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Programmatic Approach Can Deliver Cost Certainty For Utility

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Private broadband wireless networks provide better control options and are increasingly the solution utilities look to. However, telecommunications build-outs are often logistically and geographically complex. These challenges are forcing a new look at long-held assumptions on how best to deliver multiyear, multisite, capital-intensive communications projects.

Utilities have not historically acquired spectrum in a competitive landscape to build utility-grade telecommunications networks. This is now changing. Orders from the Federal Communications Commission (FCC) have opened up a number of spectrum options, making private wireless networks for utilities a realistic option. However, even with spectrum available and seemingly straightforward technology selections, building private utility-owned broadband wireless systems based on 4G long-term evolution (LTE) technology will not be easy without a programmatic approach.

For utilities, a private long-term evolution (PLTE) network will eliminate the need for multiple communications systems at substations, control centers and remote locations. Operational controls, security systems and voice systems each currently have different single purpose communications networks. Upon conversion to an LTE network, this issue will be resolved as essential communications not currently connected to a fiber-optic network will have a single communication infrastructure, thus creating increased reliability and operational efficiencies.

These efficiencies are multiplied exponentially as communications-based sensing and control assets are installed and operated by utilities. It's easy to understand the excitement being generated by the prospect of new, more effective and cost-efficient telecommunications systems. This potential is why many utilities will soon be launching telecom projects at a scale previously unheard of in the utility space.

However, these projects are unlike any other capital improvements utilities have tackled.

While the nuts and bolts of constructing a telecommunications project on a single site may not be overly complex, this can change dramatically when construction installations occur simultaneously on geographically different sites that could tally in the hundreds throughout the course of a year. Different terrains, multiple requirements for permitting

and space considerations all add to the complexity and uniqueness construction teams face on each site. Then, add the complications of working with the information technology/operational technology (IT/OT) groups placing the communications backhaul equipment, the LTE specialists bringing their skill sets, and frequent events requiring troubleshooting on-site. It's easy to see how the complexity of deployment can grow significantly.

While the major telecommunications carriers have learned how to work around these deployment concerns, utilities have traditionally not had to worry about them. Optimizing coverage, cost and functionality for an LTE network is significantly different from anything utilities have faced before. Also, the software models, while highly accurate these days, don't always translate to real-world performance. Who holds that risk? Utilities are about to enter a whole new ballgame and it is important to have a good understanding of all the variables caused by multiple stakeholders before getting started.

Program Approach is Needed

A program is generally defined as a set of related measures or activities with a particular long-term aim. For utilities, this is typically a multiproject, multiyear effort of such a size, scale and complexity that the owner is unable to execute the effort solely with internal resources. Programs aim to achieve a level of process efficiency and standardization that creates manageable expectations from a financial, performance and regulatory standpoint.

When performing telecom build-outs, logistics, cost reporting and accountability — not to mention legal, regulatory and environmental considerations — all make a strong case for a programmatic delivery method.

Telecom projects for larger utilities will necessitate construction of hundreds of towers on new sites, all of which will require extensive studies to identify the optimal spots so that the utility-grade PLTE network can provide the necessary coverage. Planning studies, followed by permitting and potential land acquisition, will take time and must be done with great care. A programmatic approach is uniquely suited to develop an orderly progression of work on project sites, a necessity when considering the schedule flexibility that will be needed if work on a few sites does not go smoothly.

Though many cellular sites can be built on utility-owned property, many others will need to be co-locations or new construction. These sites, including some utility-owned sites, will require new or modified zoning and environmental permits. Some may require further studies for endangered species, soil remediation or compliance with wetlands or other regulations. A viable strategy might be picking the easy wins first, to show early success, while more difficult sites are developed over time.

Telecom projects should start with early completion of a high-level radio frequency (RF) coverage study. This will allow the utility to understand the site requirements for its market and lock down sites early. Next will come site loading studies and a process to narrow search rings into available locations, followed by permitting, engineering and construction.

When initiating the coverage study, it's essential for the utility to have a clear vision of the level of coverage it wants to achieve. While most desire ubiquitous coverage of service territory, that is likely to drive the overall costs too high, making it difficult for the business case to gain approval. Wide area PLTE networks are built over years, so it is important to review and evaluate all the potential savings and benefits achieved by deploying this type of network. A plan that allows for the highest benefits to be achieved first is a highly recommended part of a long-term strategy to reach all areas of the utility system.

Clearly Articulate Program Goals

This early phase is the right time to thoroughly vet the goals of the program. It will pay dividends to spend extra time and money as necessary to develop a long-term strategy. Increasing upfront planning and engineering budgets by 10%-20% can lead to substantial cost savings as the construction phase proceeds over subsequent years. This will far exceed any additional dollars spent during the initial development phases. These savings will be realized from more efficient placement of towers and a realistic expectation of the appropriate level of coverage. Thoroughly working through the plan upfront will save on adding towers later — a step that would cause drastic cost increases.

Though certain elements and steps of the program can run in parallel, most project elements should be executed in sequence. For example, all planning and preparation for the network data center should be complete before ordering the equipment. A data center strategy should include geo-redundant facilities, virtualized platforms and distributed architecture, among other details. Planning is essential to properly deploy this critical infrastructure.

Then, a sequence for site construction should be planned while establishing the materials handling plan. Once the deployment of sites begins, planning should be complete for how to handle all the logistics that will be needed to keep the many separate teams moving in lockstep. These steps should also be planned around long-lead items to be procured with consideration of construction durations. Jumping ahead to other project details before current planning is complete can result in a number of inefficiencies.

The Case For Standardization

Every program is geared toward achieving efficiencies that provide cost savings and meet schedule targets. This requires standardized processes. The more standardized a program or portions of a program can be, the greater the cost efficiencies that can be realized. An approximate ratio of 80% standardized to 20% customized processes is typically a good target and can be applied to phases like:

- Real estate acquisition
- Environmental assessments and permitting
- Engineering/architectural design
- Construction management
- Commissioning

Program controls go through the gamut of submittals, requests for information (RFIs), schedules, safety workflows, all stages of permitting, preliminary and detailed design, procurement, all phases of construction, and final commissioning. These workflows cross many industry sectors and can be universally applied to programs, ranging from airport terminals and wastewater system upgrades to telecommunications and utility power delivery infrastructure. All require an approach to each program with contractual parameters that define just what a standard solution looks like.

For telecommunication programs involving hundreds of locations and a project scope that will take many years to complete, the ability to standardize creates economies of scale that reduce costs for the utility. One example is the ability to utilize a GIS program as the backbone for developing site-specific design packages. This allows engineering designs to be geospatially located and enables multiple people to review design questions or issues as they arise. By making changes in an ArcGIS platform, any revisions needed can be made prior to creation of construction drawings. This eliminates the costly utilization of CAD resources to modify detailed design drawings for site-specific construction packages.

Telecom Projects are Complex

With a build-out of this size, scale, complexity and variables, program management, and potentially an engineer-procure-construct (EPC) approach, will be a big advantage.

For a telecom program with multiple phases in construction, streamlined equipment delivery is one of the most important elements to manage. The program manager must calculate how equipment is going to be “racked and stacked” at the warehouse. Then:

- How will equipment be staged for dispersal?
- How many construction crews are needed?
- Does the construction contractor have the flexibility to ramp up resources as projects accelerate?
- How will the field testing/commissioning be handled for multiple sites simultaneously?

There should be a flow of sites that start coming online. As one is ready to build, the program manager must start coordinating notices to proceed. If a site is being leased, then additional details must be coordinated with the leasing agency. Some of the towers will need strengthening to support the additional weight of communications equipment, all requiring extensive site-by-site evaluations.

One key item is deciding whether crews will build at the cell site, or just be ready to install finished modules that are prebuilt in the factory or warehouse, then simply connected at the site. Warehousing capacity is among the most critical elements because it is key to timely delivery of the right equipment and components.

The construction plan should emphasize a continuous flow. Perhaps there might be only a small number of skilled craftsmen certified to work on towers. That would place a premium on tight scheduling, so personnel are constantly working, with equipment delivered and ready when the workers arrive on-site. All work orders need to be buttoned up, with equipment deliveries double- and triple-checked before a team is sent out to build a site. If just one necessary component is missing, it could mean a wasted day with full pay for an inactive crew. For secure sites, the program manager will need to verify that any contractors have access before arriving on-site, or this could also lead to a wasted day.

Meeting in the Middle

The utility should see program managers, contractors and other stakeholders as partners and vice versa. An adversarial relationship can be a sign of trouble.

A contractor that insists the project can only be done one way should be seen as a red flag. Likewise, a utility that insists it knows the best way to execute a project, with no input from the contractor, also should be viewed as a warning sign.

A partnership based on trust is the key for successful contracting relationships. As always, trust must be earned. For utilities it can come from working with a program manager or contractor with proven experience and results that speak for themselves. For program managers and contractors, it centers around showing utilities that they are likely to see the greatest potential for benefit when working step by step with the contractors to help them achieve their program goals.

It is difficult for contractors to accept the risk for results they are unable to manage or transfer. With telecom projects where it is a given that a certain percentage of assets will not perform as modeled, flexibility is a must. Contractors will likely agree to accept schedule and permitting risks pertaining to known, agreed-upon sites. Beyond that, if both sides can agree on how additional sites will be funded, it is important to establish who decides they are needed, and how the schedule will be impacted. These considerations should be defined in a middle-ground contract.

Sharing Risk and Reward

A contracting strategy that is focused on achieving the most ideal outcome over the life of a program requires a blend of risk- and reward-sharing.

Successful telecommunications programs require deployment and testing. It is almost always the case that anywhere from 5%-10% of coverage will not perform as expected. Digital models showing how RF signals will interact with terrain, buildings, foliage and obstacles may not reflect actual field performance. This leaves the utility and contractor with three options:

1. Over-design the Radio Access Network (RAN) to see that all areas have high signal levels and coverage. This will create a much higher cost for the utility in deploying more sites as a result of increasing the density of antennas and equipment needed to cover a small percentage of underperforming or uncovered devices.
2. Accept that a small percentage of these devices will not perform as expected. Under this option, it may be prudent to establish a budget that accommodates additional funding for a small percentage of extra sites that may be needed.
3. Agree that the devices that do not meet the funding requirements can be served by alternative solutions such as a public carrier.

If the program starts with the wrong mindset, it is easy to envision how this could create a contentious relationship between the parties. The utility may feel like it is paying for something it isn't getting, or the contractor may perceive it is on the hook for a performance guarantee that may not be 100% accurate. If all the risk is on the contractor, overbuilding will be the result. If all the risk is on the utility, the initial design may be oriented toward complying with constraints of the funding mechanism, resulting in an inadequate number of sites to meet the utility's requirements.

Either way, the project is at risk of failure.

Define What Success Looks Like

A strong partnership between the contractor and utility — keeping the interests of both in alignment — will be the foundation for success. Contractual performance guarantees need to be approached with an understanding of the realities involved in large-scale wireless deployments.

On other types of capital programs, it is common for utilities to expect the contractor to accept risks associated with end-to-end system performance, such as equipment not working as designed, or other performance issues. On telecom projects, this risk mitigation strategy is likely to result in the utility paying more to the contractor upfront and per-unit as compensation for the risk the contractor is carrying for nonperformance.

There are relatively simple contracting approaches, based on shared risks and rewards, that can align interests at the outset.

It all starts with both parties agreeing to a goal of acceptable performance of the telecommunications network at the lowest cost. This requires agreed-upon benchmarks for network performance and similar agreement on a project approach that will specify the number of sites needing to be built for certain coverage levels.

Permitting is one aspect of program execution that could benefit from a structure for sharing risk and reward. It starts with defining clearly the party responsible for obtaining all permits. If a permit is missed or not issued on time, it could have a large impact on shared savings. Who pays for this missed permit? If it is clearly defined that one party is responsible for applications and obtaining timely approvals, a powerful performance incentive is in place.

For projects that will most likely involve multiple jurisdictions and require many layers of regulatory approvals, de-risking to leverage resources and control costs is a sensible solution. This approach could potentially involve setting up a contingency funding option that creates the flexibility for the utility to agree to taking on some shared expense if it wants to build more sites and achieve more coverage than specified in the initial contract. This is achievable if all parties are working toward the same targets.

Part of the shared risk/reward structure is to determine, upfront, what success looks like. For some utilities, having the most sites built within a not-to-exceed budget might be the best value. For other utilities, an exact number of sites may be predetermined, with the goal then to build that fixed number of sites at the lowest cost. Regardless of the approach, a program manager should be able to demonstrate value based on means and methods for executing either strategy. A lack of agreement on what "success" looks like will likely cause the program to be marred by less-than-ideal execution, a large number of change orders and overpayment for construction sites.

The program will always be executed more efficiently when there is alignment on risk-sharing. A shared contingency structure with a set amount of funding held in reserve could be a solution that has merit in some situations where the actual coverage doesn't meet initial expectations.

With shared contingency agreements in place, all parties can agree if, for example, another tower is required for installation of RF equipment. This gives the team a clear understanding of specified heights and how and where to add a site to fill in coverage if needed.

If the parties agree to fund unanticipated issues out of some type of shared contingency pot, then both the utility and program manager can make that decision together because it's good for the project. The goal should be to aim for a happy medium where, if both agree that an additional tower is needed, it will be built at cost or cost-plus. It is important to jointly decide upfront how to de-risk the unknowns, so that the ideal outcome is achieved. Projects that have this shared approach tend to be win-win for both the utility and the material and construction providers.

Budget Review Mechanism

In most cases, programs can benefit from having a standing budget review board that decides the merits of project variations and makes the decisions on whether to approve. The board typically addresses questions such as: Is that extra tower and that marginal coverage improvement worth the cost of X number of additional assets?

These projects will tend to follow the 90/10 rule, where money is spent most cost-effectively on assets that will result in 90% of coverage. This means that the investment needed to achieve the remaining 10% of coverage will likely be far higher than the cost-per-device on the first 90%. A collective decision should be made by the team on whether the assets needed to achieve that last 10% of coverage are worth the investment.

If these decisions are made unilaterally, resulting in costs borne primarily by the contractor, relationships will deteriorate quickly. However, a budget review board composed of key senior managers and executives, combined with people directly involved in the project, can produce joint reviews and decisions based on unbiased facts.

This type of program is different from constructing a building, substation or overhead line. This project will be based on modeling to get the best intentions for an accurate view on how an RF signal propagates through the air. Is it going to get absorbed? Is it going to get reflected? Or is something else going to happen? In any of these scenarios, the end device isn't achieving the performance level the model projected.

It is relatively easy to agree on what those inputs are but the reality is not every device will perform in the way the model showed. When these instances occur, having a partner with processes in place, such as a budget review board, will allow the project to easily pivot and determine if coverage is good enough or if additional sites are needed.

Aligning Success Metrics

Success metrics are aligned, initially, by working with a program partner that has experience in executing large, multisite programs. Partners with this type of experience know programs can be executed successfully if the overall goals are developed in conjunction with the utility. By working together to share in the program goals, the utility partner will know there is profit to be earned if the utility achieves its goals. This all works toward the best interests of the utility — with no incentives to add higher-cost sites, unnecessary equipment or other changes in an effort to make a few extra dollars.

Shared-savings contracts are increasingly utilized as an approach to help facilitate success and a team approach to program execution. Under this formula, a budget is established with agreement among all parties on thresholds of savings to be split if the program comes in under budget. For telecom programs, the utility and program manager would agree to a contractual level of coverage and then, if additional sites are needed, both parties would sign off on the additional expenditures, as this would likely decrease the volume of shared savings. This is one of the best arguments in favor of partnered contract structure, as the utility can share some of this risk with its partner(s), creating additional value for the utility.

The key for the utility is to find a program manager that believes in working as a partner and has capacity and experience in managing multiple stakeholders and diverse supply chains. In looking for contractors like these, the best clue is to find those who are already familiar with the utility industry and/or have a long history of successful utility projects.

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