Network Operations and Maintenance for Telecommunications

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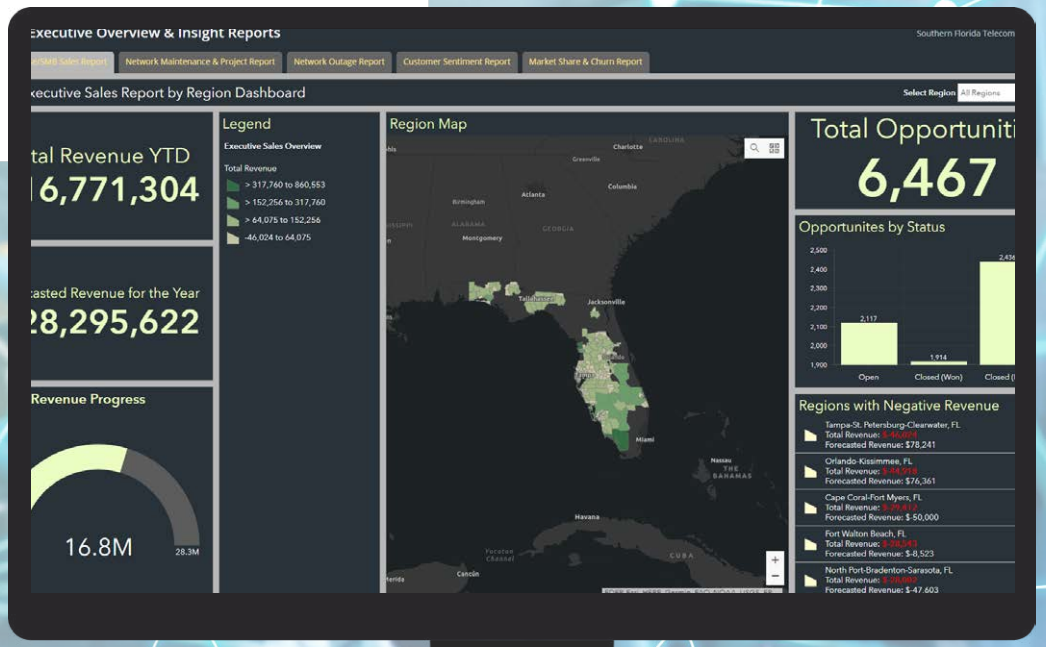


1 Introduction

Modernizing How Telecoms Manage Their Resources

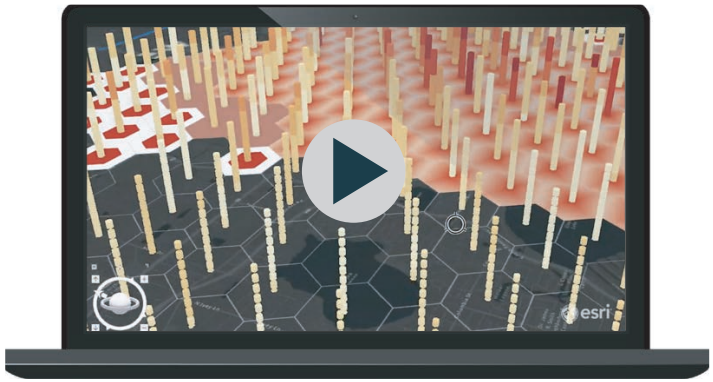
As outlined in Esri's *Comprehensive GIS for Telecommunications e-book*, ArcGIS® technology can help telecom organizations and Communications Service Providers (CSP) optimize their resources using geographic information system (GIS) technology. Because GIS leverages the one thing all telecom operations have in common (location), ArcGIS unifies Operations Support Systems (OSS) and Business Support Systems (BSS) through a common understanding of location and maps while enhancing situational awareness through real-time network and field operations.

For telecom organizations, a comprehensive GIS provides the geospatial infrastructure to effectively collaborate and communicate network operations and maintenance activities and their associated return on investment (ROI) to the business. Additional benefits include optimizing communication networks, as well as empowering the people, processes, and systems that maintain and manage telecom networks.

ArcGIS serves as a single, authoritative, interconnected, and integrated system for all workgroups in a telecom organization.

2 A Comprehensive GIS

More Than Making Maps



Everything in telecommunications happens somewhere. As the world leader in location technology, Esri provides the most advanced capabilities in the industry.

Changes in the telecom environment and the explosion of data demand vastly better ways of managing, examining, and communicating telecom information.

The telecom industry requires new solutions to meet the evolving business needs. Telecoms need solutions that provide a complete network operations and management picture and powerful insights that include exceptional visualization on any device, anywhere, at any time. As the requirements for GIS have evolved, so has ArcGIS. It delivers the power to increase effectiveness in every corner of the utility.

ArcGIS is a comprehensive GIS.

Comprehensive means it contains all the elements needed to meet telecom challenges. It maintains the network model, the assets, and all the associated transactional data.

It provides advanced visualization and analytics to improve overall business intelligence, and it enables the distribution of information to everyone that needs it, creating a comprehensive ecosystem for sharing and collaboration across teams, organizations, and communities.

These capabilities manage an organization's authoritative data, create relationships, and streamline workflows. This is enabled through a system of systems, which provides the foundations to enabling digital transformation for telecoms:

- **System of Record—Data management and integration**
- **System of Engagement—Secure sharing, collaboration, and dissemination**
- **System of Insight—Analytics, models, and data exploration**
- **Real-Time Internet of Things (IoT)—Measurement and status**
- **Location Services—Developer tools for integration and customization**

ArcGIS does things traditional mapping GIS can't touch. It employs an unparalleled data model and integrates all types and formats of data. The rich data supports out-of-the-box analytics and the latest artificial intelligence (AI) and machine learning tools. It creates a 3D digital twin of your network and allows for real-time analysis, reporting, and business decisions. The results are easily exploited with engaging apps personalized to each user's role. They provide focused capabilities and align to how people work today and into the future.

ArcGIS

Supports Three Fundamental Systems

3 Network Operations and Maintenance Using ArcGIS

As a comprehensive GIS, ArcGIS brings location intelligence to network operations and maintenance, and modernizes how telecom organizations manage their resources. ArcGIS integrates GIS with OSS and BSS to connect authoritative business data with geographic information.

ArcGIS offers real-time situational awareness by tying real-time network events to the physical network location and providing access to those maps to field or office personnel.

ArcGIS provides automated network maintenance alerting using spatial analysis, allowing telecom organizations to become predictive instead of reactive. Telecoms can digitally transform the way their organizations approach network operations and maintenance with ArcGIS.

OSS/BSS Integration

- Connects business data to operational data
- Integrates IoT/real-time systems
- Reduces technical debt and total cost of ownership
- Provides a common set of maps and geospatial tools

SYSTEM OF RECORD

Real-Time Situational Awareness

- Allows timely communication and understanding
- Improves disaster response and business continuity
- Simultaneously integrates, analyzes, and displays data
- Enhances coordination and stakeholder management

SYSTEM OF ENGAGEMENT

Resource and Network Optimization

- Optimizes workforce utilization
- and efficiency
- Improves customer satisfaction
- Streamlines business processes
- Enhances software defined networks

SYSTEM OF INSIGHT

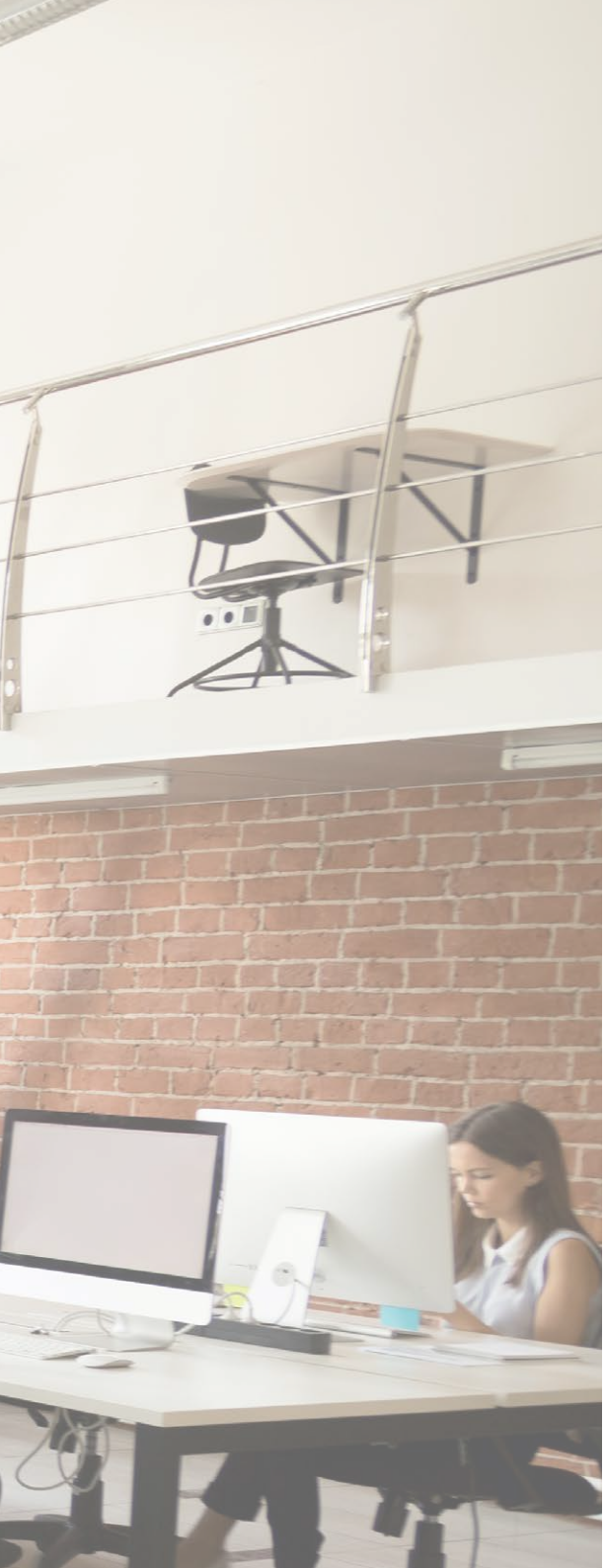
MODERNIZING HOW TELECOMS MANAGE THEIR RESOURCES

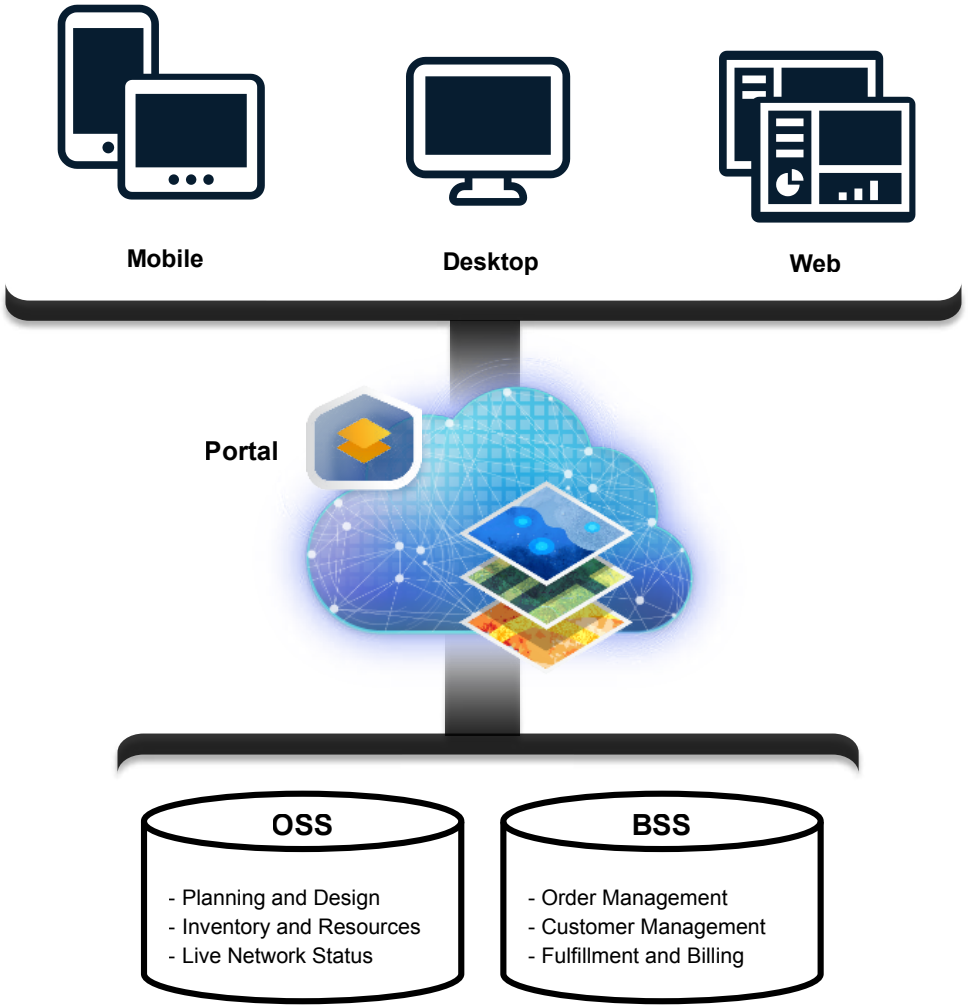
4 OSS/BSS Integration

On Any Device, Any System, Anywhere, Anytime

Telecom businesses have many critical information systems that are often not related or natively integrated. To create a valuable digital operating model, telecoms need to invest in integration between OSS and BSS to truly gain insights into their network and the subscribers they proudly serve.

Integration of BSS to support the planning of future network expansion while continuing to provide a world class quality of service. ArcGIS enables analysis of critical data, such as Customer Relationship Management (CRM), Billing, and Network Management Systems (NMS), to uncover hidden trends. It allows for maximum efficiency in sales and support activities by providing real-time situational awareness of network availability, status, and salability.





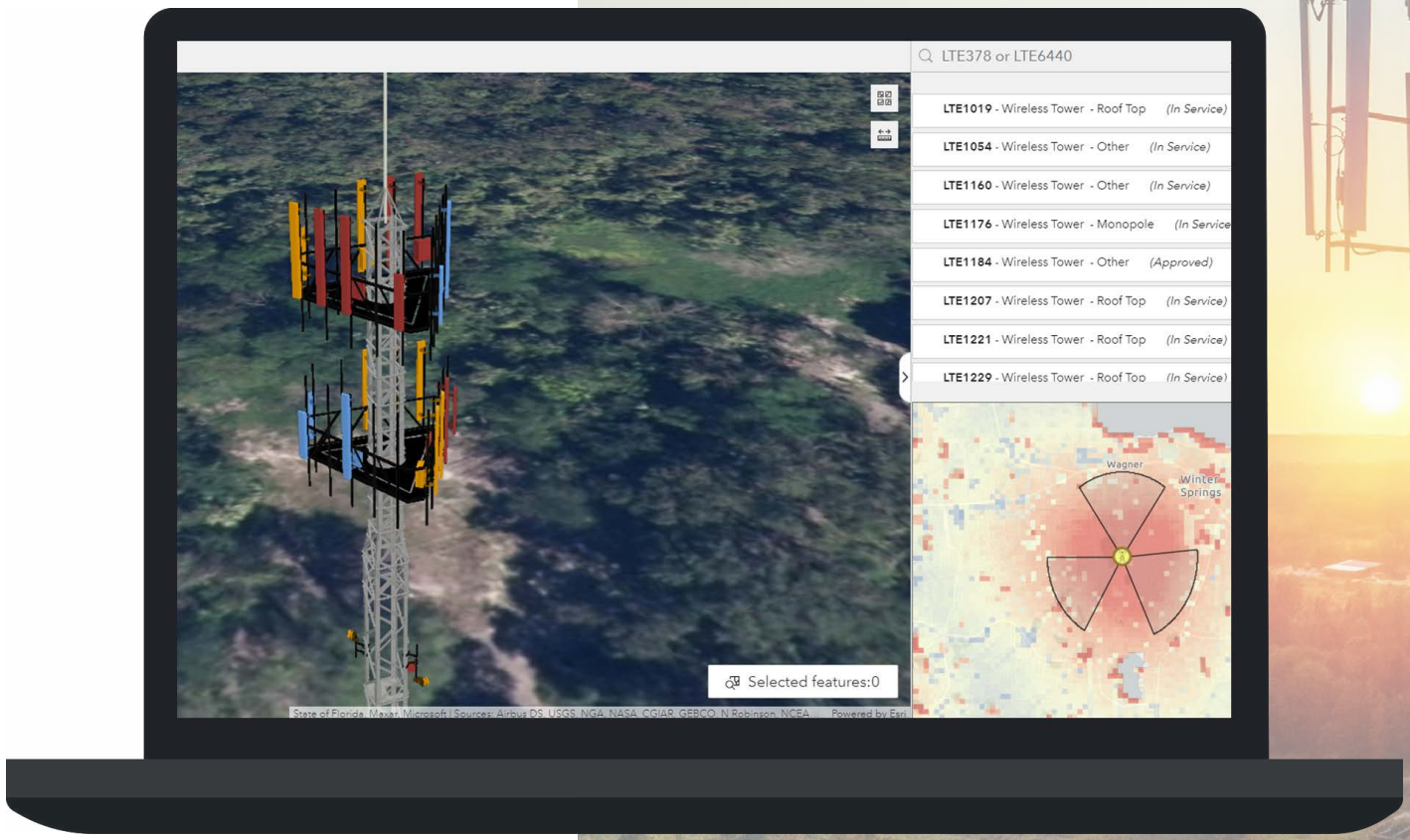
With all the location information within telecommunications, ArcGIS can integrate OSS and BSS with a common set of maps and geospatial tools. It is through this integration that you can obtain a single operational record and gain insight and engagement across the organization.

5 Real-Time Situational Awareness

Telecoms are inundated with many forms of location data and will benefit from a comprehensive GIS that enables both OSS and BSS integration with effective and easy-to-use analytical tools. It isn't until combining this critical data on geospatial infrastructure that you can truly obtain a single operational view and gain insight across the entire organization.

An emerging requirement in a modern telecom company is access to timely information to make fact-based business decisions. Latency caused through legacy processes have restricted telecom companies from modernizing their operating model, resulting in diminished subscriber satisfaction. ArcGIS allows real- time operational views to be configured through web-based dashboards to visualize the connectivity and capacity of the network, the environment surrounding it, and the up-to-date statuses of field crews. Combining several existing real-time data feeds creates operational awareness of your network and enables telecom companies to provide accurate restoration times to customers, increasing satisfaction, and reducing churn. Since the integrated data is shared across the telecom organization as it is captured, the enhanced transparency also increases safety and proactive network operation.

A common requirement for a modern telecom company is access to timely information to make more informed business decisions. Latency caused through legacy processes or paper solutions have restricted telecom companies from modernizing their operating model. ArcGIS allows real-time network operation views to be configured through web-based dashboards, visualizing the environment via digital twins, analyzing network capacity using location analytics, and providing restoration times to your customers through outage viewer maps. Information is integrated and shared across the organization as it is captured, eliminating data backlog and creating new business opportunities.



Case Study 1
Situational Awareness

Digital Twin Helps Schiphol Airport Optimize Operations

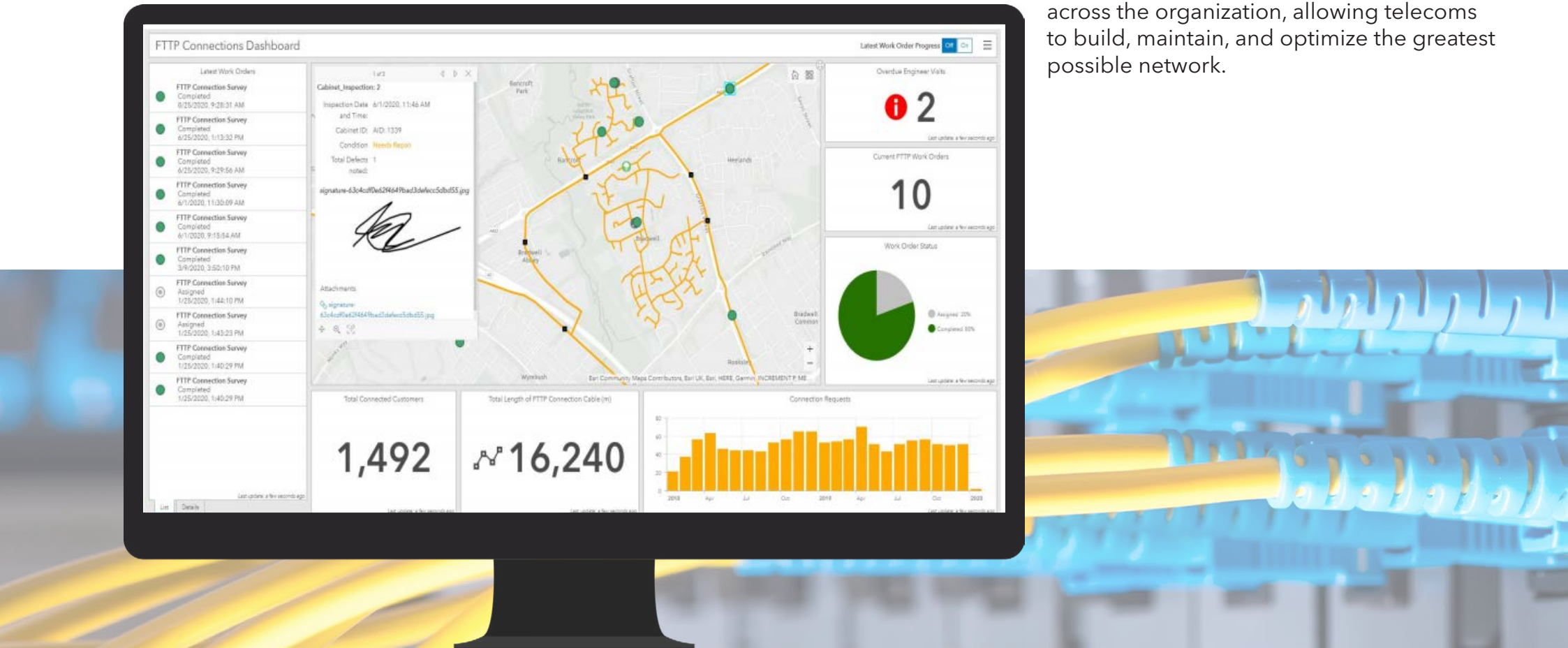
The airport originally implemented GIS in 1985. Currently, ArcGIS Enterprise is a core technology in its business processes. In 2017, Schiphol Airport began a capital improvement program scheduled to last for several years, which involves a major renovation of existing facilities and the construction of new ones. To take advantage of the numerous digital assets created for the capital improvement program, Schiphol Airport built a digital asset twin of the airport including ducts for comms and air conditioning.

6 Resource and Network Optimization

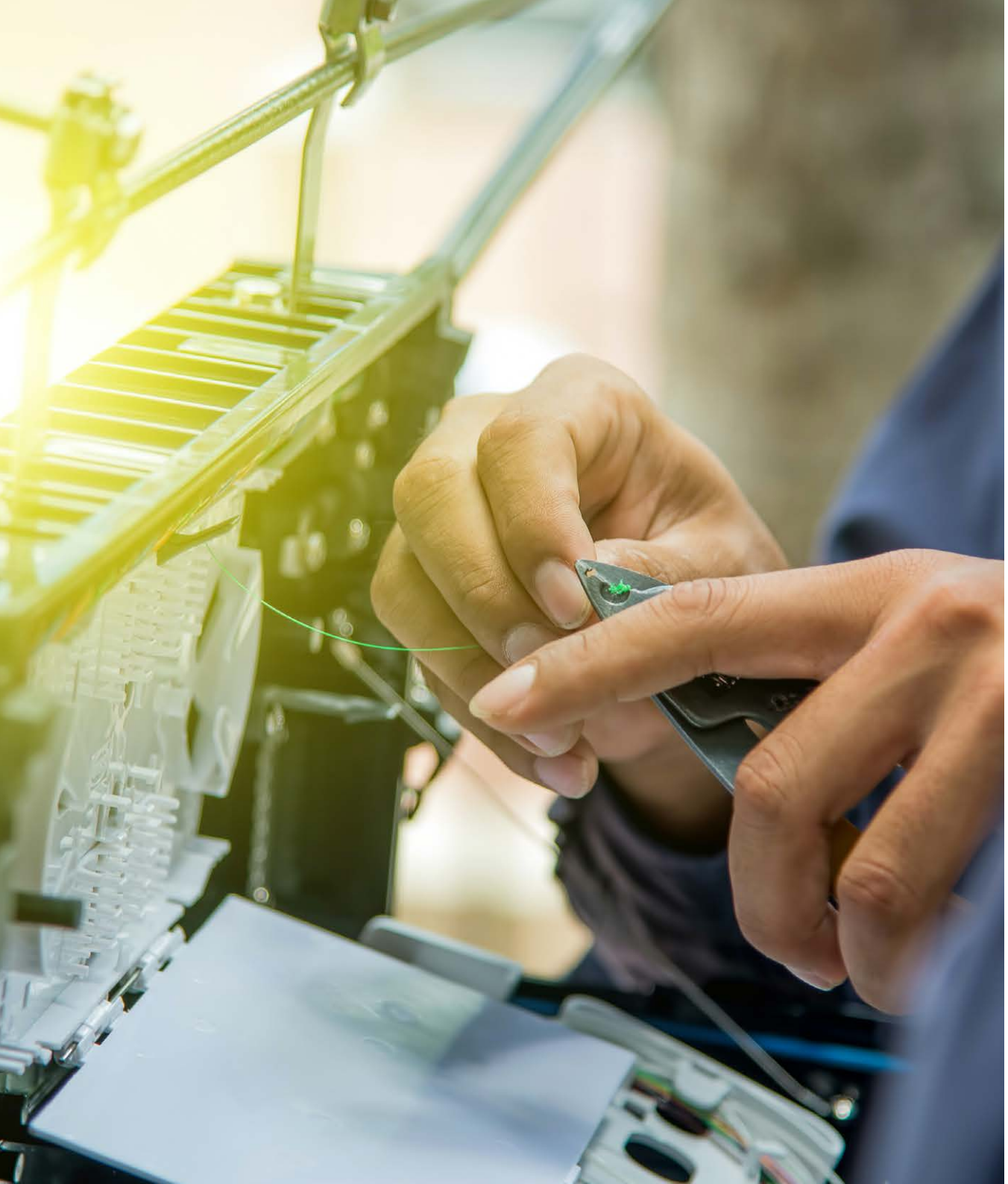
As telecom companies adapt to new digital operating models, they will endeavor to look for innovative ways to optimize their resources and better understand how their network is operating. Industry experts have long said that optimization can only be achieved once you have all the information available.

This means breaking down organizational silos while creating connected systems and information transparency.

ArcGIS is a comprehensive GIS, enabling telecoms to create the digital operating model needed to improve business processes and workflows. It visualizes and interconnects high volumes of information to create improved situational awareness across the organization, allowing telecoms to build, maintain, and optimize the greatest possible network.



To reduce costs, you need to improve the utilization of your network assets and people. With ArcGIS, users can gain a better understanding to enable more informed decision-making. Out-of-the-box capability optimizes common workflows like suitability analysis for new wireless or fixed-line service planning. Field operation workflows are also streamlined with mobile apps, showing integrated information for network, service territories, job details, and customer information, which results in significant reduction in time and cost.



Case Study 2 FiberLight

FiberLight, LLC, is a fiber infrastructure provider with more than 20 years of construction experience in building and operating mission-critical, high-bandwidth networks. FiberLight is focused on delivering solutions for complete operational control, security, and scalability, improving business operations and provisioning peace of mind for network and data center providers for large enterprises across the US. To deliver this capability, it requires network management solutions that keep it on track to deliver some of the most agile, secure, scalable, reliable, and flexible custom services in the industry.

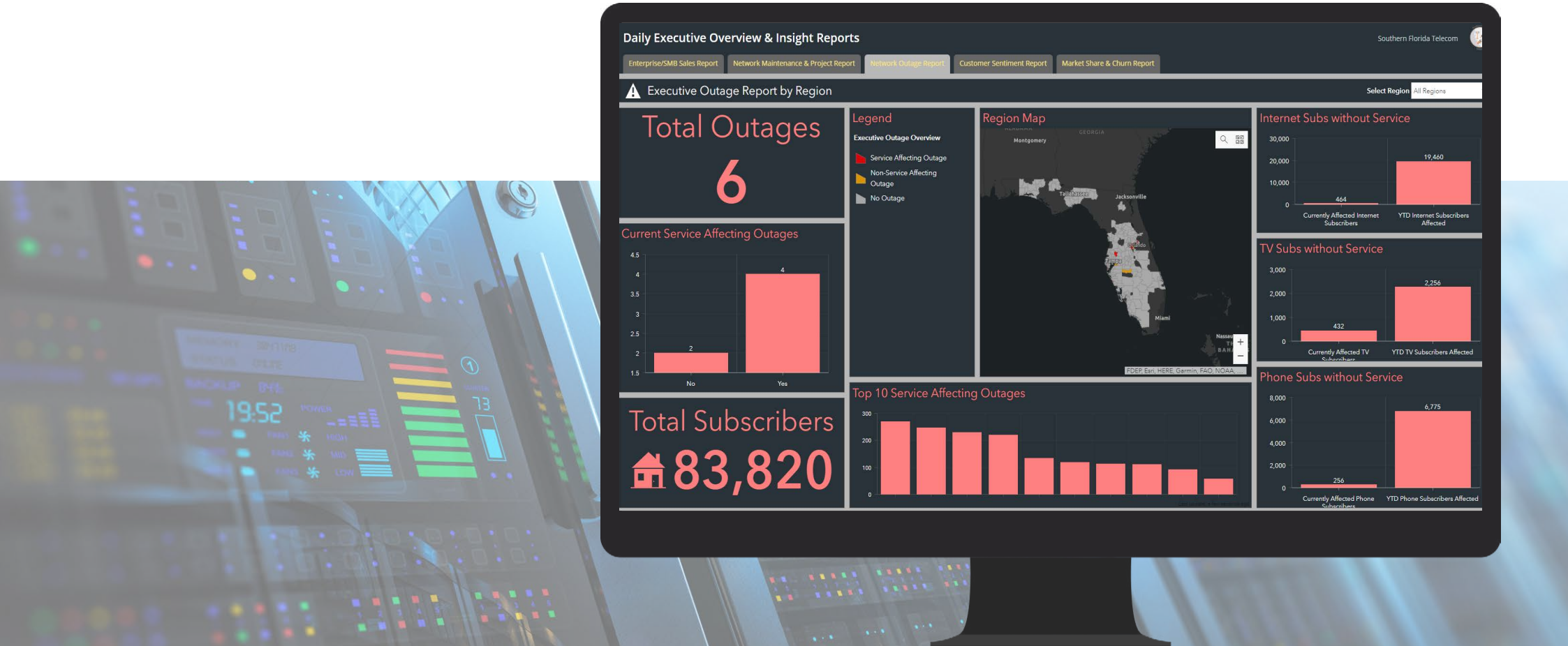
Results Using ArcGIS

- More than 3,100 signal updates to reconcile inventory
- Faster network routing and readiness to submit permits
- Reduced cost of network construction
- Reduced time for municipal and regulatory reporting
- Improved field operations

7 Summary

Esri's ArcGIS technology can help telecom organizations and CSPs optimize their resources using location intelligence and GIS technology. ArcGIS unifies OSS/BSS through a common understanding of location and maps, while enhancing situational awareness through real-time net ops and field operations.

Through using ArcGIS solutions, telecoms can digitize workflows and take advantage of digital network models and geospatial visualizations and analytics. With ArcGIS, meet your organization's next gen network initiatives and digitally transform your business.



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Esri, the global market leader in geographic information system (GIS) software, location intelligence, and mapping, helps customers unlock the full potential of data to improve operational and business results.

Founded in 1969 in Redlands, California, USA, Esri software is deployed in more than 350,000 organizations globally and in over 200,000 institutions in the Americas, Asia and the Pacific, Europe, Africa, and the Middle East. Esri has partners and local distributors in over 100 countries on six continents, including Fortune 500 companies, government agencies, nonprofits, and universities. With its pioneering commitment to geospatial information technology, Esri engineers the most innovative solutions for digital transformation, the Internet of Things (IoT), and advanced analytics.

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