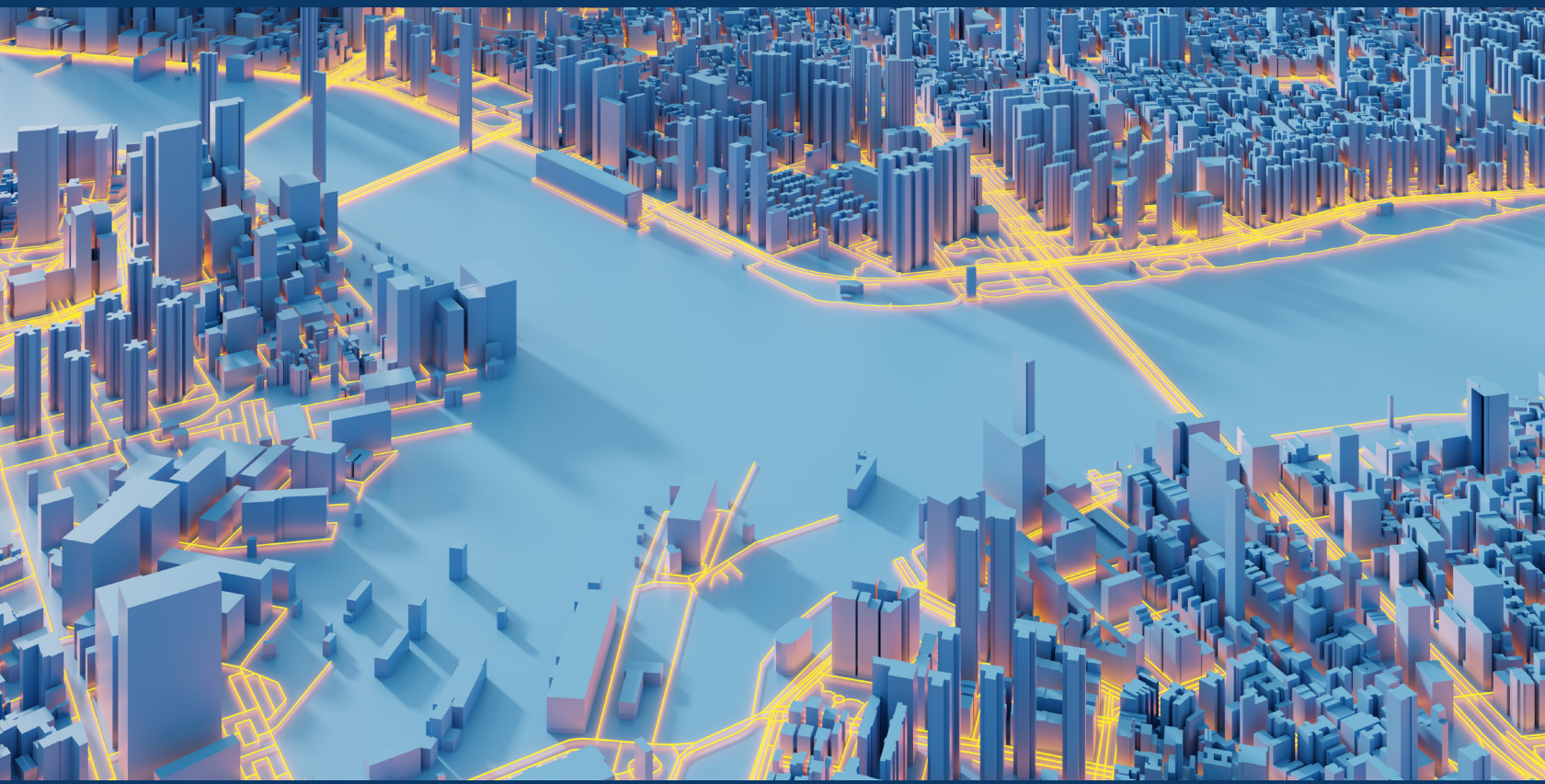

Planning and Engineering for Telecommunications

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Introduction

Employing a Modern GIS for Next Generation Work Planning and Engineering in Telecommunications

As outlined in Esri's ebook Location Intelligence for Telecommunications, ArcGIS® software can help telecom organizations and communications service providers (CSPs) 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 maps and a common understanding of location while enhancing situational awareness through real-time network and field operations.

For CSPs and telecom organizations, utilizing ArcGIS as a foundation for the planning and engineering of next generation networks is essential for meeting customer demand and operational needs. Through streamlined workflows, real-time communications and collaboration, advanced analysis of demographics and socioeconomic data, and the modeling of current network assets against future growth and consumer needs, organizations can achieve complete situational awareness and understanding of their operational environment before taking action.

Because ArcGIS serves as a single, authoritative, interconnected, and integrated system for all workgroups in a telecom organization, teams can be confident they are making intelligent decisions, establishing competitive advantage, maximizing return on investments, and enhancing the long-term customer experience during the planning and engineering of next generation broadband networks.

Comprehensive GIS Overview

Global demand in the telecom industry and the explosion of data available require vastly superior ways of managing, examining, and communicating telecom information.

To meet demands and provide broadband networks to customers as fast as possible, the global telecom industry needs a vastly better way of proactively planning and engineering scalable and sustainable next generation telecommunications networks. Telecoms require solutions capable of providing comprehensive and real-time situational awareness to planning and engineering teams while allowing for powerful insight and engagement on any device, anywhere, at any time. As the requirements in the telecommunications marketplace have evolved, ArcGIS has scaled to meet and exceed industry needs and provides the capabilities and resources telecommunications organizations need.

ArcGIS is a comprehensive GIS, which means it contains all the elements needed to meet telecom challenges, not just make conventional maps faster. It maintains key information, analyzing and distributing it to everyone who needs business intelligence.

These capabilities create a seamless experience when using the following systems:

- System of record—Data management and integration
- System of engagement—Sharing, collaboration, and dissemination
- System of insight—Analytics, models, and data exploration
- Real-time Internet of Things (IoT) data—Measurement and status
- Location services—Developer tools for integration and customization

The industry is asking for new digital tools that show the complete picture to planning and engineering teams so they can proactively make intelligent decisions in real time. ArcGIS does things traditional maps can't touch. ArcGIS employs an unparalleled data model and consumes most any form of external data. The rich data supports out-of-the-box analytics and the latest artificial intelligence (AI) and machine learning tools. The results are easily exploited with engaging apps personalized to each user's role. These apps provide focused capabilities and align to how people work today.

With ArcGIS, planning and engineering teams are best suited for transforming their operations from a workflow that is traditionally reactive into one that is proactive and includes predictive-state capabilities scalable and agile enough to meet not only the needs of today but also future utilization and growth demands.

ArcGIS–Complete GIS for Telecoms

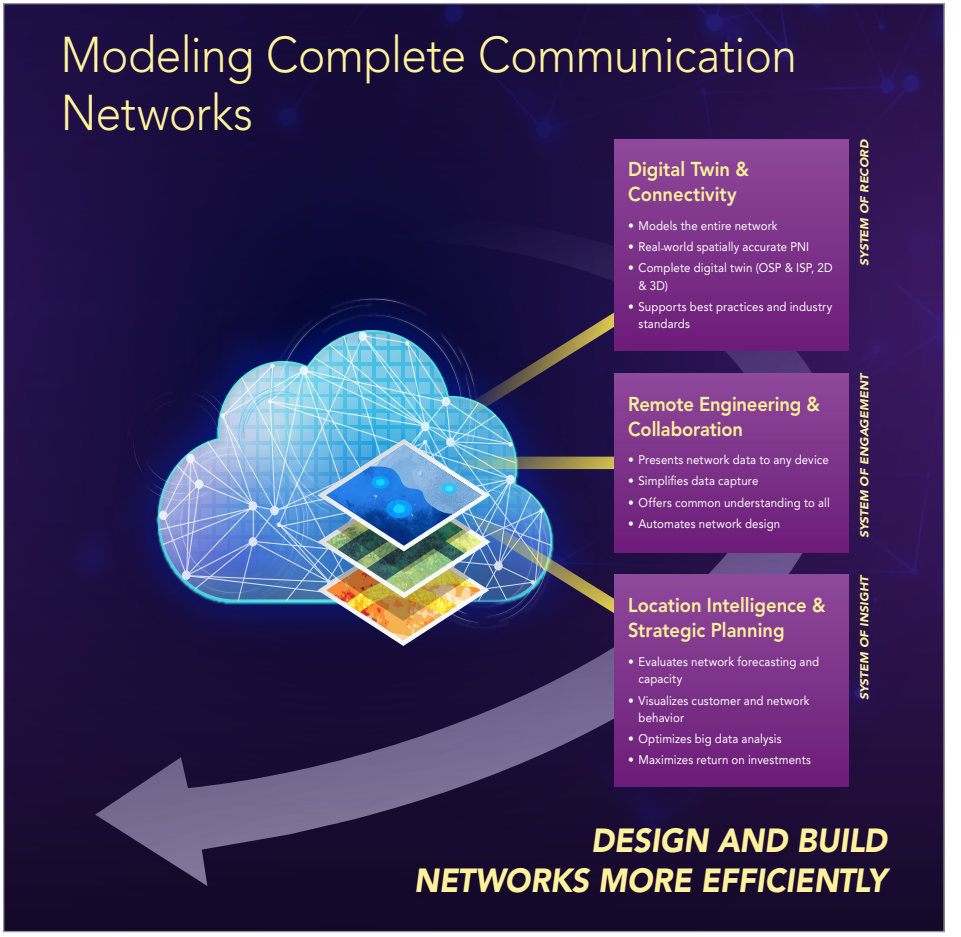
Supports Three Fundamental Systems

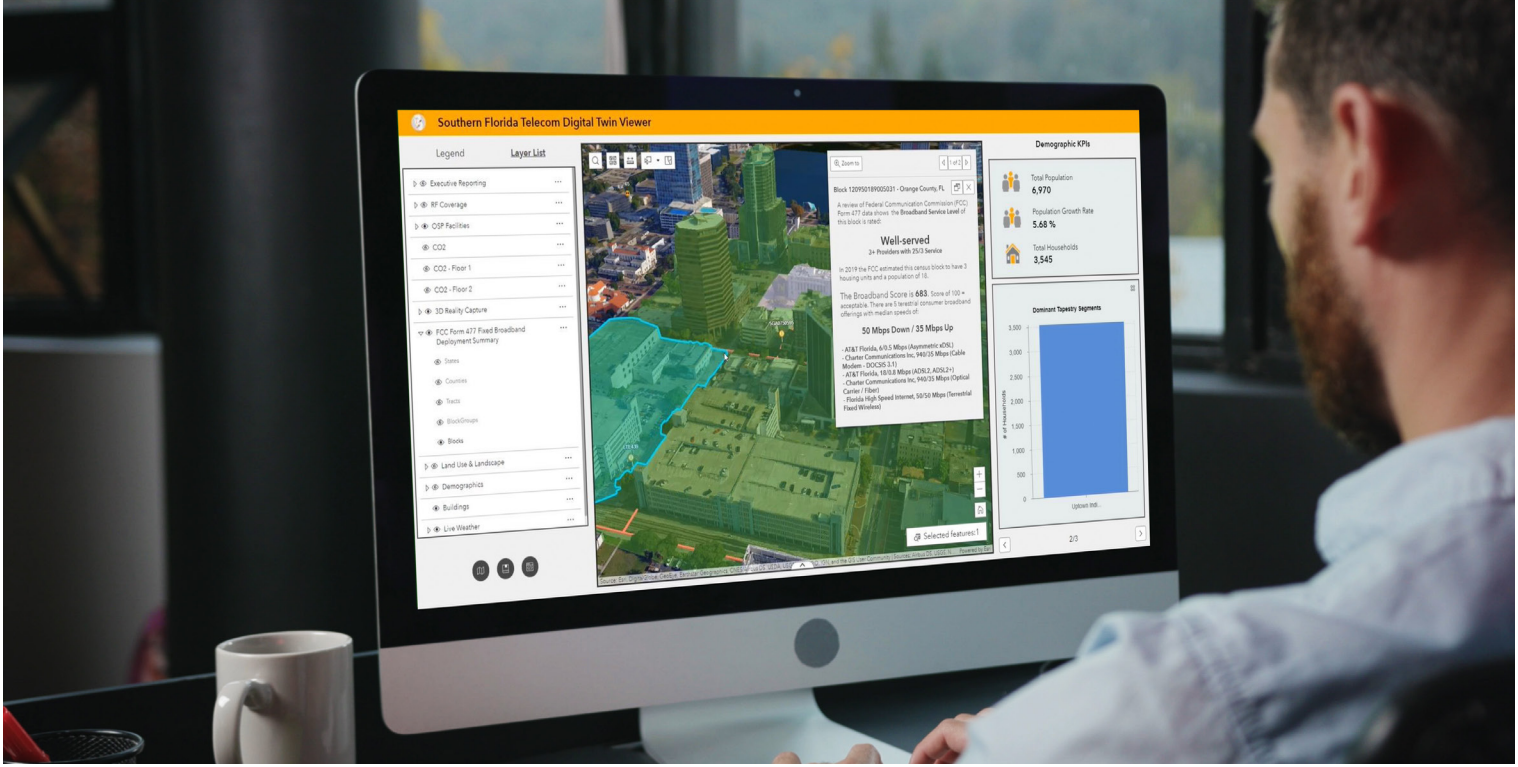
Planning and Engineering Using ArcGIS

Communication service providers need new tools to help them be more strategic and proactive in their planning and engineering; reduce time to market through remote engineering; and maintain better project operational awareness as they invest in and build out satellite technology, fixed wireless communication, 5G, Data over Cable Service Interface Specification (DOCSIS) 4.0, software-defined networks (SDN), and expanded fiber to deliver next generation broadband networks.

ArcGIS provides planning and engineering teams with real-time situational awareness and decision-making through data and information connectivity and integration, allowing for creation of a transformational and insightful digital twin environment.

ArcGIS technology provides the essential modeling and analysis tools to enable users to identify market opportunities and assess existing capacity, helping decision-makers invest where they can maximize their return on investment (ROI). With ArcGIS, organizations gain a single network view to better manage build-outs, from planning and engineering through construction, and for as-built status.





Digital Twin and Connectivity

Simply put, a digital twin is a virtual representation of real-world assets and information. It is easily created in ArcGIS from the information and records that organizations utilize in their daily operations. Both location-based and nongeospatial data and information are integrated into a common system for organizational awareness and decision-making.

In telecom, a digital twin provides planning and engineering teams—as well as all other workgroups—with a shared view. This allows insight into how customer records, network design maps, capacity and utilization metrics, coverage maps, customer experiences, operations key performance indicators (KPIs), and more, impact and guide operations. This real-time situational awareness greatly improves the capabilities and workflows of planning and engineering teams.

When integrating a network system of record, ArcGIS models the entire network with spatially accurate data. It has the tools to model fiber, coax, wireless, and hybrid networks as they really are on the ground. ArcGIS offers connectivity modeling of assets in two and three dimensions, leveraging and supporting best practices and industry standards.

CASE STUDY 1

Actavo

The National Broadband Ireland project aims to bridge the digital divide between cities and rural areas in Ireland, and it will deliver high-speed internet connectivity to 537,000 buildings, connecting 1.1 million people. However, before 146,000 kilometers of new fiber-optic cable could be laid, Actavo needed to undertake surveys across the country.

Actavo deployed solutions to enable the following:

- Planners use ArcGIS Online to review survey areas and plan survey routes, ensuring there is adequate access to poles and other assets that need to be surveyed.
- Surveyors use ArcGIS Collector and ArcGIS Survey123 to complete map-based surveys on tablets while in the field and upload survey data, making it accessible back at the central project office in Dublin.
- Specialist designers use ArcGIS Pro to design the broadband network, taking advantage of advanced programming functionality to automate many aspects of the design process.
- Managers use ArcGIS Dashboards to view the status of surveys, monitor individual and team progress against surveying targets, and gather data for client reporting.

Benefits gained include the following:

- Highly efficient nationwide surveys
- Significant annual cost savings
- No technology barriers for new surveyors
- Reliable data collection everywhere in Ireland
- Clear visibility of project performance

Remote Engineering and Collaboration

To meet the demands of today's consumers, telecommunications organizations need the capability to connect customers faster than ever. Meeting this challenge requires improved decision-making capabilities, streamlined processes, and real-time information and communication as well as proactive and predictive efforts where possible.

Through leveraging ArcGIS, telecoms can reduce the number of engineering team field visits by bringing the field to the engineer. Planning and engineering teams can access real-time and geospatially accurate field information directly on the engineer's desktop. With integrated mobile applications, office and field teams can collaborate and remotely collect field data, develop designs, create final engineering documents, and submit permits with a minimum number of field visits.

ArcGIS provides a shared view, allowing organizations to limit unnecessary expenses as well. Teams can rapidly perform project scope analysis, high-level desktop surveys, and proposed designs via the desktop. This allows teams to spend limited time and expense in gauging the viability of a project and ensures that only equitable work is issued to the field for detailed field engineering, pole inspections, final designs, and project permitting.

Location Intelligence and Strategic Planning

Since almost everything in telecommunications can be tied to a location, different departments can leverage the insight GIS provides throughout the entire organization. For instance, when teams are planning and engineering a network, it is essential they know the answers to questions impacting critical decisions for serving customers now and in the future.

Whether CSPs are planning a greenfield area or upgrading networks in an existing service area, they need to evaluate the revenue potential of new designs against current network infrastructure, bandwidth capacity, and long-term scalability. ArcGIS is ideal for this type of analysis, with optimized tools for big data geospatial analysis to visualize subscriber network behavior.

ArcGIS can provide insight and help organizations address questions such as these:

- How will environmental features impact quality of service?
- Where will population increase within the region, and how will capacity demands change?
- What will the permitting needs be for this build?
- Is this the optimal route, and is it cost-effective?
- What potential locations provide the best coverage and highest quality of service?
- How can we ensure sustainable practices, such as minimizing environmental impacts?

Companies can leverage market-leading capabilities to analyze and model projects, create forecasts for capital growth and operating expenses, create strategic project plans and generate estimates against current real-time network infrastructure, or gauge potential impacts on environmental features. This allows teams to gain in-depth understanding before taking action throughout the network management life cycle.

CASE STUDY 2

DDSI Global

At issue was the legacy GPS units' ability to work under canopy, where they lost signal. This left crews with the time-consuming alternatives of using either a total survey station or tape measures. Sometimes, drafters couldn't decipher the field data, and the crew had to revisit a site.

ArcGIS Collector was paired with Eos's laser mapping solution. The solution allows crews to map utility assets by either occupying them physically or performing laser offsets from afar. It requires the following:

- ArcGIS Collector for data collection
- An Eos Arrow Global Navigation Satellite System (GNSS) receiver for location accuracy
- LTI TruPulse 200X laser range finder for offsets
- Eos Tools Pro for offset measurements
- An iOS device on which to run Collector

"We needed an alternative solution to our field data collection methods," DDSI project manager Mike George said. "The difference between having to survey a site once or twice is often the difference between making a project profitable or breaking even."

Summary

With ArcGIS, telecommunications organizations throughout the world are best prepared for the planning and engineering of modern telecommunications networks. Telecom organizations can leverage ArcGIS as a solid foundation, allowing for proactive and predictive efforts, simplified real-time processes, and clarity of quality information for informed decision-making in network operations and management. With ArcGIS, organizations have the comprehensive ecosystem of resources necessary for successfully meeting the needs of today's consumers while ensuring networks are capable of meeting the network demands of tomorrow.

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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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