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Digitising passive infrastructure is a must

Accelerating mobile internet adoption depends on a digital transformation of our network infrastructures, says Justin Head, founder, PowerX Technologies

The mobile internet has brought life-changing benefits to communities around the world - especially in rural Africa. Unfortunately, the cost of maintenance, rising energy costs and concern about emissions are restraining its spread.

There are few markets or industries untouched by the accelerating rate of digital transformation. From education, health and e-commerce to video conferencing, banking and remote working, mobile technology continues to shape our day-to-day lives. More importantly, mobile internet is playing an increasingly critical role in boosting socio-economic growth in some of the most disadvantaged geographical areas around the world.

Yet in sub-Saharan Africa, despite recent boosts in coverage, 19% of the population (source: GSMA - The State of Mobile Internet Connectivity 2021) still lives outside the footprint of mobile connection. Compared to the rest of the world, where less than 6% of the global population is geographically denied access to mobile coverage, the African subcontinent is woefully underserved.

The inequities are stark. Whilst more than half of the world's population had access to mobile internet in 2021, only a third of the population in sub-Saharan Africa was connected to the internet using a smartphone. What's more striking is that whilst mobile network operators, tower companies and technology providers consistently push boundaries to expand 4G and 5G coverage globally, less than 12% of the population of sub-Saharan Africa enjoys connection to these essential 4G/5G services.

Much is needed to bring digital transformation to the people and industries of this region - enhancing the lives and communities of people across the entire continent. Increased efficiencies and urgent investment are essential to rapidly upgrade network capacities - not only to provide more coverage but also to offer capacity for new users and migration to 4G.

The complexity of the task

Being custodians of mobile continuity of service is far from straightforward. More often than not, tower networks are built on multiple generations of technology - some state-of-the-art and some legacy - extended over vast geographical areas. They are also in a constant state of flux, with new tenants being added, subscribers being signed up to mobile internet services in huge numbers, and equipment being swapped in and out or repaired. All this against the backdrop of difficult and constantly changing geo-political conditions, challenging terrain, extreme weather, and more pedestrian (but no less problematic) issues

SOURCE: Northern African Wireless Communications

such as hardware failures, theft or unstable power supplies.

Combined, these factors make tower networks highly complex and difficult to manage. Keeping the lights on, both at the site level and at scale across big, dispersed networks, is non-trivial. Due to the scale and complexity of infrastructure and operations, it is inevitable that things go wrong. But when they do, the current modus operandi means problems end up costing more, divesting resources, and slowing down growth. The solution lies in a new paradigm – the digitisation of passive tower infrastructures.

The power of intelligent data

To achieve essential operational efficiencies and cost reductions, as well as ensuring resilience and bandwidth growth with optimal supporting CAPEX investment, the embedding of large-scale data intelligence into the core of daily operations is becoming a non-negotiable must-have.

The operational model for monitoring tower performance today relies on fragmented data sets and requires intensive, time-consuming manual interventions to find the issues that need action. At PowerX, we typically see operational teams having to join data across 10 or more data extracts, all from different systems, to distil the key measurements that they need to spot issues or measure performance. In addition, there are often instances where - even if remote monitoring systems (RMS) are installed - they present anywhere between 20-50% data gaps. Frequently they are poorly installed, missing key data points which make it difficult for operational teams to reconcile functions like power consumption or accurately measure if all the equipment is managed most efficiently.

A typical network of 10,000 towers, connected but without data intelligence tools, experiences a network-wide error. This might initiate an investigation by 10 or so tower specialists, but their time is limited so they can only (at best) perform a deep investigation for one issue at about 20% of the problem sites, using outdated manual processes and fragmented data sets. The result? Sending field engineers on-site to solve the problem, despite them having little information and being ill-equipped to immediately fix the unattributed error.

Unlocking the data to the power of X

Data is key to unlocking efficiencies at this scale - but only if there is a layer of technology to make it work at scale and significantly increase reach.

PowerX has been developing a new approach to tower operations, maintenance, and planning: placing industry-first artificial intelligence (AI) tools at the very heart of tower operations and decision-making. Using PowerX AI, tower teams see 20-40 optimised tailored settings for every site, every day. For the same typical 10,000-tower network referenced above, data intelligence means a lean tower maintenance team can implement over 100 million+ tunings a year, across 100% of the network, without any increase in manpower.

A single anomaly at a tower is a rarity. Our engineers typically see a minimum of at least seven anomalies per site. At a scale of 10,000 sites, that is over 70,000 anomalies that may require manual intervention. These might be anything from inefficient loads on generators and sudden drops in energy produced by power equipment to diesel leakages or suboptimal battery charges. How does a team of operational managers and NOC engineers wade through so much data to make the right priority call? The answer lies in leveraging data intelligence at scale to transform network operations center (NOC) heroes from 'problem finders' into 'problem solvers.' PowerX data intelligence equips NOC and tower specialists with a wealth of interconnected context so they can choose which sites to address first based on risk or cost, and inform field engineers to fix first time.

For every 10,000 towers, PowerX data intelligence delivers the equivalent of a team of over 350 specialists - without having to increase headcount. Quoting one of our customers (currently rolling out PowerX technology in Angola) this approach is like having "an accountant standing at the tower site, along with an operations manager, a technical guy, a sustainability consultant, a cell provider customer service rep and a data analyst all making decisions together to have this one little site in the middle of nowhere operating at the cheapest, most efficient, most environmentally friendly level possible."

This level of automation and scale is only achievable with our AI-driven approach. AI learns how a network operates down to each individual tower, collecting and analysing billions of data points across tower networks in real-time to unlock efficiencies, identify invisible anomalies and generate detailed audit trails. AI automation finds inefficiencies buried deep in operational data, automates time-intensive manual processes, and delivers continuous network optimisations at scale.

Key steps for data automation

1. Build a business-oriented data environment by integrating data from the different tower systems used to collect large-scale data in real-time. Then, deploy AI data quality audit and data fix techniques to help address gaps that prevent optimizations.
2. Apply a business lens to individual site data by ingesting hundreds of data points for each site in near real-time and creating new enriched metrics, applying ML models to continuously turn raw data into up-to-date unique business information for thousands of sites.
3. Detect previously unseen efficiencies by deploying ML/AI models exclusively developed for mobile towers. Deploy these changes at scale and detect anomalies that impact operational efficiency or put the site at risk.
4. Automate at scale by embedding in the real live systems the ML/AI models developed in a closed-loop approach to automate optimizations at scale with operational tools - including audit reports, notifications, trouble tickets, AI controls and AI 'what-if' simulations.
5. Finally, run operations to benchmark best-in-class operations at scale with league tables and comparison tools. These empower teams across the business to identify best-performing operations or OEMs either within the network or against the wider market.

Data intelligence at scale accelerates growth

This approach improves asset utilization by at least 10% - meaning that without data intelligence, every US$100 million invested leaves US$10 million sitting idly in the infrastructure. That US$10 million of CAPEX can be used to upgrade capacity for new users, move to 4G or provide more coverage.

Data intelligence reduces diesel consumption by at least 20-30%, along with associated costs and environmental impacts (on some sites we reduced CO2 emissions by half, helping customers deliver mobile connectivity without compromising on the environment). It means less fuel, less maintenance, fewer visits, fewer services, fewer genset replacements. And with auditable tools, we see increased investor confidence, bringing in new funds that can go toward upgrading capacity for new users, for 4G and more coverage.

The days of preprogramming field equipment and having towers run inflexible, disconnected scripts are over. The future for the telecoms industry – especially in underserved regions like sub-Saharan Africa - is the analytical and problem-solving power of artificial intelligence. It's time to smarten up our tower networks. ■

SOURCE: Northern African Wireless Communications