

TELCO TOWER STRUCTURAL HEALTH MONITORING SYSTEM



Multipurpose Monitoring System with IoT

Monitoring system mainly consists of Accelerometers, Weather Sensors and Measurement system, that measures multiple quantities including environmental conditions, strain, solar radiation and battery charge controller parameters.

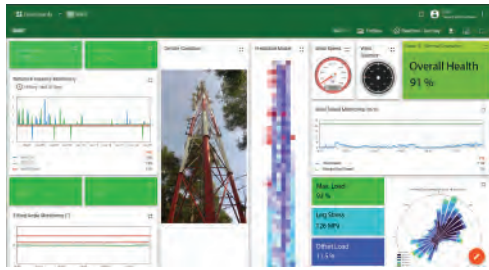
Structural health is evaluated and monitored using natural frequencies, strain on structural members and wind conditions. All measured values are fed into an advanced calculation engine to evaluate structural health parameters and display on a cloud based dashboard.

The system is designed for scalability – more towers can be added to the system with little or no additional configuration.

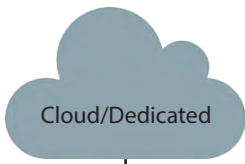
Entire system is fully isolated to reduce risks of damage by electrical surge, lightning etc, making it suitable for variety of structural types.



System Architecture



Dashboard Display on Web-Browser



Cloud/Dedicated



Measurement System

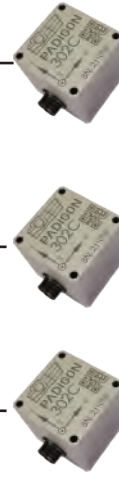
Wind Sensors



Biaxial Tilt Sensors



Accelerometers

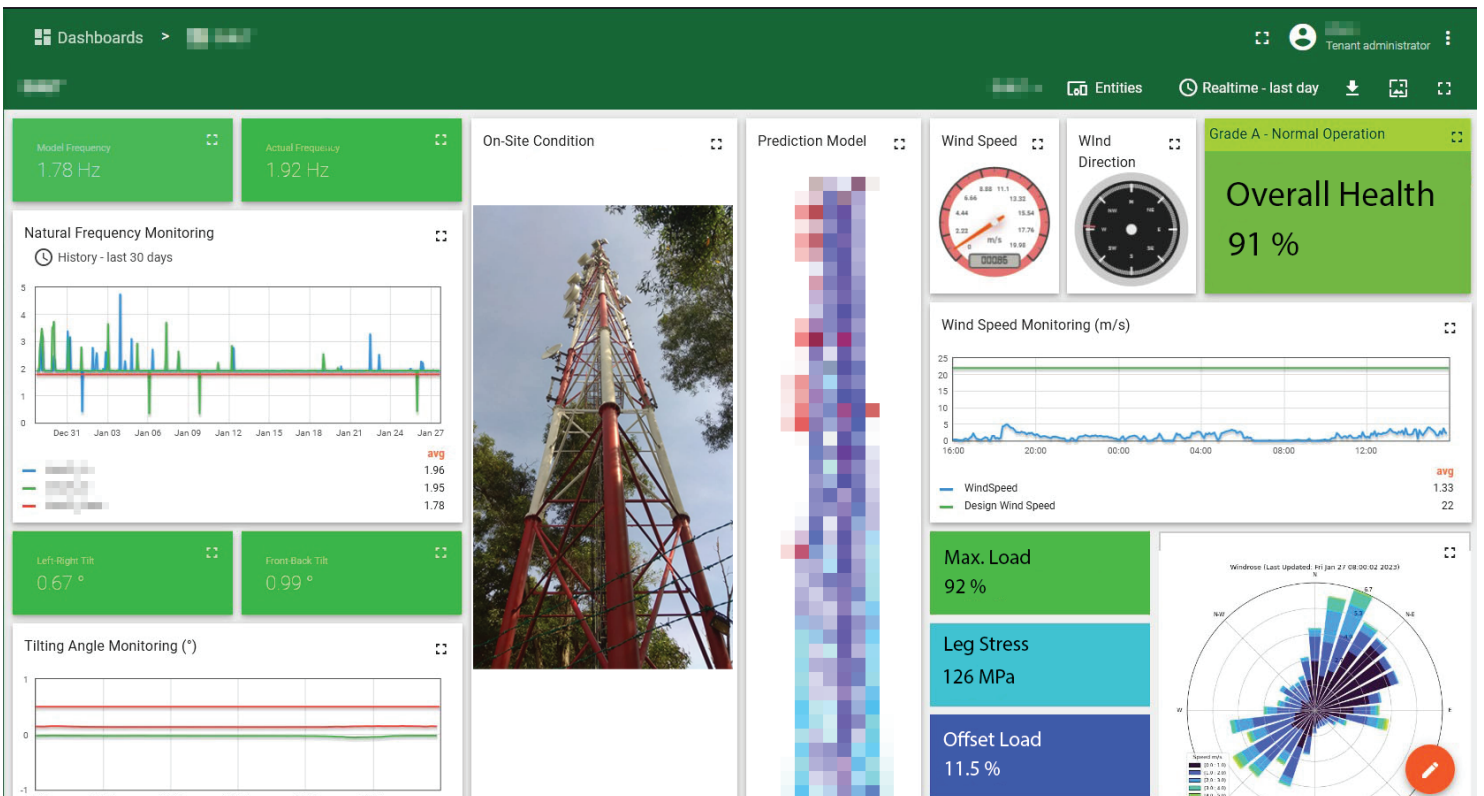


Strain Gauges



The system incorporates sensors, measurement system and cloud. To achieve comprehensive structural monitoring, a number of Triaxial/Biaxial Accelerometers, strain gauges and tilt sensors are needed. All the sensors are connected to the measurement system via analog or digital means.

The measurement system, powered by either positive or negative voltage in the range of 36 - 72 V DC collects all the sensor data and saves on internal non-volatile memory. It also sends the data through telemetry via in-band Ethernet or built-in LTE modem to cloud server for monitoring from any place using a web browser.



System Specifications



The basic system provides standard parameters for structural monitoring. The system can be upgraded with additional modules to monitor other parameters such as power/battery control, solar energy usage, fuel cell etc. Most types of telco tower can be monitored using the system with little or no modification. Low power electronics enable the system to be powered by batteries and used in remote towers with alternative power supply.

Electrical	Technical Data / Description
Input Voltage	36 - 72 V DC (Positive or Negative Supply)
Rated Power	10 W Maximum
Isolation	Fully Isolated sensor and measurement system
Overvoltage and Reverse Polarity	Fully protected
Electrical Surge	Fully protected against lightning surge and transient power spikes



Sensors	Technical Data / Description
Standard Sensors	
Triaxial Accelerometers	Low frequency DC sensors High sensitivity, ultra low noise
Biaxial Tilt Sensors	Fluidic capacitive inclination sensors High accuracy Low hysteresis Ultra low longterm drift
Wind Sensors	Wind speed Wind direction
Optional Sensors	
Strain Gauges	Full bridge strain gauges
Wire Tension Sensors	For guyed towers
Temperature Sensors	For structural temperature or environmental temperature
Energy Sensors	Voltage/Current sensors for power consumption



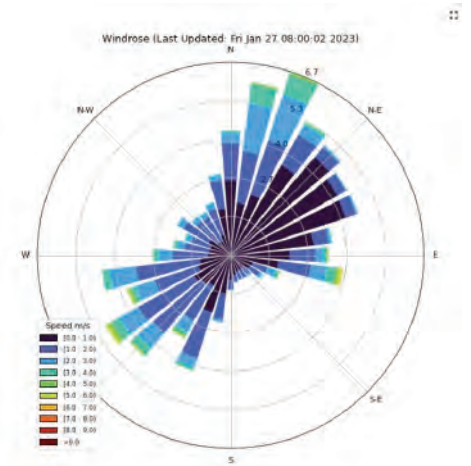
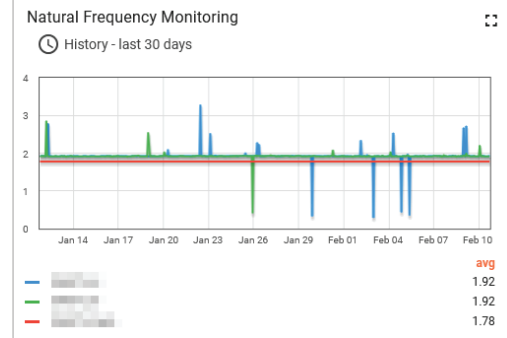
Measurement System	Technical Data / Description
Connectivity	Ethernet or built-in Modem (optionally WiFi)
Ethernet	100Mbps
Modem	Integrated 4G/CAT4 LTE modem with SIM card slot



System Specifications



Measurement Data	Technical Data / Description
Data Transfer	Transfer data via modem or ethernet to cloud and save in device memory
Data Retention	System ensures all data are transferred to cloud before clearing in-device memory
On Cloud	Data saved on cloud for 3 months (Optionally unlimited)
On Device	Device stores all data with user-defined FIFO buffers
Data Calculation	Technical Data / Description
Frequency Response Function	Real-time FRF calculated with user-defined window type and width
Wind condition	Wind speed and direction visualised graphically
Trend Analysis and Prediction Model (Optional)	Analyse data and forecast using historical data and powerful prediction engine
Automatic Solver Interface (Optional)	ARTEMIS modal pro (Damage Detection) FEMtools (Model Updating) OpenTower (Tower Design and Calculation) Custom interfaces available on request




INVICOM TEST & MEASUREMENT SDN. BHD.
10-1 Jalan Wangsa Setia 3
Wangsa Melawati, 53300 Kuala Lumpur

Tel: +603 4143 6300
www.invicom.com

Fax: +603 4143 6301
hotline@invicom.com

© All rights reserved by respective partners.

PADIGON Sensors and IoT Systems are exclusively distributed and integrated by Invicom Test & Measurement.

