ELTEK
A Delta Group Company

380VDC

Take the fast lane to capacity expansion

Progress is to create more with less

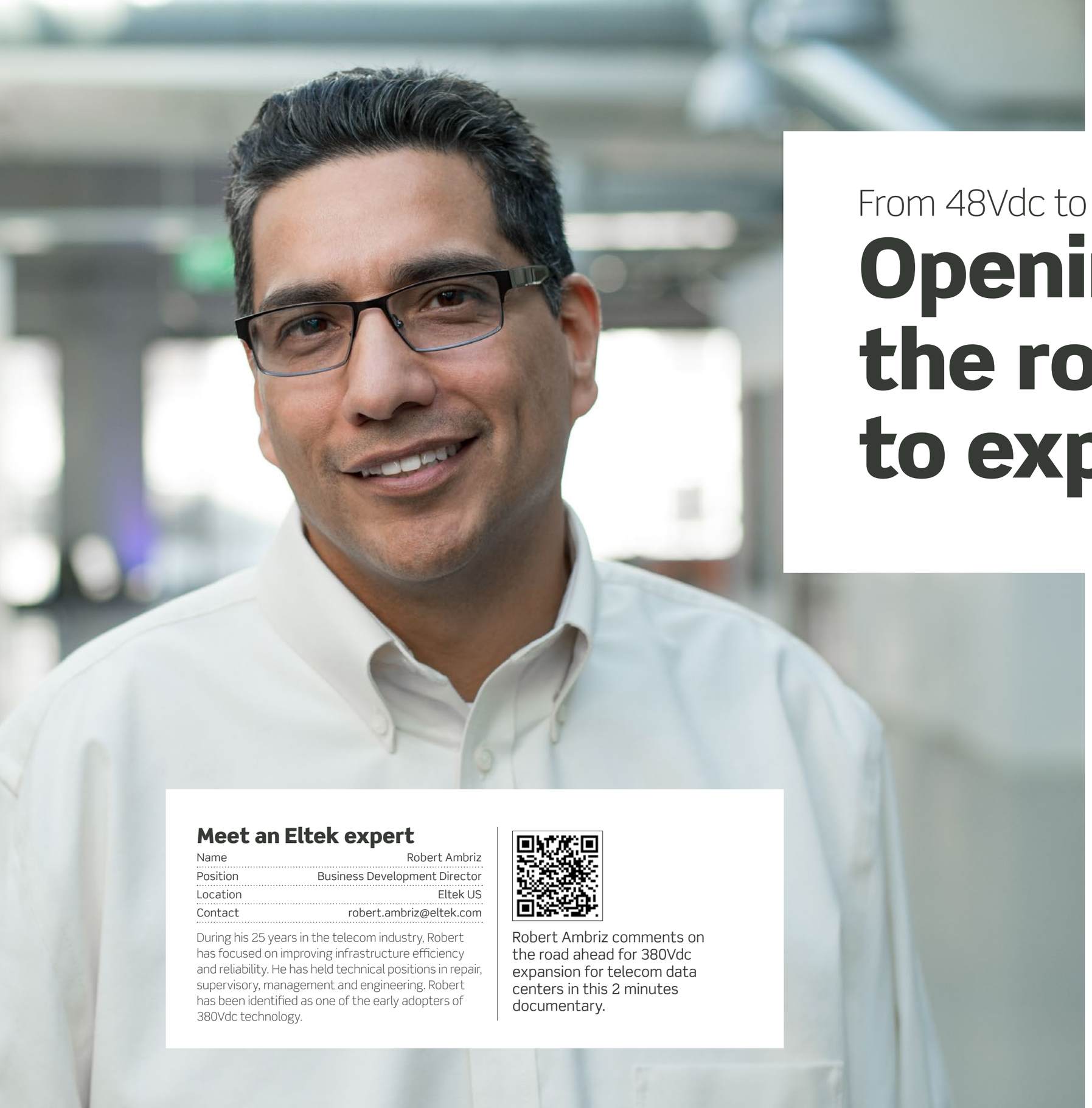
We've all come to expect ever better, faster and greater products, services and experiences. At the same time, there seems to be less time, space and patience available. People demand instant gratification, or there will be constant aggravation...

Our customers meet these requirements every day. They operate the infrastructure of the world, in telecom, data centers, power utilities, marine & offshore and railways.

They are all hard pressed to provide more and better services, operate more efficiently, reduce their environmental footprint and do more with less in so many ways.

The same pressure is upon us. Our contribution is to provide more, faster, more flexible and more reliable power – delivered in more compact solutions.

One of the ways we help our customers meet this demand is by introducing 380Vdc power transfer within our power solutions.



From 48Vdc to 380Vdc powering

Opening up the route to expansion

What do you do when the amount of data you are processing is skyrocketing, and further expansion of server capacity is blocked due to power supply constraints? This is the story of how a service provider in exactly that situation found the key which opened the route to increased capacity.

Ever more data

The increasing demand for bandwidth keeps pushing the development of telecom and computer equipment. However, the more advanced equipment – the more power you need to support it.

A few short years ago, planners could assume a power level of 750W to 1,250W per rack for the deployment of state-of-the-art servers. Today's planners project power levels as high as 15kW or more for the ICT equipment that will be delivered in the coming years.

This is a challenge. Most telecom service providers' networks are dominated by traditional 48Vdc power plants that feed the 48Vdc telecom equipment. Many of the plants are already operating near capacity. Upgrading, replacing or supplementing the existing plants with new 48Vdc power equipment is, however, not a viable solution.

Meet an Eltek expert

Name	Robert Ambriz
Position	Business Development Director
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During his 25 years in the telecom industry, Robert has focused on improving infrastructure efficiency and reliability. He has held technical positions in repair, supervisory, management and engineering. Robert has been identified as one of the early adopters of 380Vdc technology.

Robert Ambriz comments on the road ahead for 380Vdc expansion for telecom data centers in this 2 minutes documentary.

Cable congestion creates bottlenecks
Robert Ambriz, one of Eltek's network architecture specialist, explains:

"IT WAS THE LARGE CABLE BUNDLES BETWEEN THE RECTIFIER SYSTEM AND THE BDCBBS THAT CREATED THE CONGESTION"

– The most significant capacity issue is the extensive cable congestion that restricts power delivery into the ICT areas from the 48Vdc systems. These extremely large stacks of cables are the result of the high current levels associated with 48Vdc powering, the requirement to support worst-case load projections and the need to adhere to tight voltage drop considerations, says Robert.

Going from 48Vdc to 380Vdc
One of Eltek's customers, a North American service provider, has taken the step from 48Vdc to 380Vdc power transfer, assisted by Robert and his expert colleagues from Eltek.

– The company in question had a powering architecture with 48Vdc rectifier plant and batteries in a power room. The 48Vdc power was distributed to the loads through battery distributing circuit breaker boards (BDCBBs), located in the ICT equipment area. – It was the large cable bundles between the rectifier system and the BDCBBs that created the congestion, Robert explains.

The customer was preparing for the higher voltage DC future, and had decided to install 380Vdc rectifiers and batteries at the plant.

However, since the existing loads and most of the new loads will operate from 48Vdc for some time, phase 1 of the strategy was to install a high-efficiency 380Vdc/48Vdc converter system in the ICT equipment area.

Since the plan was to reuse the power transfer cables, it was beneficial to install the 380Vdc rectifier bays near the 48Vdc plant. However, the batteries can be located wherever there is space, which can even be in outdoor containers.

WHAT
380Vdc power transfer is an alternative to 220Vac and 48Vdc power transfer in power system topologies.

WHERE
380Vdc is an attractive alternative to short distance 48Vdc power transfer, and to medium range 220Vac power transfer.

WHY
The higher the voltage, the greater is the capacity to transfer power more efficiently and with lower losses. In other words, using 380Vdc instead of 220Vac or 48Vdc, one can transfer significantly more power through the same cable, or the same amount of power through significantly less cable, and with lower end-to-end losses.

This basic fact leads to a number of other advantages, some of which are:

- Reduced complexity, cable cost and footprint (space requirements)
- Increased reliability
- Greater modularity and safety

Normalized cost comparison between the 380Vdc power system and a comparable 48Vdc system

Category	Component	48Vdc System	380Vdc System	380Vdc vs. 48Vdc	Comments
Equipment	Rectifiers and Distribution	1.00	0.54	(0.46)	48Vdc requires separate distribution cabinets
	Secondary Distribution	1.00	5.86	4.86	48Vdc: four BDFBs; 380Vdc: eight converter cabinets
	Batteries	1.00	1.03	0.03	Both include disconnect switches; 380Vdc includes bus duct
	Equipment Total	1.00	1.13	0.13	
Equipment installation	Rectifiers and Distribution	1.00	0.26	(0.74)	48Vdc: five cabinets; 380Vdc: two cabinets
	Secondary Distribution	1.00	6.80	5.80	380Vdc consolidates some BDCBB panels to create spare cables
	Batteries	1.00	0.92	(0.08)	48Vdc involves 20 disconnected switches
	Equipment Installation Total	1.00	0.91	(0.09)	
Power cabling	Material	1.00	0.10	(0.90)	Does not include cabling from BDFBs or converter cabinets to the 48Vdc loads; 380Vdc will be ~30% less
	Labor	1.00	0.07	(0.93)	
	Power Cabling Total	1.00	0.09	(0.91)	
	OVERALL TOTAL	**1.00**	**0.73**	**(0.27)**	**27% SAVINGS WITH 380Vdc**

Our customer, a North American service provider, carried out this analyzes to better understand the cost factors when moving from a 48Vdc to a 380Vdc solution. As expected, power cabling was by far the major cost factor, and although the cost of equipment and installation was somewhat higher for the 380Vdc system, the total savings was as high as 27%.

Robert Ambriz and Larry Lutz are power network specialists for Eltek in the US. They recommend 380Vdc power transfer as the way forward for capacity-hungry 48Vdc sites:

The 380Vdc/48Vdc converters support any new 48Vdc loads being added at the facility, as well as provide relief for heavily loaded 48Vdc plants. The setup is ready – the 380Vdc plants will grow over time and the 48Vdc plants will be eliminated as they reach end of life.

Safe and sound solution
The technical assessment of the system included lab testing which established that a 380Vdc system is safe, both in terms of personnel safety and reliability. – Extensive tests were carried out to ensure that the rectifier and converter systems were designed and tested to UL standards and other regulatory requirements. There is no doubt that this is a safe solution, – says Robert.

A smart investment
Looking at the comparison table to the left you can clearly see the financial attractiveness of a 380Vdc vs. a 48Vdc solution.

"YOU GET A STURDY AND FUTURE-PROOF SOLUTION THAT HAS THE FLEXIBILITY TO CATER FOR CONTINUED EXPLOSIVE GROWTH"

– Due to the space limitations the customer was experiencing, a 48Vdc system was not a realistic alternative in this case.

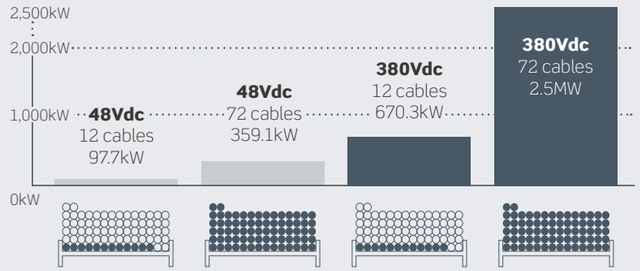
However, for better understanding they carried out an analyzes of the new 380Vdc configuration vs. what would have been a comparable 48Vdc system.

This comparison showed that power cabling was by far the major cost factor, and although the cost of equipment and installation was somewhat higher for the 380Vdc system, the total saving was as high as 27%. The magnitude of this cost saving served as an additional impetus for our customer to move ahead with its transition to 380Vdc powering.

Aside from its value in sites that are constrained by cable congestion, 380Vdc is also a fundamentally more economical alternative to the traditional 48Vdc approach.

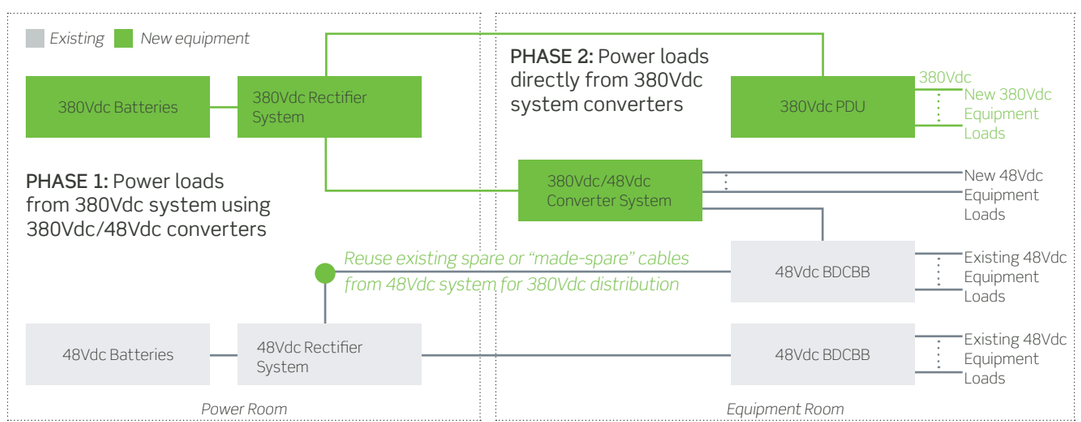
– With a 380Vdc solution you get an instant relief from the capacity bottleneck and reduced cost. But even more important: you get a sturdy and future-proof solution that has the flexibility to cater for continued explosive growth in data traffic and corresponding power requirements, concludes Robert.

700% more power



The figure above demonstrates the difference in current-carrying capacity between 48Vdc and 380Vdc configurations. Using the same cable, it can carry 7 times more current than when used to carry 48Vdc. In fact, the 380Vdc stack of 12 cables can deliver 87% more power than the 48Vdc stack of 72 cables.

48Vdc to 380Vdc transition – one customer's route



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EXPERIENCE THE POWER.

At Eltek, we are power experts with a sharp focus; to develop and provide our customers all over the world with the greatest power solutions available for applications used in an industrial context - where stable, safe and efficient supply of power is crucial.

This has been our passion and motivation for more than 40 years: to innovate and lead the way in power conversion and control. Today, we help our customers optimize and safeguard the operation of business-critical equipment, reduce their carbon footprint, while, at the same time, reduce the total cost of ownership of their power supply equipment.

Nordic by birth, we have grown to service all countries and cultures, offering the best global technology and solutions matched to local requirements.

The combination of superior expertise, advanced solutions, responsive support and service, makes it possible for our more than 2,000 passionate and proactive power experts worldwide to provide our customers with a unique, powerful experience.

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