Alcatel·Lucent

STRATEGIC WHITE PAPER

Managing Communications Change in Utility Operations – A New Approach

Change is being forced on the utilities industry. Business drivers range from stakeholder pressure for greater efficiency to the changing technologies involved in operational energy networks. New technologies such as Intelligent Networks or Smart Grids, Distribution Automation or Smart Metering are being considered. The communications network is becoming the key enabler for the evolution of reliable energy supply. However, few utilities today have a communications network that is robust enough to handle and support the exacting demands that energy delivery is now making.

It is this process of change, including the renewal of the communications network, that is vital for each utility's future. But for the utility, this is a technological step change requiring different strategies and designs, as well as new skills. The problems facing today's utility include understanding the new technologies and assessing their capabilities and applications. In addition, the utility has to develop an appropriate strategy to migrate legacy technologies and integrate them with the new infrastructure in a seamless, efficient, safe, and reliable manner.

This paper highlights the benefits utilities can realize by adopting a new approach to their customers' needs and engaging a network partner that will take responsibility for the network upgrade, its renewal and evolution, and the service transition.

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Introduction

The energy utilities industry is one of the more conservative industrial sectors. Given the safety issues at stake and the importance of the energy they produce and deliver, this native conservatism is natural. This means that the industry is generally a late adopter of new technologies. But the pressures to change this way of life are becoming more intense.

Stakeholders, whether they are private shareholders or public corporations, are requiring improved asset efficiency from the utility. Also, regulators and users are increasingly demanding greater reliability of the energy supply, while governments are insisting on greater energy efficiency as part of their environmental initiatives. In addition, end customers are looking for enhanced offerings from their energy providers – for example, more accurate meter readings, and in-home displays that allow customers to view their energy expenditures in real-time.

These conflicting pressures mean that the industry is constantly looking for new ways to improve energy efficiency without jeopardizing safety or reliability. Increasingly the industry is investigating the use of intelligent energy networks, or smart grids, to assist in achieving better reliability, increased visibility, and more efficient operations.

The Pressure to Change

The Move to Smart Grids

The intent of smart grids is to provide a better control of the production, transport and delivery of energy. This is realized in two ways:

- **Better real-time control** – Ability to remotely monitor and measure more closely the state of energy flows and then manage those flows and the assets carrying them in real-time.
- **Better predictive management** – Better able to monitor the condition of the different elements of the network, to predict failure, and direct maintenance. Focus is on being proactive to real needs prior to a potential incident, rather than being reactive to incidents, or performing maintenance on a repetitive basis whether its is needed or not.

These mechanisms imply more measurement points, remote monitoring and management capabilities than exist today. And this requires a greater reliance on reliable, robust, highly available communications than has ever been the case before.

The communications network must continue to support operational services independently of external events such as power outages or public service provider failure, yet be economical and simple to maintain. Unfortunately, the majority of today's utility communications implementations fall far short of these stringent requirements.

Changing Communications Environment

The design template for the majority of today's energy infrastructure was developed in the 1950s and 1960s – and the same is true of the associated communications networks.

Typically these communications networks have evolved into a series of overlays, often of different technology types and generations. For example:

- Protection tends to use its own dedicated network. The physical realization varies widely, from tones over copper via dedicated TDM connections to dedicated fiber connections. These generally use a mix of privately owned and leased services.
- SCADA (Supervisory Control and Data Acquisition systems) generally still uses modem technology at speeds of between 300 baud to 9.6k baud. Again, the infrastructure is often copper or TDM running as one of many separate overlay networks.
- Operational voice services (as opposed to business voice services) are frequently analog on yet another separate network.

Historically, there were good operational reasons for these overlays. But changes in device technology (for example, the evolution towards e-SCADA based on IP protocols), as well as the decreasing support by communications equipment vendors of legacy communications technologies, means that the strategy for these networks has to be reassessed. In addition, the increasing demand for further operational applications (for example, condition monitoring or CCTV, both to support substation automation) requires a more up-to-date approach to networking.

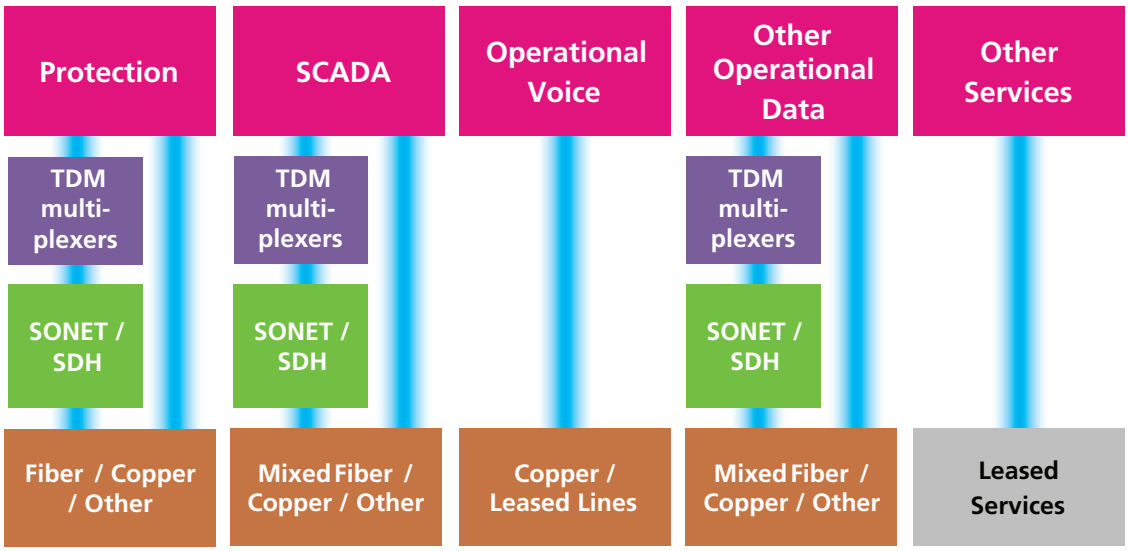

Figure 1. A typical view of a legacy operational communications infrastructure

EVOLVING TO TOMORROW'S NETWORK

With the exception of protection services, communications between network devices and to the network control centers are evolving towards IP-based networks. The benefits of this simplified infrastructure are significant and can be measured in terms of asset utilization, reduced capital and operational costs, ease of operation, and the flexibility to adapt to new applications. Consequently, utilities will find themselves being forced to seriously consider the shift to a modern, homogeneous communications infrastructure to support their critical operational services.

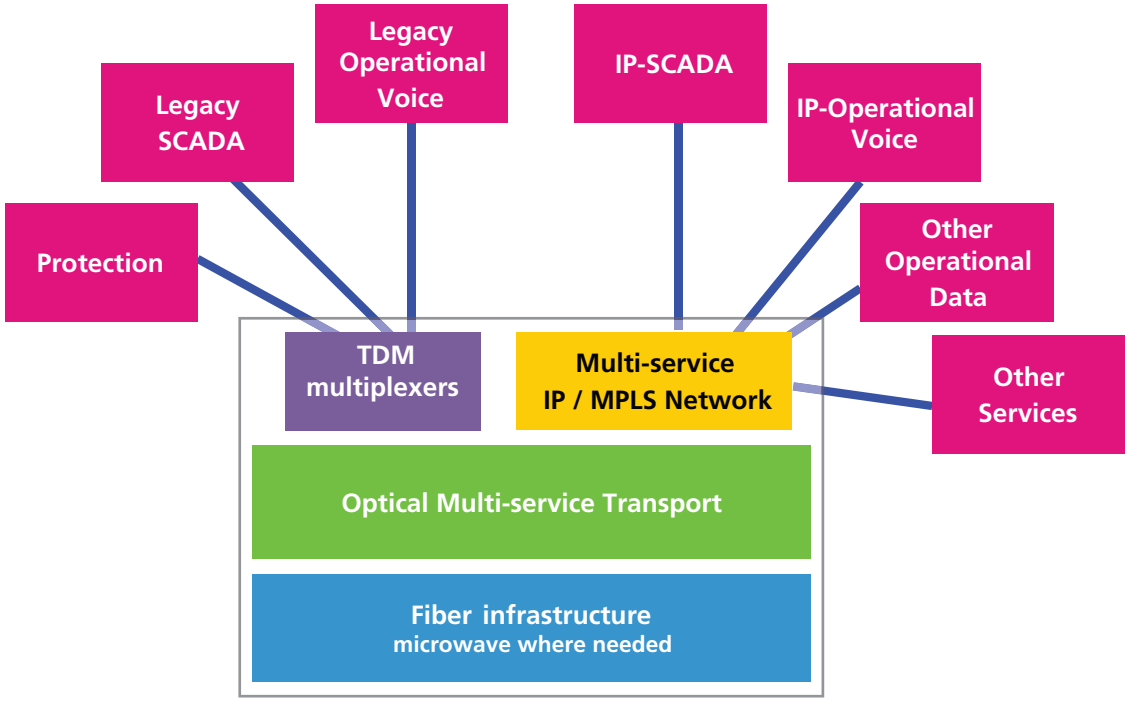

Figure 2. A typical view of a modern operational communications network

Organizing for Change

As noted above, there are many cogent reasons to transform utility communications to a modern, robust communications infrastructure in support of operational safety, reliability and efficiency. However, some significant considerations have to be addressed to achieve this transformation.

- **Network strategy** – It is almost inevitable that such a new infrastructure will cross traditional operational and departmental boundaries within the utility. Each operational department will have its own priorities and requirements for such a network and, traditionally, each wants some, or total control. However, to achieve real benefits, a greater degree of centralized strategy and management is required.
- **Architecture and design** – The new network will require careful engineering to ensure that it meets the performance critical requirements of energy operations. It must maintain or enhance the safety and reliability of the energy network, as well as supporting the traffic requirements of other departments.
- **Planning, execution and migration** – The planning and implementation of the core infrastructure is just the start of the process. Each service requires its own migration plan and has its own migration priorities. Each element requires specialist technical knowledge and, for preference, practical field experience.
- **Operation** – Gone are the days when a failure in communications was rectified by sending an engineer into the field to find the fault and to fix it. Maintaining network availability and robustness calls for sound operational processes and excellent diagnostics before any engineer or technician hits the road. The same level of robust centralized management tools and processes that support the energy networks have to be put in place to support communications network, no matter what technologies are used in the field.

- **Support** – Although these technologies are well understood by the telecommunications industry, they are likely to be new to the energy utilities industry. This means that a solid support organization familiar with these technologies must be implemented. The evolution process requires an intense level of up-front skills and resources. Often these are not readily available in-house – certainly not in the volume required to make any network renewal or transformation effective. Building up this skills and resource base by recruitment will not necessarily yield staff who are aware of the peculiarities of the energy utilities market. As a result, there will be significant time lag from concept to execution and considerable risk for the utility as it ventures alone into unknown territory.

Managing Operational Evolution – a Case Study

The energy utility industry is not the only industry that has encountered problems associated with a communications evolution strategy. Other market segments with mission critical communications have had to consider how to best face a constantly changing future. One of the mechanisms adopted by others has been to engage a networking partner that can help define strategy and take responsibility for managing the evolution and migration. This approach has also been successfully applied to the energy utilities market.

For example, one systems operator had a typical legacy communications infrastructure. It consisted of multiple parallel networks supporting a broad mix of technologies running on a variety of different physical infrastructures, ranging from owned fiber to leased copper pair services. There was no central strategy or management oversight of the overall project.

The energy network required a major upgrade to continue to meet regulatory expectations for the security of the energy supply. This was the driver for change. To economically achieve this, a corresponding communications upgrade was required. This utility did not consider communications to be a core discipline and decided to engage an external partner to upgrade its communications network.

The role of the partner was to:

- Devise a communications network plan that would meet the energy supply requirements for the next regulatory period
- Implement that plan
- Migrate the services while minimizing service interruption
- Build the management capability of the network
- Manage it to the end of the regulatory period.

The utility in this case realized a number of key benefits:

- Access to sufficient external skills and competent resources to define the strategy and the program, thereby avoiding lengthy internal recruitment and training programs
- Transfer of execution risk to the partner, while holding that partner accountable for its deliverables in a way that would have been impossible internally.
- Maintaining management control of the project through a carefully thought out governance structure, while ensuring the necessary flexibility to accommodate changing circumstances
- Releasing the utility's management attention to focus on the major issue – maintaining and upgrading the energy network.
- Leveraging the skills of the partner acquired in the execution of similar projects

Engaging a services partner does not mean ceding control through a rigid contract. Rather it means crafting a flexible relationship that takes into consideration these three factors:

- What is the desired outcome of the activity?
- What is the best balance of scope between partner assistance and in-house performance to achieve that outcome?
- How to retain the flexibility to accommodate change while retaining control?

Desired Outcome

This is probably the most critical element and must be well understood at the outset. For the case study cited above, the desired outcome was to rapidly enable the upgrade of the complete energy infrastructure without having to incur the upfront investment in a mass recruitment of the required new communications skills.

For other energy utilities, the desired outcome may be different. But if the outcomes include elements of time pressure, new skills and resources, and/or network transformation, then engaging a services partner should be seriously considered as one of the strategic options.

Balance of Scope

Not all activities have to be in scope. The objective of the exercise might be to supplement existing in-house capabilities with external expertise. Or it might be to launch the activity while building up appropriate in-house resources in a measured fashion – the Build-Operate–Transfer (BOT) approach.

In looking for a suitable partner, the utility seeks to leverage not only the partner's existing skills, but also its experience and lessons learned performing the same services for other utilities. Having a few bruises is not a bad thing – this means that the partner understands what is at stake and the range of potential pitfalls it may encounter.

Retaining flexibility and control

Retaining flexibility and control is a function of the contract between the two parties that should be addressed in their earliest discussions. The idea is to put in place the necessary management framework and a robust change control mechanism based on a discussion between equals from both organizations . The utility will then find that it not only retains full control of the project without having to take day-to-day responsibility for its management, but also that it can respond to change drivers from a variety of sources – such as technology advances, business drivers, regulators, and shareholders.

Outsourcing or partnering the communications transformation will yield benefits, both tangible and intangible. It must be remembered that there is no one standard "one size fits all" outsourcing product. Thus, the benefits accrued will depend on the details of the engagement.

Tangible Benefits

There are distinct tangible benefits that can be realized. They include:

- **Skills and resources –** A unique benefit of outsourcing is that it eliminates the need to recruit skills not available internally. These are provided by the partner on an as-needed basis. The additional advantage for the utility is that it does not having to bear the fixed costs once they are no longer required.
- **Offset risks** – Because the partner is responsible for delivery, the utility is able to mitigate risk. For example, traditionally vendors are not motivated to do anything other than deliver boxes on time. But with a well-structured partnership, there is an incentive to ensure that the strategy and design are optimized to economically deliver the required services and ease of operation. Through an appropriate regime of business related Key Performance Indicators (KPIs), there is a strong financial incentive for the partner to operate and upgrade the network to maintain peak performance – something that does not exist when an in-house organization is used.
- **Economies of scale –** Outsourcing can bring the economies of scale resulting from synergies with other parts of the partner's business such as other contracts and internal projects.

Intangible Benefits

There are many other benefits associated with outsourcing that are not as immediately obvious and commercially quantifiable as those listed above, but can be equally valuable.

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Some of these less tangible benefits include:

- **A fresh point of view** – Within most companies, employees often have a vested interest in maintaining the status quo. But a managed services organization has a vested interest in delivering the best possible service to the customer – a paradigm shift in attitude that enables dramatic improvements in performance and creativity. As one of Alcatel-Lucent's clients said, "When you put people in a different work model they look at your business differently. So people who once worked for us are now looking at our opportunities from Alcatel-Lucent's perspective, and coming up with some great new ideas about how we do business."

- **Drive to achieve optimum efficiency** – Executives, freed from the day-to-day business of running the network, can focus on their core activities, concentrating on service excellence rather than complex technology decisions. To quote another Alcatel-Lucent customer, "From my perspective, a large amount of my time that might have in the past been dedicated to networking issues is now focused on more strategic initiatives concerned with running my business more effectively."

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- **Processes and technologies optimization** - Optimizing processes and technologies to improve contract performance is part of the managed services package and can yield substantial savings. For example, when Alcatel-Lucent re-engineered one customer's network, the client realized one-time savings that were of greater value than the Alcatel-Lucent contract.
- **Synergies with existing activities create economies of scale** - A utility and a managed services vendor have considerable overlap in the functions performed within their communications engineering, operations and maintenance activities. For example, Alcatel-Lucent's multi-skilled field force installs and maintains communications equipment belonging to a variety of customers. This not only provides cost savings from synergies with the equivalent customer activity, but also an improved fault response due to the higher density of deployed staff.
- **Access to global best practices** - An outsourcing contract relieves a utility of the time-consuming and difficult responsibility of keeping up to speed with the latest thinking and developments in technology. Alcatel-Lucent currently invests around 14% of its annual revenue into R&D – research that directly benefits the customer at no cost. It allows the customer to tap into global knowledge in engineering, research and design that otherwise would be inaccessible.

What Can be Outsourced?

There is no one outsourcing solution that fits all utilities. The final scope of any project will be entirely dependent on a utility's specific vision and current circumstances.

The following list briefly describes some of the functions and activities that are good possibilities for outsourcing:

- **Communications strategy consulting –** Before making technology choices, the energy utility needs to define the operational strategy of the communications network. Too often communications is viewed as "plug and play," which is hardly ever the case. A well thought out communications strategy will deliver this kind of seamless operation. But without that initial strategy, the utility risks repeating past mistakes and acquiring an ad hoc network that will rapidly become a legacy infrastructure, which will, in turn, need replacing.

- **Design –** Outsourcing allows utilities to evolve their communications infrastructure without upfront investment in incremental resources and skills. They can delegate responsibility for defining network architecture and the associated network support systems. A utility may elect to leave all technological decisions to the vendor and merely review progress and outcomes. Or it may retain responsibility for technology strategy, and turn to the managed services vendor to turn the strategy into architecture and manage the subsequent design and project activities.
- **Build –** The detailed planning of the network, the rollout project, and the delivery of turnkey implementations all fall within the scope of the outsourcing process.
- **Operate, administer and maintain –** Includes network operations and field and support services:
  - **Network operations** – A vendor such as Alcatel-Lucent has the necessary experience in operating Network Operations Centers (NOCs), both on a Build-Operate-Transfer (BOT) and ongoing basis. This includes handling all associated tasks such as performance and fault monitoring, and services management.
  - **Network and customer field services** – Today, few energy utilities consider outside maintenance and provisioning activities to be a strategic part of their business and recognize they are prime candidates for outsourcing. Outsourceable activities include corrective and preventive maintenance, network and service provisioning, and spare parts management, return and repair — in other words, all the day-to-day, time-consuming but vitally important elements for running a reliable network.
  - **Network support services** – Behind the first line activities of the NOC are a set of engineering support functions that assist with more complex faults – these are functions that cannot be automated and tend to duplicate those of the vendor's. The integration and sharing of these functions enabled by outsourcing can significantly improve the utility's efficiency.

Conclusion

Outsourcing can deliver significant benefits to a utility, both in terms of its ability to invest in and improve its operation and associated costs. The environments described in this paper are typical of those Alcatel-Lucent encounters when working with its various customers. However, each utility has its own unique circumstances, specific immediate needs, and vision of where it is going. Therefore each technical and operational solution is different. Because of its experience and expertise, Alcatel-Lucent is in a unique position to help utilities evaluate their opportunities and fully realize the benefits.

About the Author

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Peter's career has taken him into a wide variety of experiences in the communications market working variously for vendors, managed services providers and a UTelco. In 1993, after a period with Nortel and then Racal Data Networks (managed services operator), Peter joined National Grid's UTelco operation, Energis. Here he was initially responsible for the definition and deployment of the services infrastructure and subsequently for regulatory affairs and interconnect services.

In 1997, Peter moved to Alcatel and contributed directly to the successful development of the network applications business and then the outsourcing and managed services business, with several significant wins under his belt.

Peter's current role is as Vice President for Utilities within Alcatel-Lucent's Services Business Group, leading the company's approach to this market segment.

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