Bentley®

OpenTower® iQ

The Official Guide to Digitizing Telecom Tower Maintenance

A Walkthrough of the Newly Possible Digitized Tower Maintenance Cycle

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The Growing Need for Digitization

As the world upgrades to 5G networks and adopts the internet of things (IoT), the need to upgrade towers and update tower equipment is higher than ever before. Federal initiatives like the Infrastructure Investment and Jobs Act (IIJA) in the U.S. are driving more money towards building and upgrading broadband services, making the traditional approach of managing the life of towers obsolete.

In addition to telecom equipment, tower owners and operators are realizing that they will need to offer more than a cost-sharing option. They must leverage technology to provide telecom network services and possess operational skills in energy management, operations, customized site planning, and low-cost design. Achieving these necessary changes requires speed and flexibility, which only digitization can provide.

It's time to enter the 21st century.

Current Roadblocks to a Digitized Future

Even though owners and operators are willing to embrace digitization, the adoption is very slow. For example, they don't always receive the crucial digital data necessary to maintain their new towers during telecom mergers and acquisitions (M&A). These data silos pose a particular challenge, especially as towers are changing hands faster than ever, increasing the amount of missing data during transfers. The new owners are left with a growing patchwork of outdated paper drawings, simple PDFs, or 2D CAD drawings. Since there is no central source of truth, operating and maintaining tower infrastructure can become an even more difficult and costly process.

Tower owners and operators face a myriad of problems:

- ◆ Outdated, inaccurate, or incomplete equipment inventory
- ◆ Missing or inaccessible documentation
- ◆ Inability to collaborate between key stakeholders and responsible vendors
- ◆ Reliance on manual processes
- ◆ High Opex costs and volume

Telecom tower owners and operators need reliable data that includes accurate equipment inventory, maintenance information, and revision history to make informed decisions and appropriately maintain tower infrastructure.

Enabling Telecom Tower Digitization through Digital Twin Technology

A digital twin is innovative technology that can help solve infrastructure challenges by capturing past, present, and predicted features through the use of real-time and historical data. Motivated by outcomes and tailored to use cases, a digital twin accelerates holistic understanding, effective action, and decision-making processes.

Four operational and economic benefits of a digital twin:

Creates a single source of truth
A digital twin provides tower companies with an easy-to access single source of truth that includes the complete view and history of a tower.

Automates manual workflows
A digital twin automates the entire telecom tower lifecycle to support data acquisition, visualization, analytics and planning, engineering, and approvals.

Optimizes time spent and revenue
From inspection and truck roll for the start of the installation process, a digital twin can reduce the time spent per tower from 30 days to three days, and saves 60% in costs.

Delivers interactive and actionable analytics
The right analytics—with artificial intelligence—will supply the most up-to-date information so tower companies have the insight needed to make informed decisions.

Automation throughout Each Stage of the Tower Maintenance Lifecycle

The lifecycle of today's tower maintenance is disconnected and discrete. To maintain towers, owners and operators leverage available as-designed data (2D, 3D, CAD, and BIM) to plan and predict maintenance activities. Once plans are agreed upon, engineering and construction documents are developed, and construction and implementation is executed. Post-construction validation is a recommended step to ensure proper implementation and data accuracy. But in reality, it is often overlooked or the closeout package doesn't offer enough details. Decision-makers are left with unreliable or incomplete data for the next round of maintenance tasks.

This cycle uses disconnected systems and data sources with various vendors and stakeholders. It is a linear process that makes efficiencies difficult and accuracy nearly impossible.

A digital twin approach to telecom tower maintenance enables a connected, continuous,and digitized lifecycle. It allows automation through each individual stage, including data acquisition, visualization, analytics and planning, and engineering and approvals.
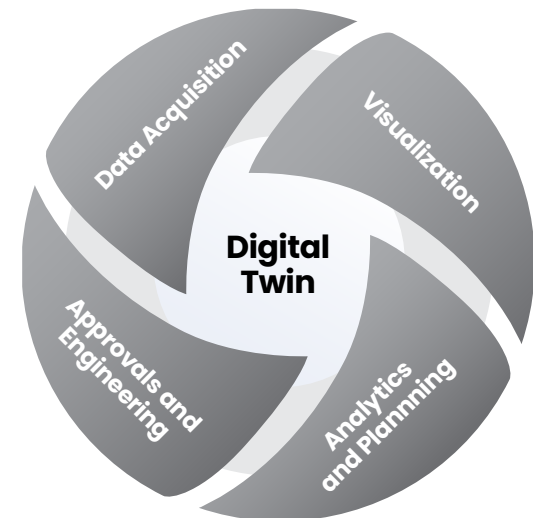
Tower Maintenance Lifecycle

Lifecycle Stage 1: Data Acquisition

It is important to have a complete understanding of telecom tower infrastructure before dedicating resources toward maintenance or operations. Existing or legacy data provides the original intent of the structure, historical view, and possible current state. This information needs to be gathered and made accessible to enable post-construction validation and pre-construction planning. Legacy data, including as-designed 2D or 3D drawings, pre- and post-construction reports, BIM models, and drone captures, help create a complete view of a tower.

Current workflow
Legacy data is stored throughout different systems in a variety of formats. This presents numerous challenges, including:

- Difficulty consolidating, accessing, and validating data.
- More opportunities for error since manual interactions, inputs, and reconciliations still occur with numerous touchpoints.
- Increasing the time spent gathering data by a week or more.
- Additional time delays while information is gathered and entered into repositories.

Current workflow: 30+ days

Digital twin workflow
Legacy data is automatically compiled and connected in a single view. This workflow:

- Creates a single repository of tower data, increasing data accuracy and decreasing duplication possibilities.
- Enables collaboration as all stakeholders access data from the same source.
- Empowers quick and informed decision-making.
- Connects data to create contextualized and interactive 3D models for future lifecycle stages.

Digital twin workflow: three days

Additional digital twin benefits:
- Supports hybrid work environments: Remotely verify work quality and site acceptance audits.
- Promotes worker safety: Reduce Workplace Health and Safety (WHS) and Health & Safety Executive (HSE) risks by keeping contractors off towers.

Lifecycle Stage 2: Visualization

Now that legacy data has been compiled and connected, as-built information needs to be verified to validate as-designed information. Conducting a visual inspection is necessary to provide a realistic view of the tower, including defects and other possible issues.

Current workflow

A manual, in-person inspection is required to assess the current state of a telecom tower, which leads to:

- High costs associated with truck rolls and manual inspections.
- Time delays for resource scheduling and processing with outside vendors and contractors.
- Possible tower access impediments.
- Data accuracy limitations from human error.

Current workflow: 30+ days

Digital twin workflow

A virtually accessible, interactive 3D model is automatically created. This enables the ability to:

- Perform visual site and equipment inspections from anywhere.
- Visualize and compare as-designed and as-built tower data to improve data accuracy.
- Automate frame, mount, and equipment detection.
- Assess asset conditions safely and securely.

Digital twin workflow: one day

Lifecycle Stage 3: Analytics and Planning

When tower data has been visualized and virtually inspected, owners and carriers can now analyze it to plan for future maintenance and upgrade needs. Planning can, at best, be guesswork without a complete understanding or view of tower data. Having access to accurate data and powerful applications can streamline this process.

Current workflow

Without accurate data or analytics, owners are forced to:

- Manually analyze, measure, and plan, usually via human inspection, inviting the probability of errors.
- Plan for future upgrades using unreliable as-built information, resulting in incorrect RF planning and difficulties during construction, causing delays and significant loss of revenue with incorrect space availability.
- Rely on different contractors and vendors to perform physical inspections, each using different metrics and their own files and formats, requiring multiple integrations with individual software licenses and varying costs, increasing the probability of errors.

Current workflow: 21 days

Digital twin workflow

With the power of analytics, critical analysis activities that accelerate planning timelines can be automated, including:

- Mount analysis, mount and tower mapping, and rust detection.
- Critical reports to inform decision-making, such as space availability reports and equipment information.
- Access to intuitive measurement capabilities that perform an in-depth inspection.
- Reconciliation and validation of tower data through powerful comparison functions.

Digital twin workflow: five days

Lifecycle Stage 4: Engineering and Approvals

After the analytics and planning have been completed, all necessary documents must be created and shared with those responsible for implementation and construction.

Current workflow

Manually process requests for necessary construction document creation:

- Work with multiple vendors in a variety of systems to produce the necessary documentation.
- Depend on vendor timelines and resourcing.
- Rely on legacy, as-designed data without an understanding of as-built information.

Current workflow: 21 days

Digital twin workflow

Automatically generate necessary construction documentation in minutes:

- Generate fully automated elevation, plan, base level, and site plan drawings.
- Automatically create equipment inventory and space availability reports.
- Save files in a single, multitenanted database and share with approved internal and external stakeholders.
- Assess compliance before implementation/installation (AI and manual).

Digital twin workflow: one day

The ROI of Digitizing Telecom Tower Maintenance

Bentley's OpenTower iQ leverages the best in digital twin technology, automating manual workflows for an improved return on investment (ROI), optimizing time spent and revenue. Tower owners and operators also gain access to a single source of truth that includes a complete view and history of a tower, as well as interactive and actionable analytics for more informed decision-making.

Financial Savings

Current Process

$5,700
per tower, per year

Process Utilizing OpenTower iQ

$2,200
per tower, per year

Savings

$3,500
per tower, per year
(60% per tower)

500 Towers
save over
$1.7M
per year

10,000 Towers
save over
$35M
per year

Additional Savings

42%
reduction in the 10-year cost of ownership

45%
reduction in M&A costs

65%
lower yearly tower maintenance costs

15%
ongoing savings in operations

Time Savings

33%
quicker M&A transactions

50%
less time spent on analysis reporting

95%
faster for the entire leasing process

Improve the Lifecycle of Your Towers Today

Realize the return on investment available to you by digitizing your tower infrastructure maintenance through OpenTower iQ. Bentley has decades of experience providing innovative software to enterprises by designing, building, and operating the world's infrastructure. OpenTower iQ will help you:

- ◆ Automate your entire telecom tower lifecycle to support data acquisition, visualization, analytics and planning, and engineering and approvals.

- ◆ Create an easy-to-access single source of truth that includes the complete view and history of your tower.

- ◆ Receive the insights you need to make the most informed decisions through AI- and ML-powered interactive and actionable analytics.

- ◆ Reduce the time you spend on every tower from 30 days to three days while helping you save 60% in costs.

We can help you validate, scale, and adopt digital twin technology into your everyday workflow so you can realize the time to value immediately.

About Bentley Systems

Bentley Systems (Nasdaq: BSY) is the *infrastructure engineering software company*. We provide innovative software to advance the world's infrastructure – sustaining both the global economy and environment. Our industry-leading software solutions are used by professionals, and organizations of every size, for the design, construction, and operations of roads and bridges, rail and transit, water and wastewater, public works and utilities, buildings and campuses, mining, and industrial facilities. Our offerings, powered by the *iTwin*® Platform for infrastructure digital twins, include *MicroStation*® and *Bentley Open*™ applications for modeling and simulation, *Seequent's* software for geoprofessionals, and *Bentley Infrastructure Cloud*™ encompassing *ProjectWise*® for project delivery, *SYNCHRO*™ for construction management, and *AssetWise*® for asset operations. Bentley Systems' 5,200 colleagues generate annual revenues of more than $1 billion in 194 countries.

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