

# ALTALINK'S SMART GRID TRANSFORMATION CREATES FLEXIBILITY AND VALUE

CANADA'S LARGEST INDEPENDENT ELECTRICAL TRANSMISSION PROVIDER IS REAPING THE BENEFITS FROM ITS MAJOR IP/MPLS ROLLOUT



CASE STUDY MARKET: **POWER UTILITY** REGION: **ALBERTA, WESTERN CANADA**

Calgary-based AltaLink is Canada's only fully-independent transmission company, responsible for the operation and maintenance of approximately 12,000 km of high-voltage transmission lines that serve 85 percent of Alberta's population. With over 600 employees and \$1.4 billion in assets, in 2010 AltaLink launched an upgrade of its entire transmission telecommunications infrastructure to an IP/MPLS mission-critical platform. Now installed at 40 of its 300 facilities, this smart grid transformation creates unprecedented efficiencies and flexibility while supporting over 10 different types of services, including supervisory control and data acquisition (SCADA), various types of teleprotection (TPR), mobile radio, substation metering, office LAN (local area network) and operational voice (PBX).

## CHALLENGES

- Maintaining and improving critical network technology in a market environment where TDM and ATM availability is declining and costs are escalating
- An industry where service requirements are increasingly becoming IP-based
- Addressing greater regulatory requirements, with more emphasis on reporting of actual operating data and statistics
- Supporting a proliferation of corporate voice, video and data applications
- Migrating mission-critical services to a new network with attention to latency requirements, cyber security and employee training
- Implementing a carrier-based model using centralized monitoring, provisioning, and control

## SOLUTIONS

- 7705 SAR-8 Service Aggregation Router, optimized for multiservice adaptation over flexible network topologies with multiple traffic streams
- 7750 SR-c12 Service Router, delivering high-performance IP/MPLS routing and switching of voice, video and data
- 6850 and 6855 OmniSwitch LAN switches, specifically built for IP network deployments in severe environmental operating conditions
- 5620 SAM Service Aware Manager and 5650 Control Plane Assurance Manager (CPAM) provides high availability service-aware operations, administration, management, and provisioning for the 7705 SAR, 7750 SR, OS6850 and OS6855 products as well as the 9500 MPR and 1830 PSS products to be deployed soon.
- Alcatel-Lucent professional services to support proofs of concepts, lab testing and migration assistance

## BENEFITS

- The combination of cost-effective and flexible IP/MPLS technology with a visually-oriented network and service management system provides AltaLink with a compliant, effective solution for legacy, new and future requirements.
- With IP/MPLS, the available bandwidth is distributed between services as and when needed, creating unprecedented efficiencies, while ensuring priority traffic always gets through.
- A centralized carrier model allows AltaLink to eliminate duplication in manpower and services for IP and SCADA management, provisioning and reporting.
- Alcatel-Lucent's professional services lessened the learning curve for personnel and allowed AltaLink to significantly accelerate deployment.



## THE CHALLENGES

AltaLink's decision to upgrade its operational communications network originally was triggered by the impending obsolescence of the ATM and TDM solutions, according to Clinton Struth, AltaLink's Principal Engineer, Network Communications, though other factors bolstered the case for change. "We also had a need for more IP-based services and, because our division is practically an internal service provider to the various business units that use the network, we decided that we wanted to implement a carrier-like model with centralized management and provisioning," Struth says.

Other challenges included greater regulatory requirements, placing more emphasis on AltaLink's ability to provision, manage and operate critical services while reporting actual operating statistics, and the necessity to adhere to reliability benchmarks for TPR, SCADA, or other operations. Additionally, the company needed to maintain the services running on its legacy network and ensure cyber-security during the transition.

Struth and his staff soon focused on cost-effective IP/MPLS technology as a highly efficient and flexible platform that could address all of the company's needs. MPLS's point-to-multipoint packet-based architecture offers centralized control, security and the capability to distribute disparate applications' data protocols simultaneously over the same pipe, rather than requiring circuits dedicated to each service. Meanwhile, MPLS's "protocol-agnostic" capability, would allow AltaLink to maintain the services and visual interfaces running on its legacy ATM and TDM equipment.

"Although this started out as an equipment upgrade, once we got our heads wrapped around the capabilities of MPLS centralized management technology, it certainly steered our strategic goals," says Struth. "We knew that a few had gone down this path before us, but none with 100- percent of their utility services centralized within one network. It was a complete

end-to-end migration to a new technology that we knew would pay off in a significant way. This was really a network transformation."

## WHY ALCATEL-LUCENT?

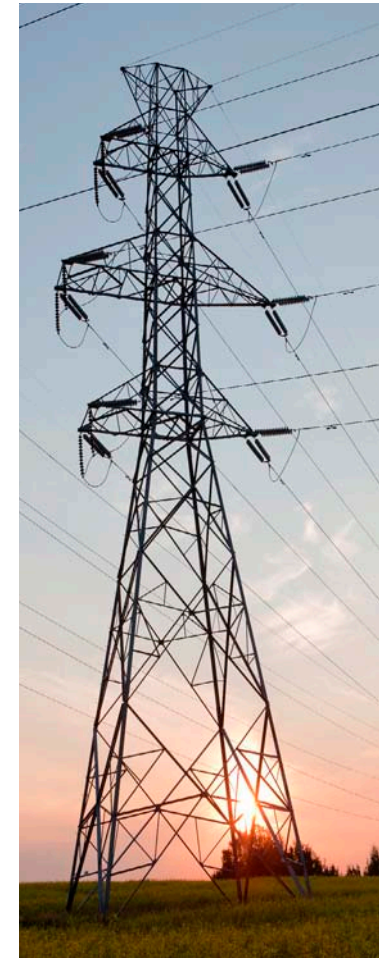
At the outset of the project AltaLink compared potential vendor solutions by looking at whose platforms and technologies the commercial carriers were deploying. "When you contrast the competitor offerings for IP/MPLS, you see that Alcatel-Lucent is the only company that has a broad suite of legacy interfaces," says Struth, "so when you're trying to bridge the gap between old network and new, the others simply can't do it."

Struth notes that Alcatel-Lucent's position in the marketplace as a leader in the development of IP/MPLS technology further supported the case to go with them, as did the fact that for years it had worked with AltaLink in supplying and supporting its legacy ATM/TDM network.

"The prior experience we have in dealing with Alcatel-Lucent is a plus, as is the fact that they have their R&D facility here in Canada," he notes. "We knew through some of their commercial deployments with carriers that they had the technology and skillset to back us up if we ran into trouble. In fact, Alcatel-Lucent has the capability to do a bit of everything, so we were very comfortable with using them rather than bring in a new vendor. All of these considerations made our selection clear."

## THE SOLUTIONS

In October 2009, AltaLink and Alcatel-Lucent built a lab for testing various interfaces, circuits, and settings for teleprotection latency and interoperability with TDM equipment. Primary equipment selected for the project included Alcatel-Lucent's 7705 SAR-8 Service Aggregation Router, optimized for multiservice adaptation over flexible network topologies with multiple traffic streams; the 7750 SR-c12 Service Router, which delivers high-performance, high availability routing with service-aware



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**Cory Struth**

operations, administration, management, and provisioning; and 6850 and 6855 OmniSwitch LAN switches, specifically built for IP network deployments in severe environmental operating conditions with temperature extremes, electrical conditions, shock or vibration. Additionally, a 5620 SAM, provides full service, network and element management end-to-end of the new network including provisioning, administration and trouble shooting, while the 5650 CPAM ensures that there are no routing errors in the network by silently monitoring and reporting on all IP traffic.

For security, AltaLink has employed a multi-tier scheme that makes full use of IP/MPLS intelligence, flexibility and control with intrusion-detection checkpoints, centralized authentication and logging, security policies for each service through access control lists, MAC-pinning, IP and bandwidth filters, centrally-managed and monitored Fortinet firewalls at every substation, and comprehensive password protection at different levels.

Between April and September 2010, AltaLink deployed 24 IP/MPLS nodes for a comprehensive field pilot test, migrating teleprotection and other critical services. The full rollout began in the spring of 2011 and after several months over 70 of its potentially 400+ MPLS nodes are in service with a complete migration targeted for the end of 2013.

## THE BENEFITS

Going to a carrier model means that AltaLink will be able to eliminate duplication in services. “Rather than separate units supporting IT, Operational Telecom and SCADA/EMS, we’re going to have one centralized team,” says Struth. “That means no duplication of manpower. One team will provide centralized management, provisioning and reporting, standardized processes for new services requests, standardized engineering and design, as well as a common hardware design. Security will also have a common management model for control and monitoring and uniform policy.”



“By taking the time at the beginning of the project to prove that a single MPLS solution could meet the requirements of mission-critical services, rather than running two parallel networks including the legacy TDM like some utilities are doing, we are gaining additional value,” Struth says. “And, we have a lot more visibility now than we ever did before. It’s real-time monitoring — we know from one common pane of glass what all of the services are doing. If anything we have more confidence now in the network than we did in the past.”

**“I would challenge you to find another vendor that can match Alcatel-Lucent’s offering in MPLS.”**

**Clinton Struth**



Cory Struth, AltaLink's Network Architect, points to the benefits of Alcatel-Lucent's professional services during the rollout. "There's no way we would have been able to get our project off the ground, and in a practical sense be sitting where we are now in terms of our nodes in the field and our project well on its way through year two without the assistance that IPD engineering brought us," he says. "It lessened the learning curve for those of us who were doing the implementation and gave us someone to really mentor with, but also let us go and do it on our own. It has probably saved us at least a year of time."

Both Struths note that working with Alcatel-Lucent at the project's outset not only proved the technology, but also gave them information that they could take back to the company's executives to demonstrate due diligence and that the solution they were proposing would work. "The value of that can't be understated," says Cory Struth. "The engineer can come up with a solution, but the executives have to sign off on the checkpoints. The methodical process with Alcatel-Lucent at the beginning kept our project going when others in the industry may have stalled."

## NEXT STEPS

AltaLink now has created and released internal engineering standards that make IP/MPLS the only technology it will be deploying for its telecom network going forward. Being standardized on MPLS will open up a great deal of possibility in what the company can now do in terms of flexibility and scope. Among the next steps, it plans to deploy Alcatel-Lucent's 1830 Photonic Service Switch, a multi-reach photonic platform that can mimic the flexibility, automation and fast time-to-service capabilities of electrical-based transport networks, with support for dense wave division multiplexing (DWDM), and a terabit optical transport network (OTN) switch.

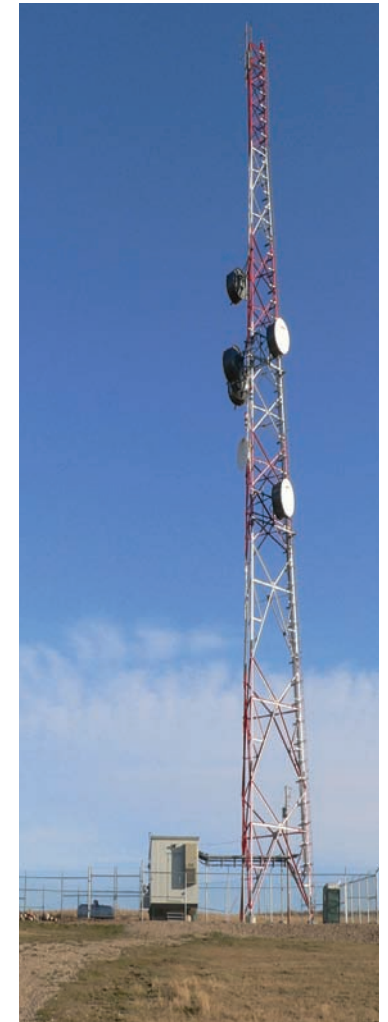
The Struths expect that most of AltaLink's services will ultimately transition to IP, with SCADA eventually going over IP as a 61850-type of application (eScada). In addition synchrophasors, metering, and almost all substation services will have an IP compatible roadmap.

"We don't even know yet all the ways in which we are ultimately going to use this network," says Clinton Struth. "There are so many different solutions that are possible now that we couldn't do before. Since MPLS brings point to multi-point communications to the table, that in turn can be used to provide additional fault tolerance, redundancy and resiliency to any number of services, whether voice, data or even internet access."

## SUMMARY

What began as a maintenance upgrade driven by sourcing concerns has developed into a transformational change for AltaLink's communications and control network, yielding superior, centralized management of its transmission infrastructure to ensure more reliability, security and cost efficiency. By successfully engineering the network to support critical applications such as SCADA and TPR (teleprotection), this next-generation smart-grid network is fully addressing current needs — supporting legacy assets while remaining flexible and ready for further smart-grid enhancements in the future.

"Definitely engage and leverage professional services up front to make sure you're on the right track before you go down the path," Clinton Struth recommends. "Fortunately we did that, partnering with Alcatel-Lucent on all levels from the very beginning. I would challenge you to find another vendor that can match Alcatel-Lucent's offering in MPLS technology — a migration strategy, legacy interfaces and even a new technology to ensure future capacity. It's pretty much unmatched in the utility industry."



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