

## Viotel Smart Towers Capability Statement

Viotel's SMART Tower solution provides a real-time Structural Health Monitoring (SHM) solution for communication towers and transmission towers, including monopole and lattice structures.



## The Strategy

More effective management of geographically dispersed high value communication network assets via an integrated asset management system with real-time structural health monitoring.

## Key Benefits

- Focused inspection and maintenance effort where needed. Reduce costs associated with unnecessary inspections.
- Improve safety by reducing unnecessary working-at-height exposures.
- Better ESG outcomes: reducing travel associated with manual inspections, thereby reducing emissions.
- Calibration of tower response against design parameters with potential to increase utilisation loads and generate higher revenues.
- Monitor tower response to repairs / strengthening in real-time.
- Constant monitoring and alerting provide early detection of structural defects or vandalism/ sabotage, thereby reducing the risk of catastrophic failure.
- Detection of hidden defects, such as internal cracking or foundation softening, that may not be evident by visual inspection.
- 'Big Data' - analysis of aggregate data across the asset portfolio provides greater insight to asset performance, performance of different types of structures and longer term effectiveness of structural health interventions. Provides planning insights for better decisions regarding replacement and/or augmentation of towers within the portfolio.



## Features

- Cutting edge technology, combines ultra-low noise MEMS sensor with power efficient IoT electronics
- Pole-mount small enclosure and solar panel
- Secure AWS Cloud hosted data storage, data processing, and analytics
- API integration with commercial asset management systems
- Immediate Alert Services - email/text notifications when critical action is required
- Monitors
  - 3D acceleration and tilt near the top of tower
  - Automated data analysis gives the movements of the top of tower
  - Automated resonant frequency analysis detects changes in tower response associated with structural weakening or strengthening.
- Ability to integrate other sensors into the monitoring network, such as wind speed / direction, crack meters, strain gauges.

## The Challenge

With inventories of hundreds of different configurations of towers over large geographic areas, tower operators face significant costs associated with management of their diverse asset base. The consequences of a tower failure are significant, not only from a safety perspective but also in relation to consequential damages due to loss of services.

Some form of inspection or manual monitoring is often the go-to solution for risk management and compliance, adopted by asset owners and managers to provide early warning of deteriorating conditions or confirmation that remedial works are functioning as designed.

Many asset managers are still reliant on manual systems such as traditional surveying techniques and physical inspection. Operationally these monitoring systems are demanding more management time and maintenance effort.

Likewise emerging technologies like drone surveys are now being used to supplement physical inspections however access constraints may also prevent key elements from being observed and drone surveys can only assist with detecting obvious surface defects, they can't detect internal defects.

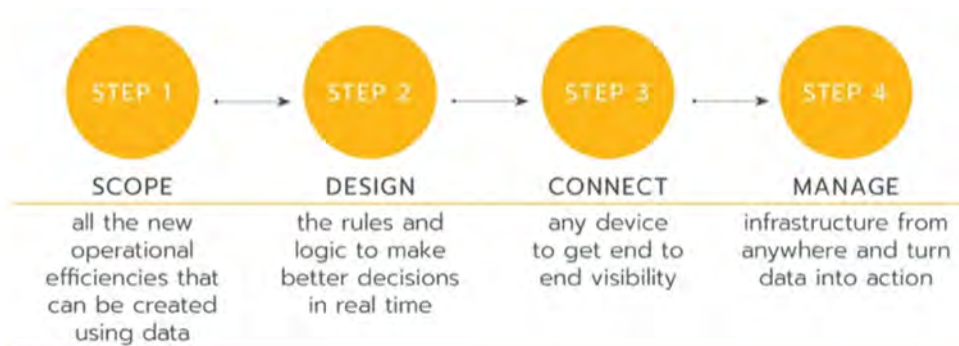
The work health and safety (WHS) risks associated with sending personnel into the field, working in at heights is becoming difficult to justify as societal expectations of what is an acceptable WHS risk has changed. The recent situation with COVID-19 has highlighted the future challenges of maintaining field based manual structural health monitoring systems and undertaking physical inspections.



## The Liability Gap

With periodic measurement systems requiring manual field measurements or manual data processing there can be a significant liability gap created between the instance of structural cracking, foundation movements or other leading risk indicators, and the reporting of the field measurements in an actionable format to asset managers. This liability gap can become more significant where an asset owner has out-sourced maintenance to a third party yet retains statutory accountability for the provision of safe infrastructure to the public.

Gaining greater insight into the structural health of infrastructure is crucial to improving maintenance management and public safety, but traditional manual and siloed processes are unable to provide the detail necessary to provide these insights in a timely manner.



Real-time monitoring, data aggregation and alerting platforms are increasingly being viewed as a requirement to meet oversight requirements under tightening maintenance standards and increased stakeholder focus.

Critical to the effective structural health maintenance and management of infrastructure is ready access to real-time information such as:

- Location, time, date
- Weather conditions
- Movement of structures
- Tilt
- Resonant Frequency
- Crack measurements
- Seismicity - acceleration
- Strain in key members
- Settlement



## Viotel Smart Tower Solution

Incorporating Internet of Things (IoT) technology a **Viotel SMART** Structural Health network can reduce the reliance on manual inspections, improve triaging and scheduling of maintenance, reduce delay time from hazard alert to risk mitigation action, minimise disruption and safety risks to workers and the public.

**SMART** sensors provide real-time monitoring and advise asset managers when leading indicators reach key thresholds, associated with structural condition, sufficient to warrant safety actions, inspections, or maintenance.

**Data Analytics** functions enable structure specific algorithms to be developed by structural engineers and incorporated into alarm and control systems such as mobile phone / email alerts to maintenance personnel.

Our systems are easily configurable to record action response rates and help provide auditable records.

The **Viotel SMART** units are safe, self-contained IoT sensor packs which are discrete, simple to install and calibrate, powered with battery &/or solar power and with built in pre-processing analysis power, with further analytics deployed in Cloud. The **myViotel app** accessing internet-based data, transforms a sensor from a disconnected unintelligent asset to a networked live data device.



Integrated data path from source to decision

**Viotel's SMART** structural health monitoring system harnesses 'Internet of Things (IoT)' technology and features sensors and telemetry device, which streams real-time data to the Cloud hosted via Amazon Web Services (AWS). The SMART sensor units are self-contained with each unit able to operate as IoT device.

**Viotel's** key advantage lies in the flexibility of our data management system. Clients are NOT tied into monolithic silos requiring multiple applications to look at different datasets - Viotel understands that your data is YOUR data, and we will help you to integrate our data sensors into your management systems. Or we can customize a dashboard for you, or provide a preconfigured standard dashboard - it's your choice.



## About Viotel

Our mission is to empower businesses with better data for better decisions. At Viotel we believe knowledge is power and understand the critical role data plays in managing risks, identifying opportunities and protecting business assets. Using 'plug and play' Smart Box technology, coupled with the power of Amazon Web Services, Viotel has created a data ecosystem. We believe in making smart technology smarter.

By continually investing in new technology and collecting and analysing data in real time, our cutting- edge solutions empower businesses to identify cost savings, increase productivity, streamline maintenance, increase OHS, monitor assets from any location and respond faster to emergencies.

Viotel currently have operations support in Australia and New Zealand.

## Contact

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## Our Resonance

Resonance describes the phenomenon of increased amplitude that occurs when an external force or a vibrating system is equal or close to a natural frequency of the system on which it acts.

Leveraging decades of experience in earthquake analysis and monitoring of mining seismicity, Viotel has a deep understanding of resonance and has developed a unique series of asset management solutions involving monitoring and analysis of vibrations and waveforms.