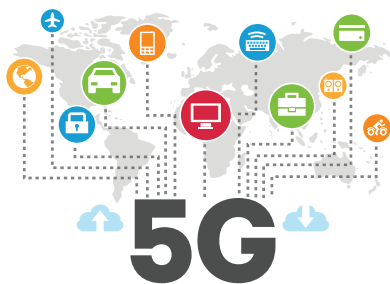




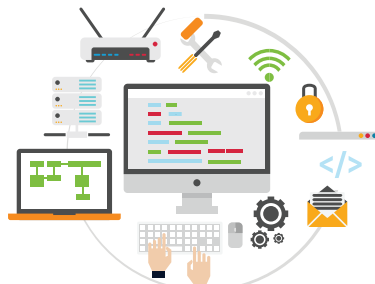
## Enabling a Hyperconnected Future: **VERTIV IN THE TELECOM SPACE**

### THE FUTURE OF TELCO



#### The (Long) Road to 5G

- Using cutting-edge technology, 5G is said to enable super-fast connections with average Wdownload speeds of around 1GBps
- 5G is expected to support the Internet of Things (IoT) revolution, providing the connectivity and bandwidth needed to support loads of data being generated by a multitude of devices
- With 5G expected to be launched by 2020, telco providers are in a race to have the right infrastructure to support this technology
- Having the right infrastructure and overall strategy is essential in the race to 5G



#### SDN/NFV Opportunities

- While often associated with data centers, SDN has the potential to transform the telecom space and bring with it tremendous advantages
- SDN improves the ability of carriers (both wired and wireless) to flexibly deliver bandwidth on demand' allowing for greater personalization of data usage for consumers
- NFV, meanwhile, has the potential to replace traditional network devices with software, delivering speed while reducing costs
- These new technologies require telco operators to employ a different approach to managing network through end-to-end visibility



#### Sustainable, Hyperconnected World

- Telco operators face the challenge of enabling connectivity for consumers in far-flung locations
- Lack of available resources can be challenging
- Alternative sources of energy such as solar or wind are viable especially for those in rural locations

# INFRASTRUCTURE CHALLENGES



## Telecom Core

- The telecom core network supports a vast array of functions within the network, from supporting and enabling mobile and web services; hosting cloud and colo offerings; and handling backend IT requirements of the business. By supporting different IT functions, the telecom core becomes prone to high heat densities due to an increase in computing requirements.
- With 5G quickly evolving from myth to reality, operators must reevaluate their existing infrastructure to ensure that it is able to support a high-density computing environment
- Many operators' core data centers are designed in a small footprint, making it prone to heat challenges with the expected high-density computing brought by 5G and IoT
- The challenge, therefore, is optimizing the existing infrastructure for maximum reliability and efficiency, while ensuring flexibility and adaptability to future needs
- Next-gen power and cooling solutions, racks and containment that can protect critical equipment and sensitive data are vital
- As mobile & wireless services become critical, downtime is not an option. Having a disaster recovery plan with the right infrastructure is vital.



## Telecom Edge

- Consumers today are craving for more data and faster broadband speeds. Against this backdrop, operators are faced with the challenge of expanding their network footprint and bringing connectivity closer to customers to avoid customer churn
- With a wide network across scattered locations, operators must reduce latency for its customers and ensure data sovereignty
- Relying on the core data center may not be effective and cost-efficient for telco operators. Strengthening the network edges then must be considered
- Converged, fully-integrated solutions are ideal for edge sites, with their rapid deployment features, fully configured design and small footprint

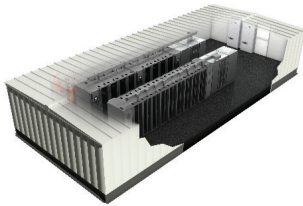


## Access Network

- Many telco operators are in the process of connecting consumers in far-flung, rural areas. But laying or connecting power cables in remote areas can be a challenge
- Managing and maintaining power in remote sites require the use of generators; and diesel deliveries can be hampered by poor weather conditions and other causes of delays
- Where resources are available, hybrid/alternative sources of energy are a viable
- Protecting vital broadband enclosures from the harsh environment is of critical importance to maintaining connectivity and reliability
- Maintaining efficiency and low footprint in these areas is also essential. High efficiency rectifiers are viable in these locations
- Customization feature depending on location and customer needs

# VERTIV CORE TO EDGE SOLUTIONS

## Integrated Modular Solutions



- Prefabricated data centers that offer high availability, flexibility and efficiency
- Ideal for remote deployments, disaster recovery sites or back-up locations
- Simplified, standardized designs reduces build time compared to traditional approach



### SmartAisle™

- Pre-configured, rapidly deployable integrated IT infrastructure for core deployments
- Replaces traditional bricks-and-mortar design with flexible, efficient solutions



### NetSure™ HVT E02 CA1/CN1

- Enhanced system reliability by removing conversion equipment, thereby reducing power losses
- Smaller foot print
- No Load balancing issues
- No harmonic issues
- Eliminates the need for paralleling and synchronization
- Improved overall electrical efficiency
- Lower heat load



## Data Center Facility Manager

Vertiv's Facility Manager is an integrated, cost-effect, and real-time infrastructure management solution that helps your IT and facilities organizations to realize their objectives.



## Telecom Monitoring System

- Reduce the total cost of ownership (TCO) and OPEX of Telecom Infrastructures/ Facilities
- Proactively manage energy usage
- Predict infrastructure/facility failures before they occur
- Optimize network power and environment
- Communicate with and control heterogeneous equipment with different communication protocols and physical interfaces
- Automate policies and heuristic procedures to reduce operational costs
- Extend the useful life of existing Telecom Infrastructures/ Facilities



### SmartCabinet™

- Integrated, pre-configured infrastructure that brings "plug-and-play" convenience to small spaces and edge locations
- Offers high efficiency and availability with the Liebert ITA2 UPS and integrated Thermal Management solution
- Comes with intelligent monitoring capabilities through the Liebert RDU software



### Liebert® ITA2 (5 - 20kVA)

Compact, Efficient & Robust UPS For Critical Applications



### SmartRow™ Plus

- Rapidly deployable IT infrastructure for core or branch deployments
- Integrated with full suite of power, cooling and monitoring solutions for maximum efficiency and availability
- Expandable and flexible depending on IT requirements



### Liebert® CRV+

- Compact design allows cooling to be delivered closer to heat source
- EC fan allows energy savings of up to 30%

## Off-Grid Hybrid System

- Fully tested and integrated system at the factory before arriving at the site



- Modular replacement components for solar and wind converters and all power conversion equipment
- Provides protection/distribution for -48 volt DC customer loads



## Outdoor Enclosures

Multi-purpose enclosures for outdoor applications. The outdoor cabinets and enclosures protect an array of electronic equipment at remote sites

## E-Base Indoor Power System

- Small foot print (Optimizes use of space)
- Reduces cooling power usage through contained airflow, and high efficiency technologies
- High Energy Efficiency Ratio(EER)
- Centralized High Efficient Power supply
- Deployable in <= 6hrs
- Integrated intelligent monitoring system
- Flexibility in future expansion
- Future Proof Infrastructure



### NetSure™ 531 C41 Wall-mounted Power Supply System



### NetSure™ 731 48V DC Power System



## Vertiv optimization services

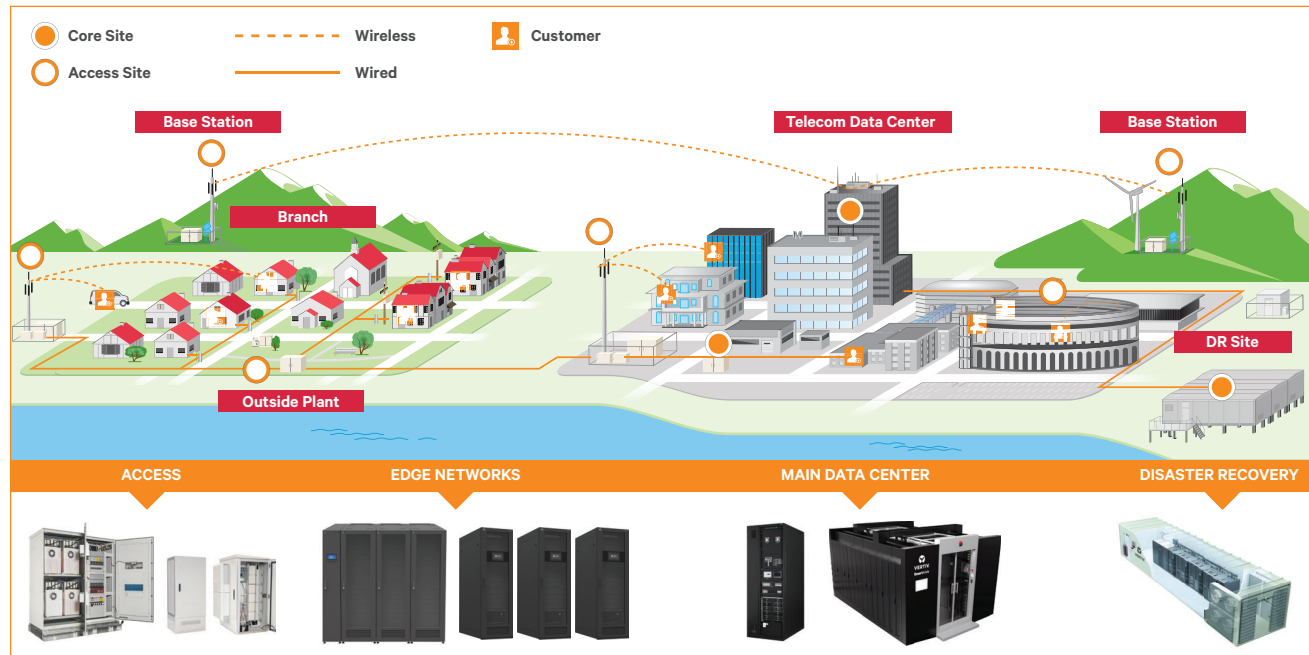
Reduce energy consumption through strategic power and cooling optimization in the data center.



## Service

Maximize your investments and prevent delays or repeated work with effective product planning, selection and deployment.

## VERTIV END-TO-END CRITICAL INFRASTRUCTURE



### VODAFONE NEW ZEALAND



#### Overview

Vodafone is one of the world's largest telecommunications companies. In New Zealand, it faced the challenge of bringing connectivity to remote locations where there is no grid power or other reliable sources of energy.

#### Vertiv Solution

- Hybrid Energy Storage System

### TELECOM PROVIDER IN INDONESIA



#### Overview

The customer needed a reliable power and cooling solution for its data center modernization program.

#### Vertiv Solution

- Integrated Modular Solution
- Liebert® NXa
- Liebert® PEX

### CHORUS NEW ZEALAND



#### Overview

Moving away from traditional bricks and mortar IT, the telco provider was looking for an infrastructure that can provide redundancy and support disaster-recovery initiatives.

#### Vertiv Solution

- SmartAisle™

### MAJOR TELCO PLAYER IN JAPAN



#### Overview

This telco player was facing challenges of high heat load in its data center, making it prone to outages and equipment breakdowns.

#### Vertiv Solution

- Liebert® PEX

#### Remote & Site Monitoring Services

##### System-wide monitoring solutions

- 24 hour help desk support by expert engineers
- Remote preventive maintenance for proactive identification of anomalies
- Remote battery testing
- Alarm management
- Field incident resolution
- Equipment optimization advice
- 24/7 customer access via internet
- Third party equipment integration
- Customized reports
- Integration with high level platforms via SNMP

#### LIFE™ Remote Monitoring & Diagnostics

##### Maximized system availability via real-time diagnosis and resolution of operating anomalies

- 24 hour monitoring and service delivery by expert engineers
- Monitoring and trending of system data
- Diagnosis through expert data analysis allowing effective proactive maintenance and prevention of future anomalies
- Prompt alarm identification and resolution
- Alarm notification
- On-site corrective maintenance dispatching
- Third party equipment integration
- Customer reporting

#### Vertiv Data Center Optimization Services

##### Complete infrastructure audits maximize system availability and enhance data center efficiency

- Airflow, heat and power assessments
- Temperature measurements
- Floor plan layout
- Reporting
- Recommendation
- EC fans enhance energy savings on installed equipment
- iCOM Control enables modern communication capabilities of multiple units

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