Changing the Landscape of Telecom Infrastructure

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EXECUTIVE SUMMARY

Telecom Tower Business: The Natural Evolution

Mobile telephony in developing countries like India plays a pivotal role in not only connecting most corners of the map, but also spurring economic activity and development across the society. Its fast paced penetration in India is a story remarkably ready to be replicated across other continents and geographies untapped of telecom benefits.

Whilst the growth for the Indian telecom sector has been rapid, the evolution of its business models has been equally dynamic. The mobile operator companies’ (OpCos) instinctive priority was increasing subscriber base and thus the spotlight was more towards marketing their services. Speedy network expansion was the next point of focus, and active equipment service providers, the next natural partners of OpCos. This is when the ecosystem needed another key partner to manage its backbone.

TowerCos brought in optimal utilization of infrastructure, and significant Capex saving opportunities for OpCos to help focus on increasing reach to their end-users. OpCos had a clear need:
- Faster time to market
- Higher site-uptime
- Lower energy cost

Also, in a situation where telecom penetration was fast exceeding grid power penetration / availability, it was getting increasingly tough to sustain the spiralling energy costs.

The Tower industry while tasked with managing the challenge of stabilizing its nascent operations model, had to build from scratch its business and operational processes which were mostly manual in nature due to the spread across tough terrains and remote locations – both rural and urban. Even though an efficient management model existed for the active infrastructure through the OpCos’ NOC or of the active equipment partner, the TowerCos were operating under the native norm of site assets being serviced on an ad-hoc reactive basis.

The bar however had to be raised, as Infratel took its leap in plucking learning’s from the NOC model, and pioneering the development of its very own Tower Operations Center, in partnership with IBM. Infratel’s TOC was meant to automate the monitoring and management of its wide tower footprint and enable a proactive asset maintenance for achieving higher uptime, and reducing the energy costs.

Creating a world-class O&M (Operations and Maintenance)

Bharti Infratel’s Network Operations Center – also called Tower Operations Center - leverages real-time intelligence and a highly efficient workflow to create a world-class O&M (Operations and Maintenance).

This has helped Infratel maximize site uptime; optimize fuel consumption and minimize operational costs.
SECTION 1
NEED FOR A ‘TOWER OPERATIONS CENTER’

Key Business challenges

Tower operations and asset management being the core business for tower infrastructure companies, the main business challenges were as follows:

- Telecom penetration far exceeding Grid power availability
- Highly decentralized and manpower intensive operations
- Tough logistics supply chain for remote areas
- Difficulty in tracking and managing SLAs for customers
- Lack of operational visibility affecting long-term planning and strategic improvements

Business Objectives

The Tower Operations Center (TOC) was then conceptualized with clear objective in mind:

- Centrally monitor and manage Infratel’s large, distributed tower infrastructure
- Use IT as an enabler in pioneering the monitoring and automation of operations in telecom infrastructure
- Reengineer and integrate operational processes with ERP
- Innovate and create a key product differentiator
- Proactively monitor and manage SLAs committed to customers and stakeholders
- Drive improvements through improved operational visibility, energy analytics, usage and fault patterns, process metrics, vendor performance etc.

Once the basic objectives were established, a high-level implementation plan was created to convert the business goals into a series of technical ‘To-Do’s. Best of breed software applications and hardware components were incorporated into the workflow to convert raw data into real-time intelligence.
SECTION 2
ARCHITECTING AN EFFECTIVE SOLUTION

Translating Business Objectives into a Process Workflow

The solution follows a ‘3IM Methodology’ where Instrumentation, Interconnect and Intelligence come together to achieve better Management.

1. Sensors placed at site in the NMS (Network Management System) box sense minute changes in the normal functioning of a tower site - like changes in temperature, door to the DG room being open/close etc. The NMS then polls the data from these sensors and communicates the same instantly, in real-time, to the TOC, using GPRS. In case the GPRS server is not able to establish connectivity with the TOC due to any glitches, it’s programmed to make two more attempts, failing which an SMS can be sent from the NMS. These events are continuously generated throughout the day, from as many as 35000 sites, continuously reporting site conditions, status updates and energy readings.

2. A homegrown application converts the SMS and GPRS feeds from the NMS and OSS systems received from all circles that are in a binary format, into a text format.

3. All the event data is fed continuously in real-time to a Centralized Monitoring system. Here, a ‘Rule Engine’ (the brain of this solution) analyses the data using business rules that pertain to management of the passive infrastructure and converts the data into ‘actionable intelligence’ that is then used to drive process workflows, and relayed to the on-site workforce for issue closure.

4. Based on this data, an analytics layer processes all the infrastructure and process data and provides insights on process performance, asset performance and energy analytics. This helps Infratel identify opportunities for energy optimization, detect irregularities, and proactively prevent service outages. This helps in better Incident Management, Asset Management and Energy Management.

Challenges faced while deploying the solution:

- Deployment of tools and instrumentation for the project, across a large geographic footprint, including some tough terrain
- Integrating a wide range of sensors, from different solution partners, and for different kinds of sites, through effective program management
- Lack of a standard protocol for communicating with NMS
- Extensive training of the field force on usage of the solution and associated instrumentation
3iM Methodology

<table>
<thead>
<tr>
<th>INSTRUMENT</th>
<th>INTERCONNECT</th>
<th>INTELLIGENT</th>
<th>MANAGEMENT</th>
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<tbody>
<tr>
<td>Sensors</td>
<td>GPRS</td>
<td>Alarm View Engine</td>
<td>Alarm Management</td>
</tr>
<tr>
<td>Energy Meter(AC/DC)</td>
<td>SMS</td>
<td>Rule Engine</td>
<td>Incident Management</td>
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<tr>
<td>Battery</td>
<td>OSS</td>
<td>Asset Management Engine</td>
<td>Energy Management</td>
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<tr>
<td>Remote Terminal Unit(RTU)</td>
<td>Aggregator</td>
<td>Ticketing Engine</td>
<td>Asset Management</td>
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<td>Power Interface Unit (PIU)</td>
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<td>Analytics</td>
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<td>Generator</td>
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<td>Over-the-Air (OTA)</td>
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<td>Air Conditioner</td>
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<td>Rectifier etc</td>
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In short, the TOC automates the Tower management process and workflows which help in better:

**Incident Management and Alarm Management**
Proactive reporting of incidents before a site goes down, and reactive reporting on a site when it’s down

**Asset Management and Outage Management**
Real-time/frequency-based preventive maintenance as well as breakdown maintenance of on-site assets

**Energy Management**
Identify opportunities for Energy Optimization

**Fraud Detection**
Detect incidents of willful sabotage, manipulation or ineffective handling of an asset or issue - by the onsite workforce or 3rd party vendors
SECTION 3
BENEFITS OF THE SOLUTION

By implementing the TOC, Bharti Infratel has been able to successfully achieve all the major objectives that were outlined when the project was conceptualized.

The TOC has helped Infratel remotely manage its equipment assets at the tower sites better and monitor the tower sites and incidents generated on a real-time basis effectively, resulting in improved operations, savings and increased Customer Satisfaction. Further, with continuous monitoring of fuel and energy usage, and adoption of various green technologies, it has helped significantly reduce greenhouse gases emissions and contribute to a greener and healthier environment.

Business Benefits of the Tower Operating Center

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<tr>
<th>TO BHARTI INFRATEL</th>
<th>TO THE CUSTOMER</th>
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<tr>
<td>REAL-TIME MONITORING</td>
<td>HIGHER UPTIME</td>
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<td>EARLY DETECTION</td>
<td>STABLE NETWORK</td>
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<td>BETTER ASSET LIFE</td>
<td>SINGLE POINT OF CONTACT</td>
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<td>BETTER CAPEX/OPEX PRODUCTIVITY</td>
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<tr>
<td>PROCESS EFFICIENCY</td>
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<td>HIGHER PROFITABILITY</td>
<td>HAPPY CUSTOMERS</td>
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USP of the solution

The TOC is state-of-the-art implementation of a NOC tower infrastructure (Network Operations Center) and is the first of its kind anywhere in world which integrate Instrumentation, Interconnect protocols, and Information Technology for better operations Management.

Through “intelligent automation” of infrastructure management and various operational processes, the TOC provides a wealth of insights to drive asset performance and energy efficiency. This has helped Bharti Infratel achieve significant business benefits while at the same time contributing to a cleaner and greener environment.
SECTION 4
LEVERAGING THE SOLUTION FOR MAXIMUM GAIN

On the Operations Front
On an average, nearly 2 million events are transmitted every day through the firmware, continuously reporting site events and conditions, status updates and energy readings.

The Rule Engine (the ‘brain’ of the TOC) is designed to receive these inputs in parallel, analyze them and generate 1 or 2 action items for the site, for the day. These are then communicated to the field staff directly, resulting in a quicker and better responses from an earlier turn-around time of ‘a few hours’ to just ‘a few minutes’. TOC is now also integrated with Infratel’s ERP systems for providing and overall energy management solution – along with automated business process for enhanced savings on energy opex and an improved breakdown maintenance. Additionally, our GreenTower P7* initiatives have also been mapped to the TOC to aid further improvements.

On the Energy Front
Apart from reducing the OPEX / CAPEX on the operations front, the TOC has also had a significant impact on the environment and has made a case for ‘Greener Telecom’.

- Significant savings (on account of fuel) to the tune of USD 1.23 million/year by minimizing DG failure, helping negate and reduce ‘extra run-hours’
- This is not only a direct saving on the fuel cost, but it also helps reduce CO₂ and greenhouse gases emitted to the tune of 4.08 million kgs per year

On the billing front
- This has helped save more than 35000 field trips per year, while also increasing accuracy and reducing delays in billing
- Accurate tracking of DG/Mains/Battery usage across all sites has further helped save more than 5000 DG run-hours

Operational impact of the solution
- Telecom grade uptime of 99.9% across Infratel's tower network
- Upto 50% reduction in outage incidents per site per month in a year
- Reduction in average critical incidents upto 30%

*Infratel’s GreenTower P7 initiative is a pioneering effort within the telecom tower industry, and is aimed at using alternate, renewable and energy efficient technologies for powering its tower footprint. To know more log on to bharti-infratel.com/web/gogreen
ABOUT BHARTI INFRATEL

Bharti Infratel Limited is one of the world’s leading telecom tower infrastructure service providers. It deploys, owns and manages telecom towers and communication structures, for various mobile operators across 18 states of India. It has a vast footprint of over 33,000+ towers and holds a 42% stake in Indus Towers Limited – a Joint Venture between Bharti Infratel, Vodafone & Idea Cellular.