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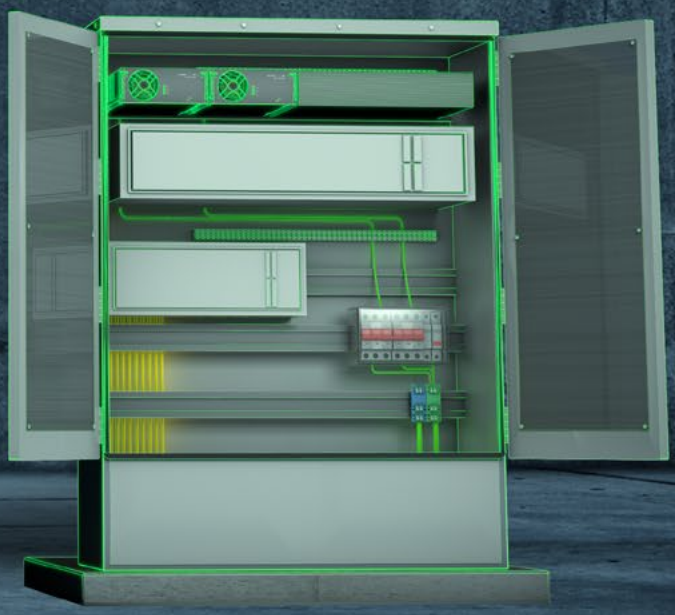

HVDC Power Feed for DSLAM

# The smart way to remote performance

# always more always on

To keep up with demand for ever faster and heavier data communication, networks are in constant change. Always growing. More fiber. More equipment. More power.

And with all this, higher costs. Greater complexity. More maintenance and more equipment that needs power.

However, wherever a fiber cable is installed, there is also room for a power cable that can distribute 380 VDC from a central system to the DSLAMs. It is safe, efficient and cost-effective.

FEED THE POWER TO THE PEOPLE:
HVDC POWER SOLUTIONS FOR DSLAM

# HE Remote Power

## Safe and cost efficient HVDC feed for optimal remote performance

A power feed solution from a central point to DSLAMs or wireless equipment is a cost-effective option compared to local power supply, for several reasons:

- There is no local power system that requires mains supply, so there will be no AC connection or subscription fees. In a large network, installing and running on local mains is costly, both in terms of CAPEX and OPEX.
- Complexity is greatly reduced. Remotely there will be no batteries, less power electronics, i.e. less equipment to buy, install and maintain.
- Better use of existing infrastructure and investments made at the central site.

HE Eltek was the first to launch High Efficiency technology in 2008. As of January 2015, more than 1.5 million power conversion units with this technology have found their way to our customers, contributing to cost savings for the operators and a substantial reduction of carbon footprint.

DSLAM

DSLAM

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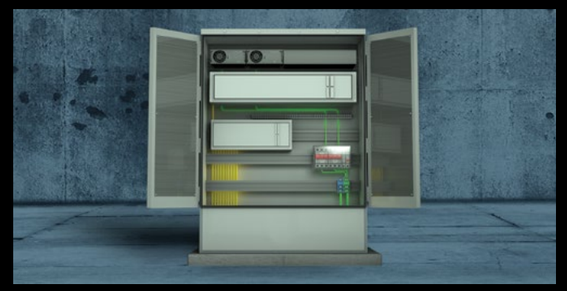


### Reduce complexity in your DSLAMs

With an HE Remote Power Solution, feeding HVDC from a central site, the amount of equipment needed at the individual DSLAM is greatly reduced. There is no longer need for local grid connections or complete power systems with battery backup, cutting operational cost significantly.

The HE Remote Power System is designed for the safe feeding of telecom equipment that is distributed in many decentralized outdoor locations. Remote end sites are connected to central office power supplies via a cable which is dedicated for remote power. To achieve a high efficiency and to keep the cable transmission losses low, the DC power is transmitted at 380 VDC.

A key safety element built into the concept is the use of a floating IT (French: Isolé Terre) DC transmission network.

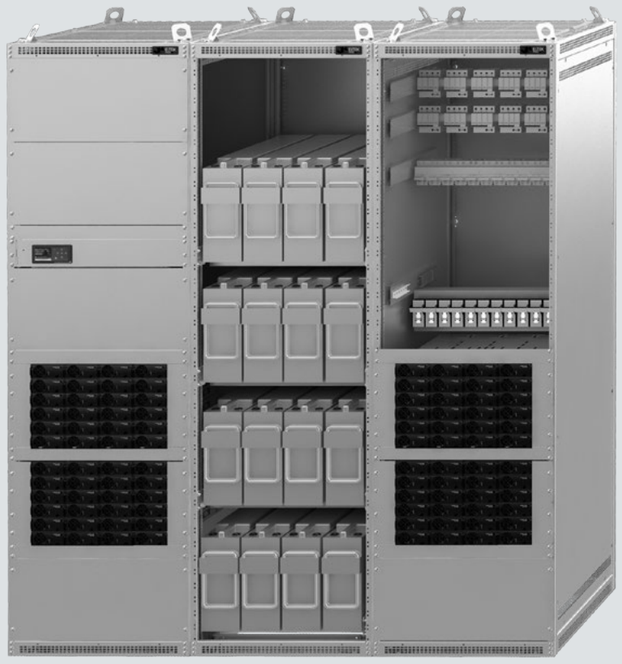
## 48/60 VDC switch mode power solution

At the central site, an existing (or new) 48/60 VDC switch mode power solution, complete with battery backup, is supplemented by Flatpack2 HE DC/DC converters to transform the 48/60 VDC bus voltage up to a 380 VDC remote power.

The output side of the system includes a miniature circuit breaker (MCB) (F) for short circuit protection, an insulation monitoring device (IMD) for earth-fault detection and a surge protection device (SPD) to protect the equipment against surges from the outside.

The underground transmission cable is a two-pole, shielded cable, which is suitable for ground installation and voltages above 380 VDC.

On the remote side, Flatpack S DC/DC converters transform the 380 VDC down to 48 VDC, suitable for the DSLAM equipment in the outdoor enclosures. A distribution box includes surge protection device, a two-pole MCB (F) for disconnecting the remote site from the remote feed and cable terminals for the distribution of the underground cable to further DSLAM locations.



### Flatpack2 HE

This Flatpack2 DC/DC converter provides a 380 VDC output from the 48 VDC or 60 VDC central system.

This allows for high efficient transmission of battery backed up energy to small remote sites without grid connection. The galvanic isolated CAN bus allows for direct connection to the controller in a supplying Eltek power system. Advanced monitoring and control can then be achieved without adding a separate controller.

### Flatpack S

The Flatpack S DC/DC converter accepts a wide input range (200 - 400 VDC) and converts the transmission voltage back to 48 VDC - providing a stable supply for the remote equipment.

### Existing telecom power installation


The power required for DSLAMs are fed from a standard power source at an existing, backed up telecom installation. The DC power produced here is converted to 380 VDC.

### HVDC power feed


A dedicated long-distance power cable (up to 5 km) connects the central site and the remote sites. The power is transmitted through this cable at 380 VDC, to minimize transmission losses.

### DSLAM installation


At the remote sites, a second voltage conversion takes place where the 380 VDC power is converted back to 48 VDC power for the DSLAM equipment. Backup power is then provided from the centralized battery plant.

## Meet an Eltek expert

| | |
|---|---|
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Bjørn Håvard Stokke is Product Manager for Eltek's portfolio of remote power solutions, i.e. solutions that provide power for the equipment close to the end user in the telecom network.

### Always more bandwidth...

It's a never-ending story. More traffic, heavier traffic. More and more bandwith is required – networks must be expanded both when it comes to capacity and reach. Consequently, more equipment is needed closer to the end users. And more power is required...

The question is: What is the best way to provide the required power? Traditionally, this has been done by deploying a power system at each DSLAM (or 4G/LTE RRU) including batteries and mains feed. But there is a different approach, with many advantages.

### The power of HVDC...

If you need to power a DSLAM up to 5000 meters away from an existing backed up power system, a HVDC remote power solution is the way to go.

This is the "old" central office-to remote site model, but with a major difference: The power transmission takes place via dedicated power cables, with a minimum total cost of ownership compared to traditional remote power or with remote grid connections.

This is how it works: When rolling out a fiber network, add a power cable alongside the fiber cable. Add a DC-DC converter at the central power system end to step up voltage to 380 VDC, transmit via the cable, add a DC/DC converter to step voltage back down, before feeding the DSLAM.

### Also for wireless...

The solution is also very suitable in wireless networks when RRUs are added for increased bandwidth and the distance is too long for 48 VDC. The same goes for installations where it is impractical to have the power system next to the telecom equipment (mountains, ski resorts, etc.).

### Why HVDC remote power is smart...

There are several reasons why an HE Remote Power System is an attractive option. First of all, the total amount of equipment will be reduced. Less equipment means less complexity means less maintenance – or to put it simpler: it costs less to buy and less to maintain and less to operate, compared to a solution with local power systems, including batteries.

So in terms of cost, complexity and reliability, a HVDC power solution is a very good proposition indeed.

### Things to consider...

When evaluating an HE remote power solution versus a traditional solution, some of the main parameters to consider are the initial and operational costs of the local AC feed, added complexity due to local batteries and the power system itself in a traditional solution; versus the costs of the power cable and converters in a HVDC solution.

There are of course other technical and practical issues to consider, such as the power requirements at the remote sites, the distance from the central office, national regulations, and so on. But provided you plan for a power cable to be laid down with the fiber, my experience is that the HVDC feed solution, in most cases, will come out clearly on top.

### The future of remote power...

With continued network growth, there is a strong case for a DC feed from a central system to the remote installations. A significant part of the network growth will take place within wireless, powered more and more by HVDC.

## "A smarter way to power expansion of your telecom network"

Eltek expert Bjørn Håvard Stokke comments on pros and cons of feeding DC power from a central site, rather than doing the AC/DC conversion at the point-of-use.

Meet Bjørn Håvard in this 2 minutes documentary

Safe and cost efficient HVDC feed for optimal remote performance.

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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 operation of business-critical equipment, reduce their carbon footprint, while at the same time reduce their total cost of ownership of 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, support and service, makes it possible for our more than 2500 passionate and proactive power experts world-wide to provide our customers with a unique, powerful experience.

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