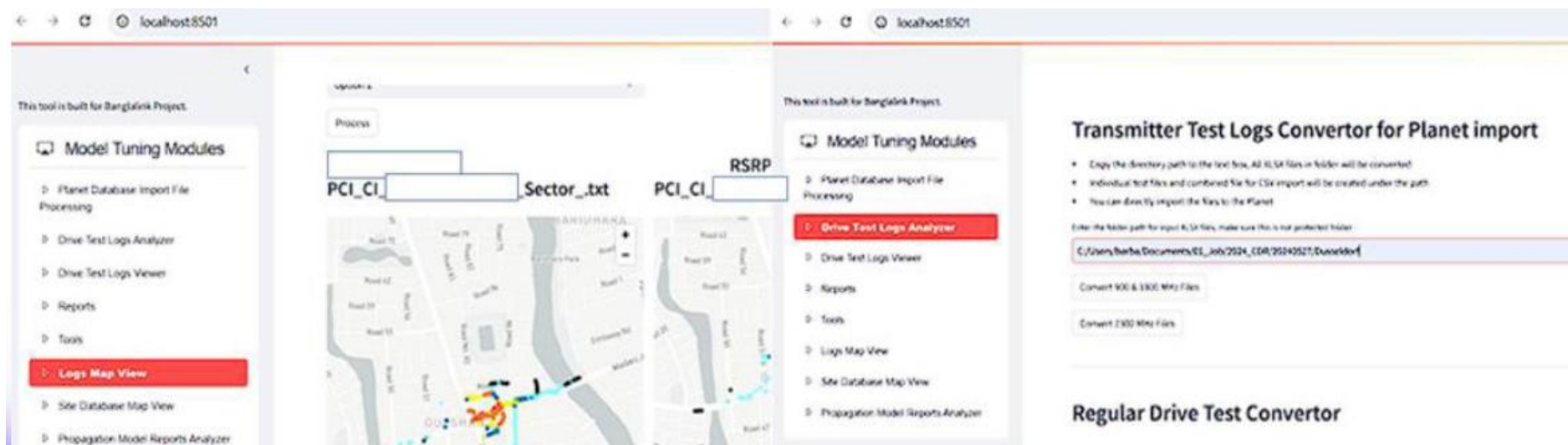
REPORT DATA

Figure 3: Screenshot of custom automation software — Developed specifically for this project, the tool enables visual inspection, cleaning, and conversion of drive test logs. It streamlines data preprocessing and ensures high-quality inputs for RF planning tools like Planet, significantly reducing manual effort.

TESTIMONIALS

Tangent International successfully completed "Model tuning project" within three-month timeframe, showcasing their expertise in delivering quality results under tight deadlines. Leveraging their advanced automated tools and a global network of specialized talent, they efficiently fine-tuned the model to meet Banglalink requirements. The project's success was driven by Tangent's streamlined processes and expert team collaboration which ensured optimal performance and client satisfaction. We wish them continued success.
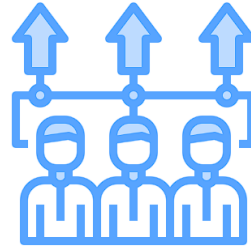
Director of Networks

WHY SBYSOFT ?

Access to highly specialized consultants with hands-on delivery experience.

The ability to scale up teams quickly for regional or multi-country projects.
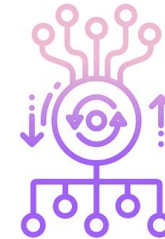
A practical, data led approach grounded in real-world network behaviors.

Fast, fully remote delivery with deep expertise and consistency

Smart, cost-effective RF solutions tailored to each project's goals.

A data-driven approach that reduces costs, shortens timelines, and improves accuracy.

CONTACT

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