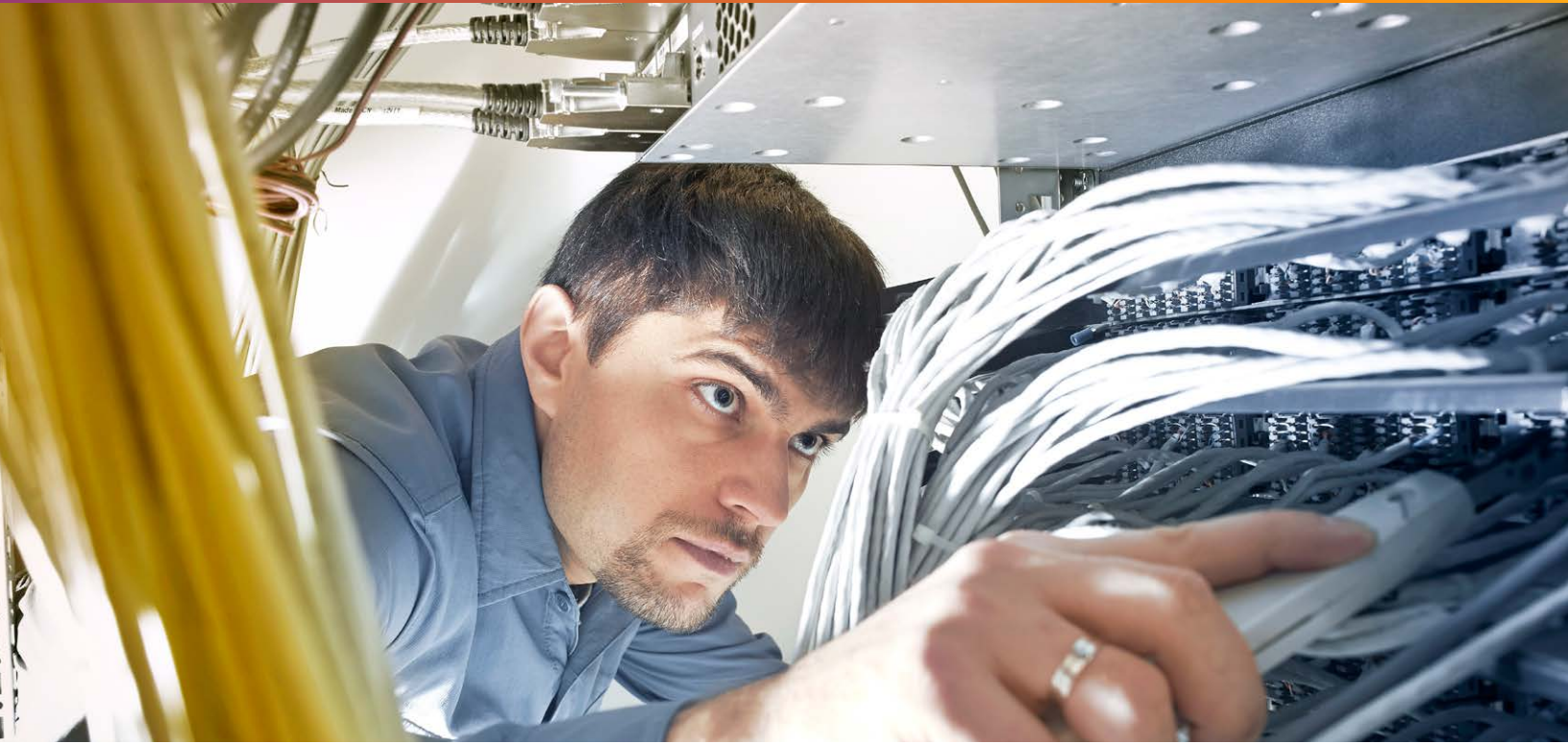


# Major Telco Leverages HVDC Power in Core Exchange Sites to Reduce Carbon Emissions



A Vertiv Case Study



## Background

Analyst McKinsey & Company projects that the worldwide number of Internet of Things (IoT)-connected devices will grow to [43 billion by 2023](#). In response, telecom networks are becoming denser in order to deliver wider coverage and increased capacity. Network operators are deploying telecom infrastructure assets closer to their customers, for example, to support both wired and wireless access. Even in places where carriers have sufficient coverage, they are densifying their networks to provide better capacity to hungry data users.

One of the world's largest communications services companies is at the forefront of this expansion of connectivity services. It runs operations in more than 180 countries and is heavily investing in fibre, 5G, edge, core access, and extended access in order to build a high quality, converged, and smart network. This provider is challenged with achieving the lowest throughput cost and the highest availability of service, while maintaining sustainable operations.

In fact, the company has taken aggressive actions for advancing its vision of achieving sustained growth while reducing its carbon emissions. Some of these actions include:

- Investing heavily in energy management projects
- Accelerating the fibre to the premises (FTTP) buildout with a target of 20 million premises by mid- to late-2020s
- Shrinking carbon emissions from its operations and achieving net zero carbon emissions by 2045

### Challenge:

Alleviate space constraints in telecom exchange sites while increasing capacity and reducing carbon emissions

### Solution:

Vertiv™ NetSure™ HVT with 380V high-voltage direct current (HVDC) rectifiers

### Results:

- Low energy consumption and reduced need for copper
- Configuration flexibility due to longer cable run lengths
- Higher communication capacity requiring less space
- Future-proof modular solution for easy expansion and maintenance

This leading communication services provider is focused on simplifying and modernizing its technology, including implementation of a complete network and architecture refresh. Public switched telephone network (PSTN) connections are being phased out in favour of a digital-only IP network. The current phase of modernization aims to drive significant gross annualized savings over the next five years. This five-year initiative will re-engineer out-of-date processes, validate products, reduce re-work, and switch off many legacy services.

## Challenge

### Modernization and cost control represent key priorities

As part of the mission to cut costs and achieve long-term business goals, company leadership decided to take on the challenge of streamlining the provider's power distribution systems across its network of telecom exchange sites. A key area of focus involved eight of its largest core facilities. The work at these sites would include centralizing power, increasing power density and capacity within existing buildings, removing legacy systems, and installing new smart power distribution components.

To take on this challenge, the provider actively sought out technology partners with a proven track record of multiple installations across geographies. Over the years, the company established a close relationship with Vertiv, a key provider of power and cooling technologies, investing in both single- and three-phase uninterruptible power supply (UPS) solutions.

On a visit to the Vertiv test facilities in China, one of the company's power and cooling executives noticed some new generation HVDC power cabinets which were originally sold by Vertiv in the Asia Pacific region, and inquiries were made regarding the possibility of developing a similar product for a different region. The provider's technology team recognized that Vertiv was willing to work collaboratively on the further evolution of the 380V HVDC rectifier product. As a result, the company decided to award Vertiv with the exchange upgrade business.

### Space constraints a serious obstacle to expansion

Telco companies like this one, have successfully deployed DC power solutions for decades. Historically, telecom exchanges have operated on -48V DC for reasons of safety, durability (lack of cathodic corrosion), fault tracing, and easy battery integration. However, the modern modems and communication equipment that have developed over time have large power demands which the older systems could not accommodate. In addition, the provider's exchanges were running out of physical space.

As part of the upgrade of the network, more communication lines and more connections were required, and these needed to fit into the existing facilities. For these reasons, older -48V DC equipment would have to be removed and replaced with more efficient 380V HVDC rectifier units.

## Solution

### Reduced installation and support costs

Deployment of the Vertiv™ NetSure™ HVT with 380V HVDC units reduces the normal transmission current required by a factor of eight compared to the telco's existing -48V DC implementation. This reduction in current increases the flexibility of rearchitecting the exchange site. In fact, the company's long-term plan is to also deploy 380V HVDC equipment in its metro nodes.

Along with the NetSure HVT units, the provider uses Vertiv™ NetSure™ 7100 converter systems to feed all existing 48V DC gear and effectively act as end-of-suite distribution. The combination of these systems allowed the company to place the HVDC backup system and battery banks further away from the load, which would be difficult and expensive with a traditional -48V DC system. And by relocating the power system, the provider was able to recover more floor space.

Operational power efficiency also increased. Not only are up front expenditures and operating costs lower, but there is improved reliability. The simpler design also reduces maintenance cost while making this service safer.

With the NetSure HVT units, no accessible bare live conductor is present when the door is closed or opened. Insulation failure or grounding fault alarm functions are supported for DC buses and DC output branches. Therefore, maintenance is a much safer proposition. In addition, full load monitoring is possible for each circuit from all parts of the system and is supported with 7-inch touchscreens to communicate the running status and automatic fault alarms.

NetSure HVT technology combines the proven benefits of -48V DC power — modularity, scalability, ease of integration — with the cable and installation savings benefit of the 380V HVDC distribution.

## Results

### Digital solution enables future-proof, high efficiency network

Beyond the eight sites originally allocated to the Vertiv team, this provider plans to upgrade between 12 and 20 sites in the next year with the 380V HVDC technology. As the equipment rollout begins, Vertiv has been asked to support the initial installations and to provide training, spare parts, and warranty support.

*The deployment of the Vertiv™ NetSure™ HVT with 380V HVDC units reduces the normal transmission current required by a factor of eight compared to the telco's existing -48V DC implementation.*



#### Vertiv™ NetSure™ HVT with 380V HVDC Rectifier Features:

- Strong adaptability to the grid and environment
- Low total harmonic distortion (THD) for high power factor, power density, and efficiency
- Plug-and-play technology that is hot-swappable
- Redundancy function and intelligent, active load sharing upon controller failure

The early implementations are already resulting in a number of tangible business benefits:

- **Cost control** – The copper cables between the power system and the load of the new 380V HVDC distribution are only 240 square millimeters in diameter and run for 317 meters. These cables can also be run for long distances (up to approximately 800 meters). In order to carry the current over similar distances using a -48V DC system, the cables required would have to exceed 1,700 square millimeters in diameter, which is neither practical from a weight perspective nor attractive from a cost perspective. The current price of copper is more than six times higher than the price in 2000. Since the new technology enabled this communications services provider to migrate from a distributed to centralized approach for its sites, both capital and operational savings are being realized. Along with cable cost savings, the higher efficiency results in energy savings. With 380V HVDC, the provider also no longer needs to house the power system on the exchange floor. The relocation of batteries and rectifiers creates floor space that can be repurposed, potentially enabling the selling of additional services like data colocation to local customers or partners.

- **Future proofing of network infrastructure** – Migrating the provider's network from analog to digital by implementing devices such as the Vertiv™ NetSure™ HVT allows the teleco to fundamentally change the way it conducts business. Its customers can now more easily realize IoT benefits, such as self-driving and electric vehicles (EVs) and communicating with new infrastructure in smart homes or smart cities. By pushing more communications capacity through the same physical space, the provider is now in a better position to accelerate high speed connectivity on behalf of customers.
- **Lower carbon dioxide (CO<sub>2</sub>) emissions** – The rollout of 380V HVDC also dovetails with the provider's desires to pursue an aggressive green agenda. While its legacy DC distribution equipment had peak efficiency levels around 90%, the new equipment operates at 98% efficiency, drastically reducing the kilowatt hours (kWh) of energy being consumed and lowering CO<sub>2</sub> emissions.
- **Remote monitoring capabilities** – In the digital world, real-time monitoring of telecommunication assets helps improve network reliability and availability. This provider is also focused on accessing more data surrounding its network operations. By accurately monitoring network loads, the currents going into those loads, and the batteries that store the power, network performance and uptime improves. The NetSure HVT with 380V HVDC units are smart devices and can be monitored remotely via Ethernet, modem, or RS232 port from any web browser. All loads are measured using Vertiv's patented Intelligent Load Management capability. The units also automatically send out an alert if a fault is occurring. The units are designed with hot swappable modules and allow for the replacement of spare parts without bringing equipment offline. The result is simple diagnostics and customers who benefit from a higher rate of uptime in their communication networks.

#### Continued collaboration results in further innovation

Upgrading to 380V HVDC power has allowed this leading communications services provider to more easily scale capacity to meet current and future demands for data while utilizing more energy efficient technology. As the company accelerates its rollout of the NetSure HVT with 380V HVDC units, it will continue to rely on Vertiv as a trusted advisor, working in collaboration to help revolutionize the way the connected world communicates.

***Go online to learn more about how Vertiv can help you optimize your network for 5G.***

**Vertiv.com** | Vertiv Infrastructure Limited, Fraser Road, Priory Business Park, Bedford, MK44 3BF, VAT Number: GB188146827

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