LIQUID CUBE PLATFORM

PURPOSE

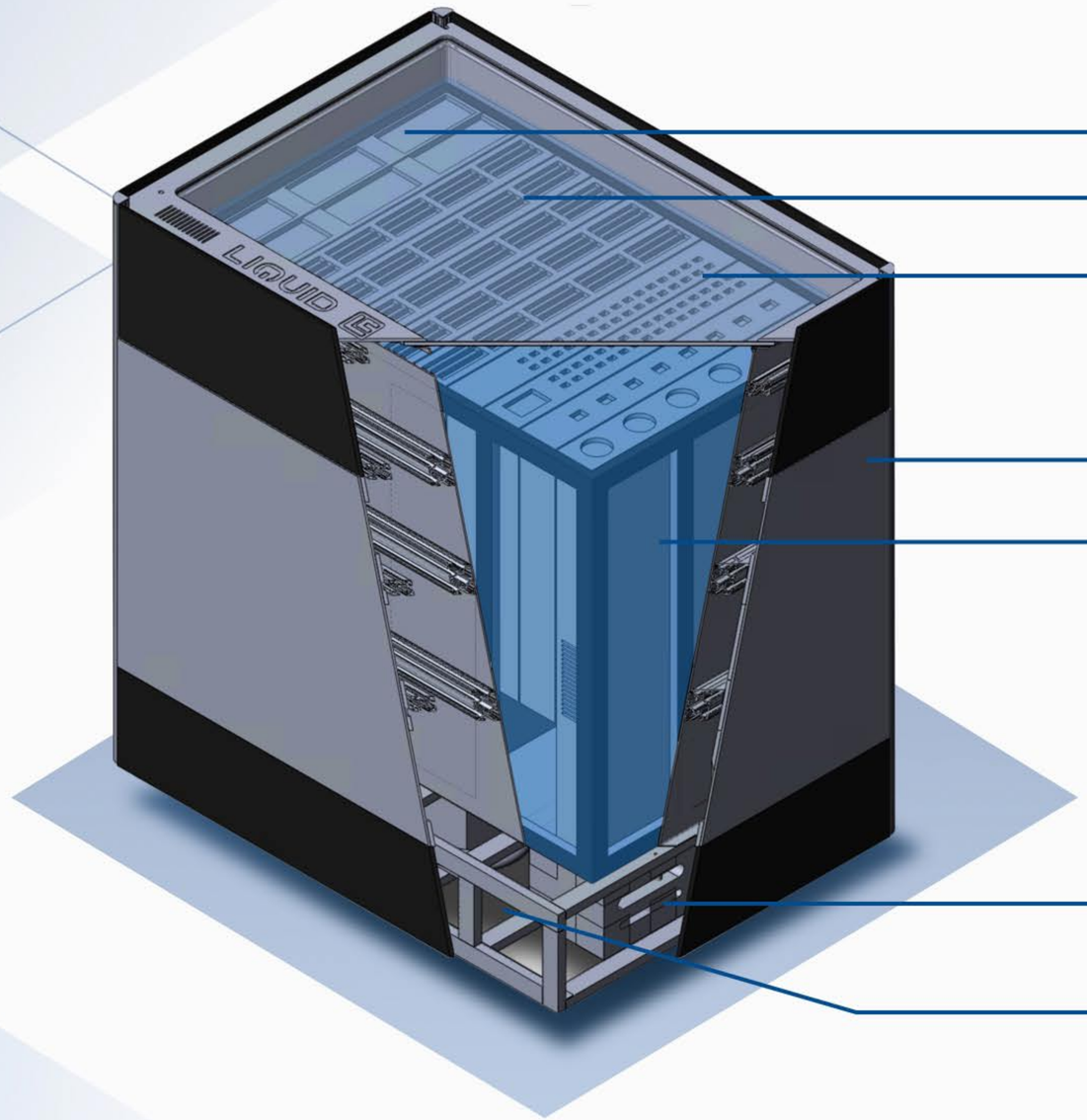
LIQUID CUBE Platform is the computing and communication complex integrated with electronic modules and electrical components direct liquid cooling system

Designed for a wide range of information and technology solutions in various application areas

The solution appliance grants the maximum benefits in the following areas: any scale data centers, blockchain networks, supercomputing nodes, information security complexes, mobile and distributed computing systems

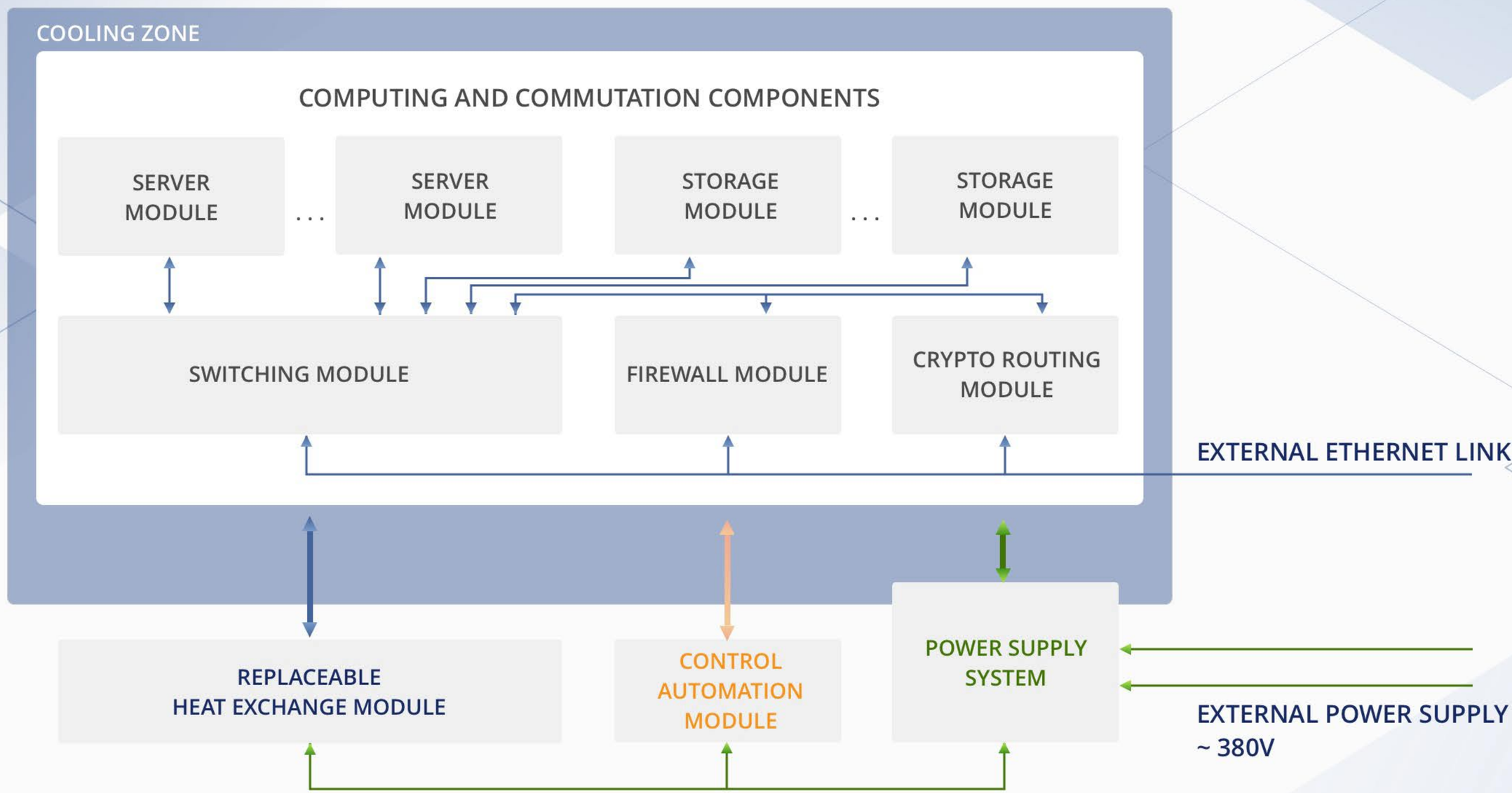
COMPOSITION

LIQUID CUBE PLATFORM CONSISTS OF THE FOLLOWING MAIN COMPONENTS



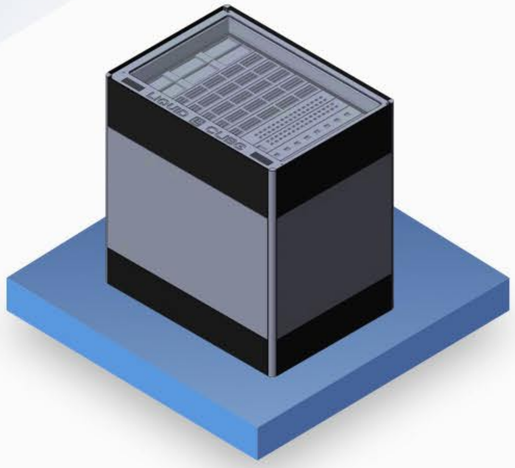
- Storage subsystem
- Computing subsystem
- Communication subsystem
- External housing
- Power supply system
- Technological processes management subsystem
- Direct liquid cooling system

ARCHITECTURE



MANUFACTURING VERSIONS

LIQUID CUBE PLATFORM MAY HAVE THE FOLLOWING ALTERNATIVE DESIGNS:



OFFICE DESIGN

DATA CENTERS DISIGN

SPECIAL / MOBILE DESIGN

special / mobile design, including the design for allocation outside the capital structures and structures

OFFICE CONSTRUCTION

LIQUID CUBE PLATFORM IS ORIENTED ON THE ELECTRONIC COMPONENTS INSTALLATION OF THE FOLLOWING FORM-FACTOR STANDARDS:

- 21" - OCP basic constructive standard (21" Open Rack)
- 19" - the basic rackmount standard

PLATFORM STANDARD "OFFICE" DESIGN PARAMETERS:

- **Height** - 1300 mm
- **Width** - 800 mm
- **Length** - 1200 mm
- **Equipment maximal mounting depth** - 800 mm
- **Platform equipment maximal mounting space** - 23 RU
- **1RU maximal power load** - 1kW
- **Coolant volume** - up to 500 liters
- **Active equipment placement direction** - vertical

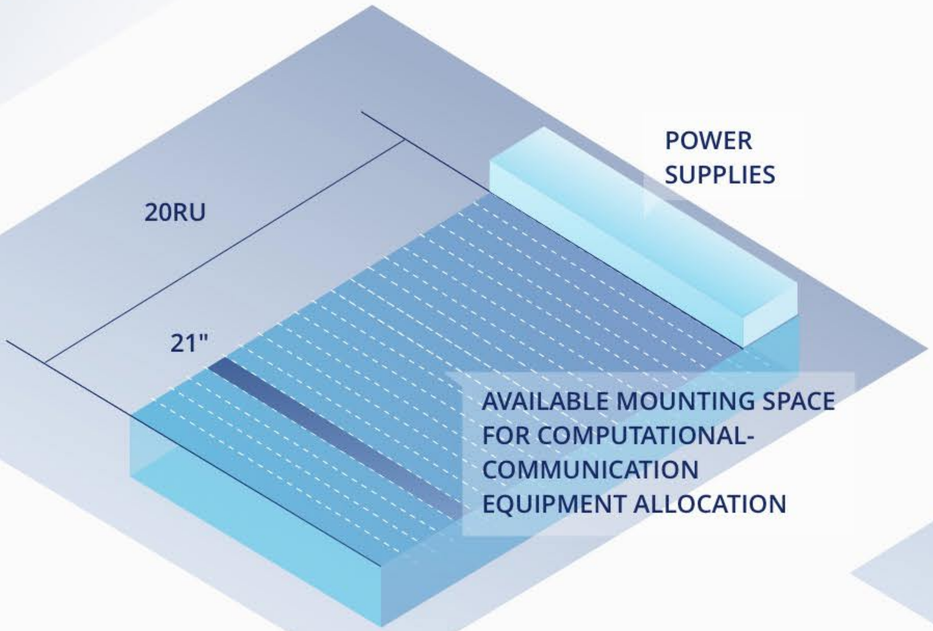
PLATFORM "DATA CENTER“ DESIGN PARAMETERS:

- **Required computer room space** - not more then 3 sq. meters
- **Total data center space required** - not more than 4 sq. meters

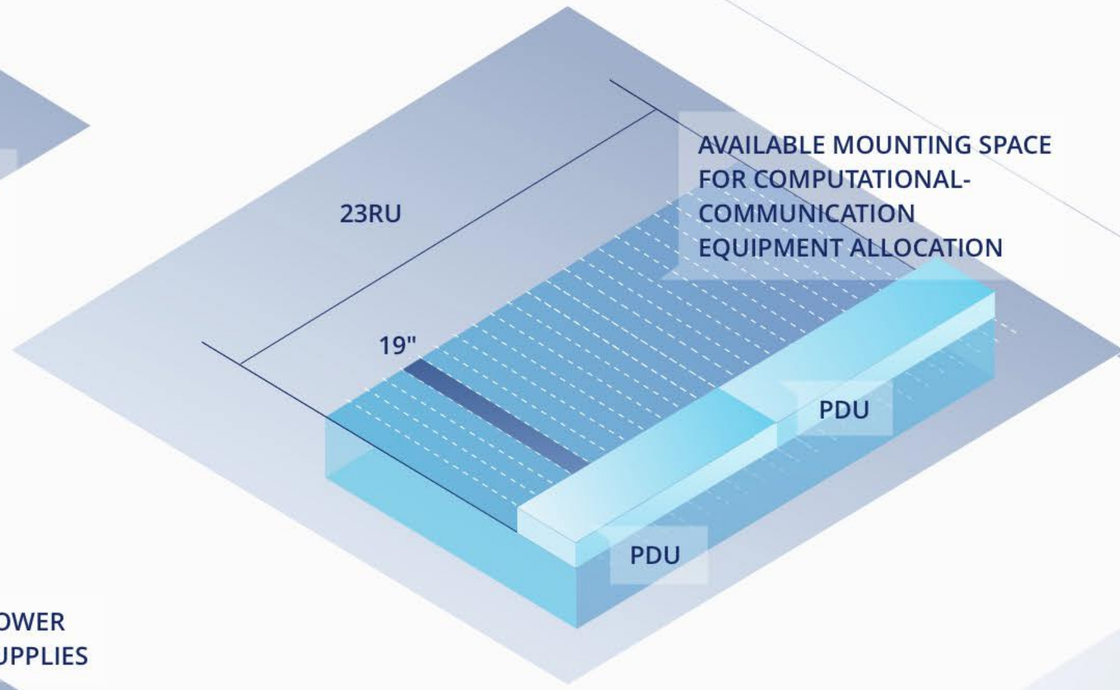
OFFICE CONSTRUCTION

DIFFERENT FORM-FACTOR STANDARDS EQUIPMENT PLACEMENT RULES

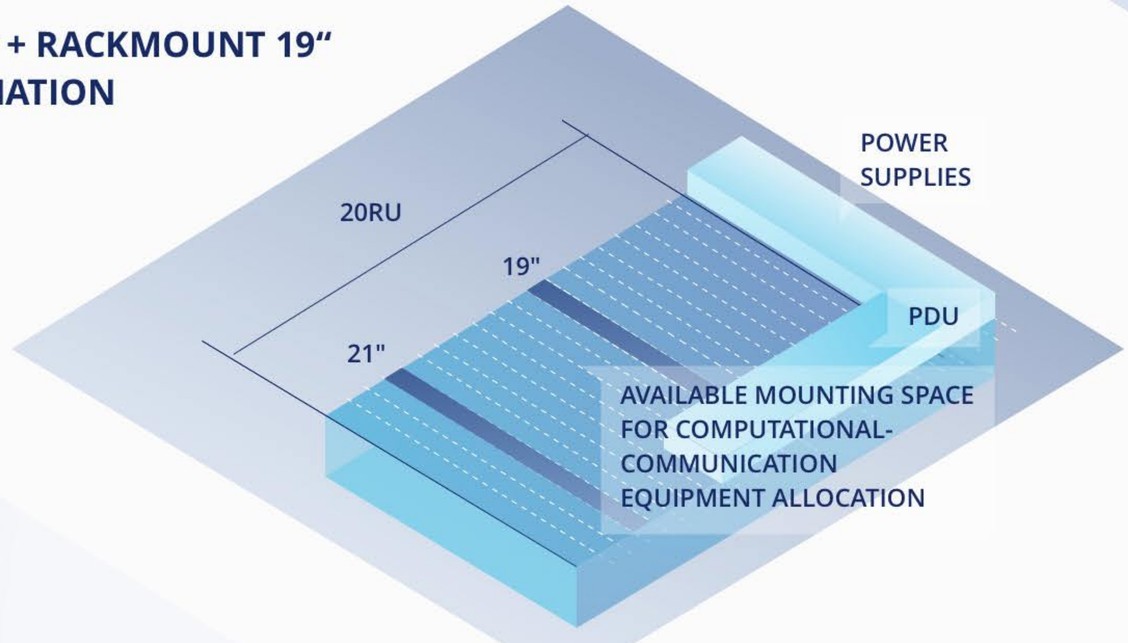
21" OCP EQUIPMENT



RACKMOUNT 19" EQUIPMENT

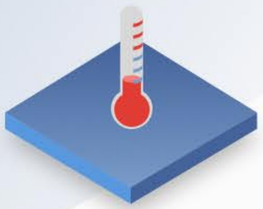


21" OCP + RACKMOUNT 19“ COMBINATION



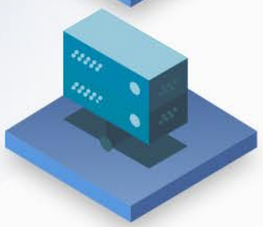
CONSTRUCTIVE

DESIGN ADVANTAGES



Providing the thermostable mode of operation of the electronic components

Lack of dust and elimination of the dustiness related problems



The platform design provides the ability to apply various manufacturers server nodes and storage systems supporting OCP standard

significant cooling equipment energy cost reduction benefit

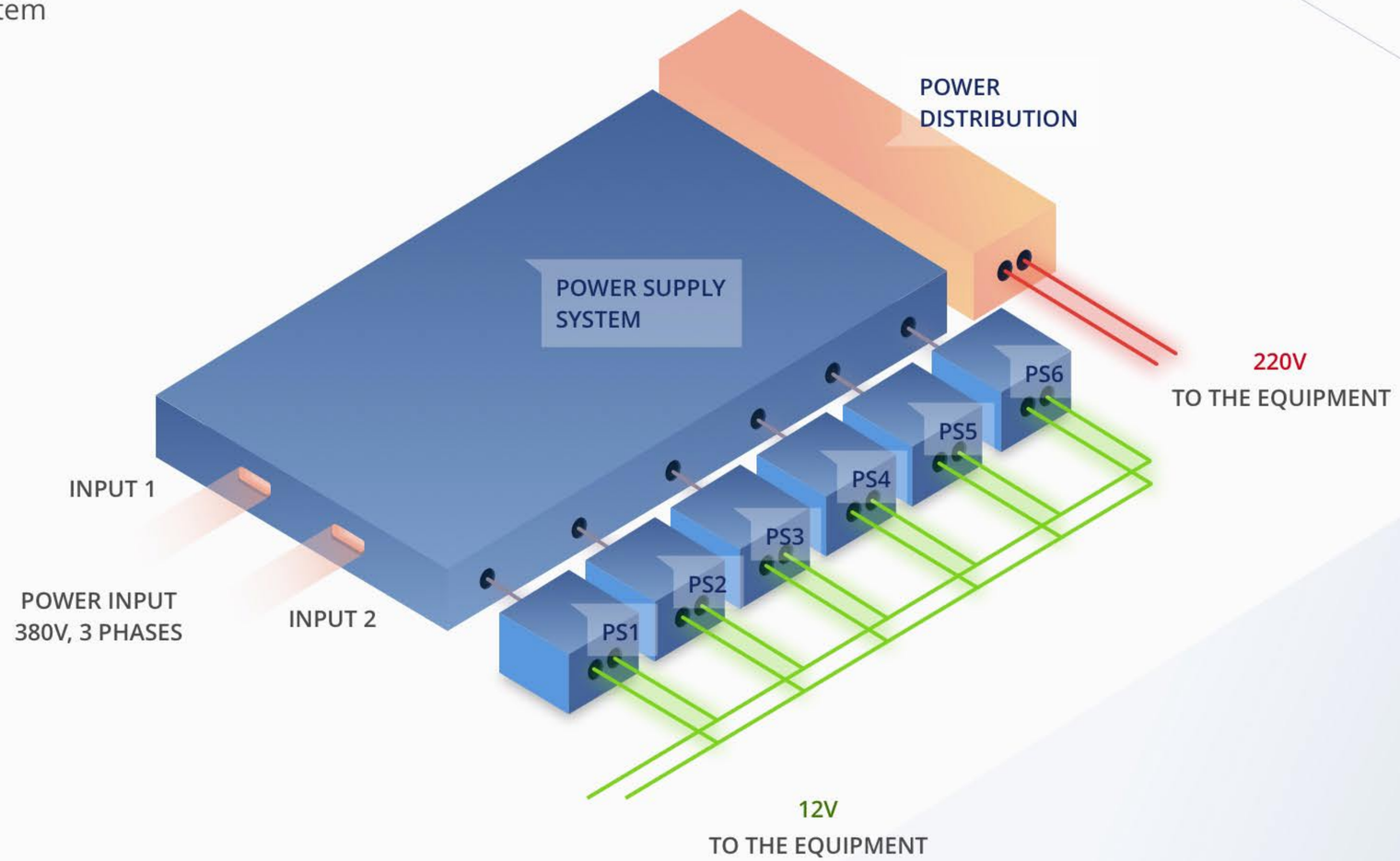
Allocated equipment energy density increasing:
2 standard 19" 7.5 kW racks = 1 LIQUID CUBE platform - 15 kW

POWER SUPPLY

LIQUID CUBE PLATFORM HAS THE FOLLOWING POWER SUBSYSTEM FEATURES:

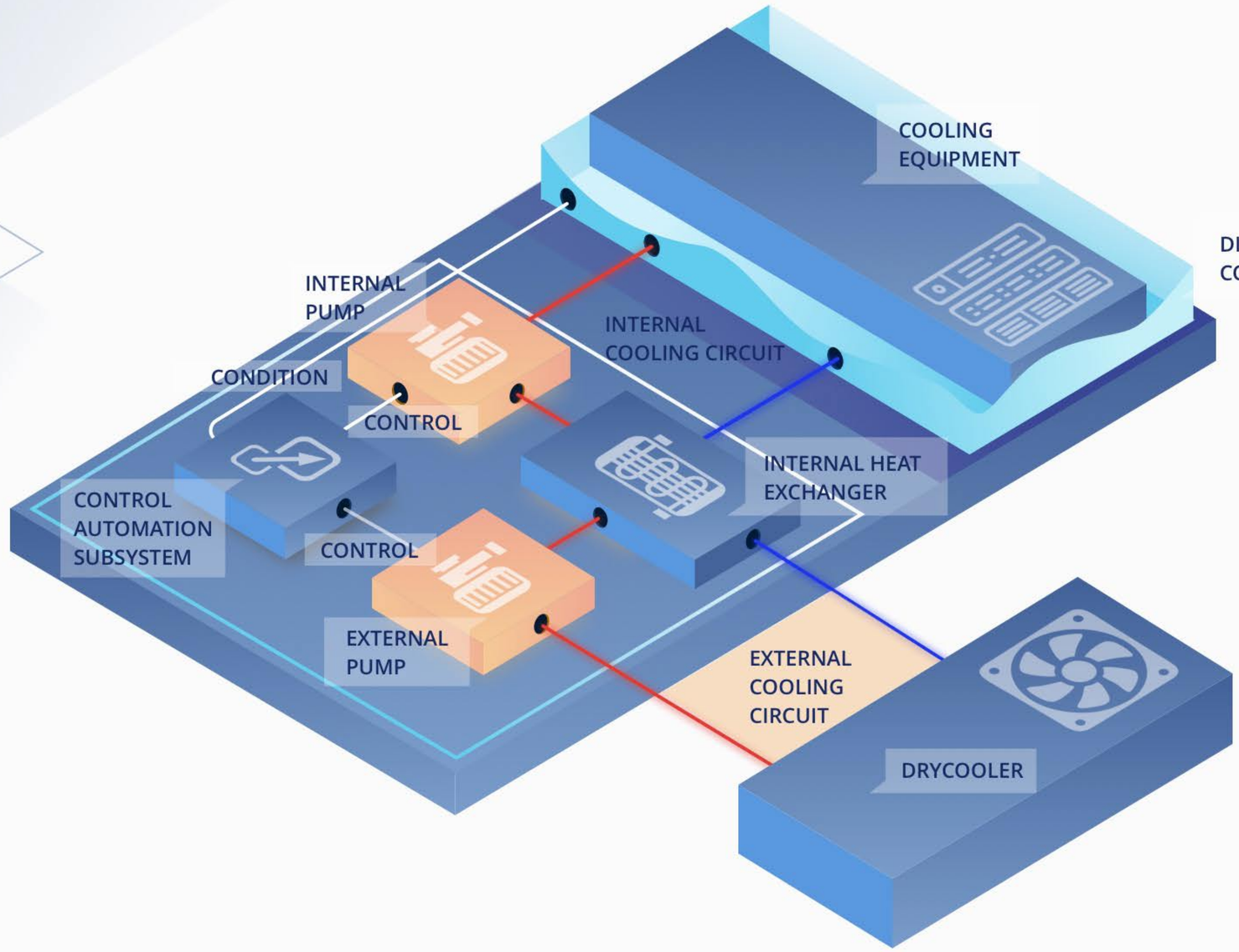
- dual redundant input power line AC 380 V (3 phases)
- OCP 21" Open Rack standard 12 V DC power bus lead for the equipment
- power supply for OCP standard 21" equipment (12 V) redundancy (N + 1)
- standard AC 220 V power:
  - for standard 19" rackmount equipment
  - for process control subsystem
  - for direct liquid cooling system

PLATFORM POWER SUPPLY SYSTEM SCHEME



LIQUID COOLING SYSTEM

LIQUID CUBE PLATFORM IS EQUIPPED WITH DOUBLE-LOOP DIRECT LIQUID COOLING SYSTEM WITHOUT COOLANT PHASE TRANSITION

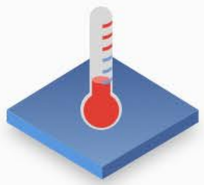


COOLANT

LIQUID CUBE PLATFORM IS USING THREE TYPES OF THE DIELECTRIC LIQUID COOLANT FOR ELECTRONIC COMPONENTS COOLING FOR THE DIFFERENT PLATFORM DESIGNS:

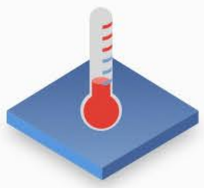
OFFICE DESIGN

external environment temperature +5°C ÷ +40°C



DATA CENTER DESIGN

external environment temperature 0°C ÷ +40°C



SPECIAL DESIGN

external environment temperature -50°C ÷ +50°C

DIELECTRIC LIQUID COOLANTS HAVE THE FOLLOWING MAIN CHARACTERISTICS:

DIELECTRIC

breakdown voltage - 22 kV

INCOMBUSTIBILITY

flash point in the open crucible - above 150°C

SAFETY

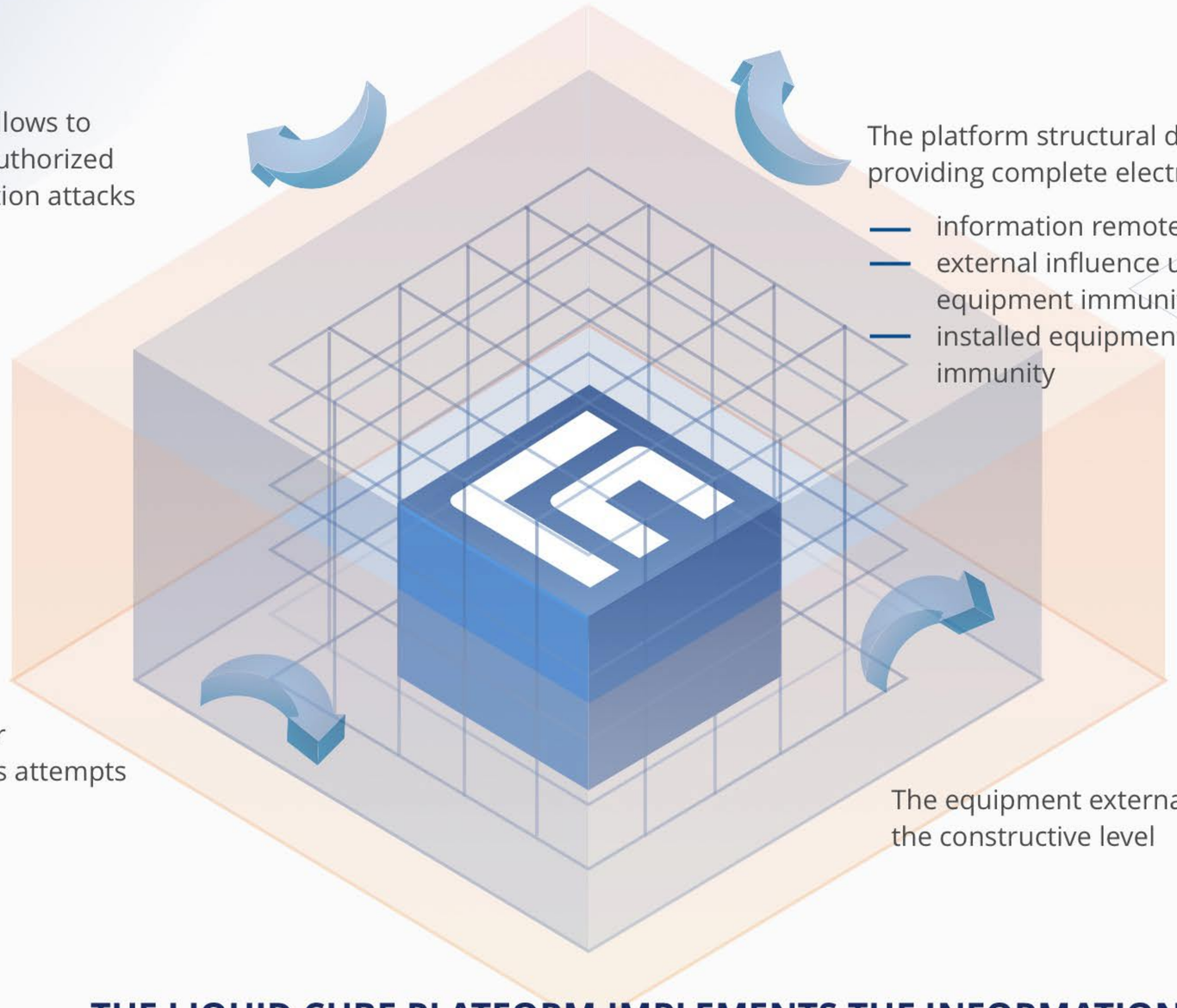
safe for humans and the environment

TEMPERATURE

high boiling point (above 240°C)

PLATFORM IMMUNITY AND PROTECTION

The firewall usage allows to provide system unauthorized access and information attacks protection



The platform structural design is a **"Faraday shield"** providing complete electric fields shielding:

- information remote access immunity;
- external influence upon the installed equipment immunity;
- installed equipment electromagnetic noise immunity

Remote control over unauthorized access attempts

The equipment external influence physical protection at the constructive level

THE LIQUID CUBE PLATFORM IMPLEMENTS THE INFORMATION SECURITY COMPLEXES (ISC):

Certified equipment usage

FEATURES

LIQUID CUBE PLATFORM GRANTS THE FOLLOWING ADVANTAGES:

- the higher computing resources density achievement
- the virtual and physical resources managing and monitoring
- comprehensive usage
- high range physical protection
- low noise level
- operational reliability
- the equipment life cycle prolongation
- CAPEX reduction by 50% and OPEX reduction by 30% and more
- low-maintenance and unattended nodes creation

APPLICATION

POSSIBLE LIQUID CUBE PLATFORM APPLICATION CASES

HYPERCONVERGENT SYSTEM

TRANSPORT TOLL COLLECTION SYSTEM LIQUID CUBE BASED DATACENTER

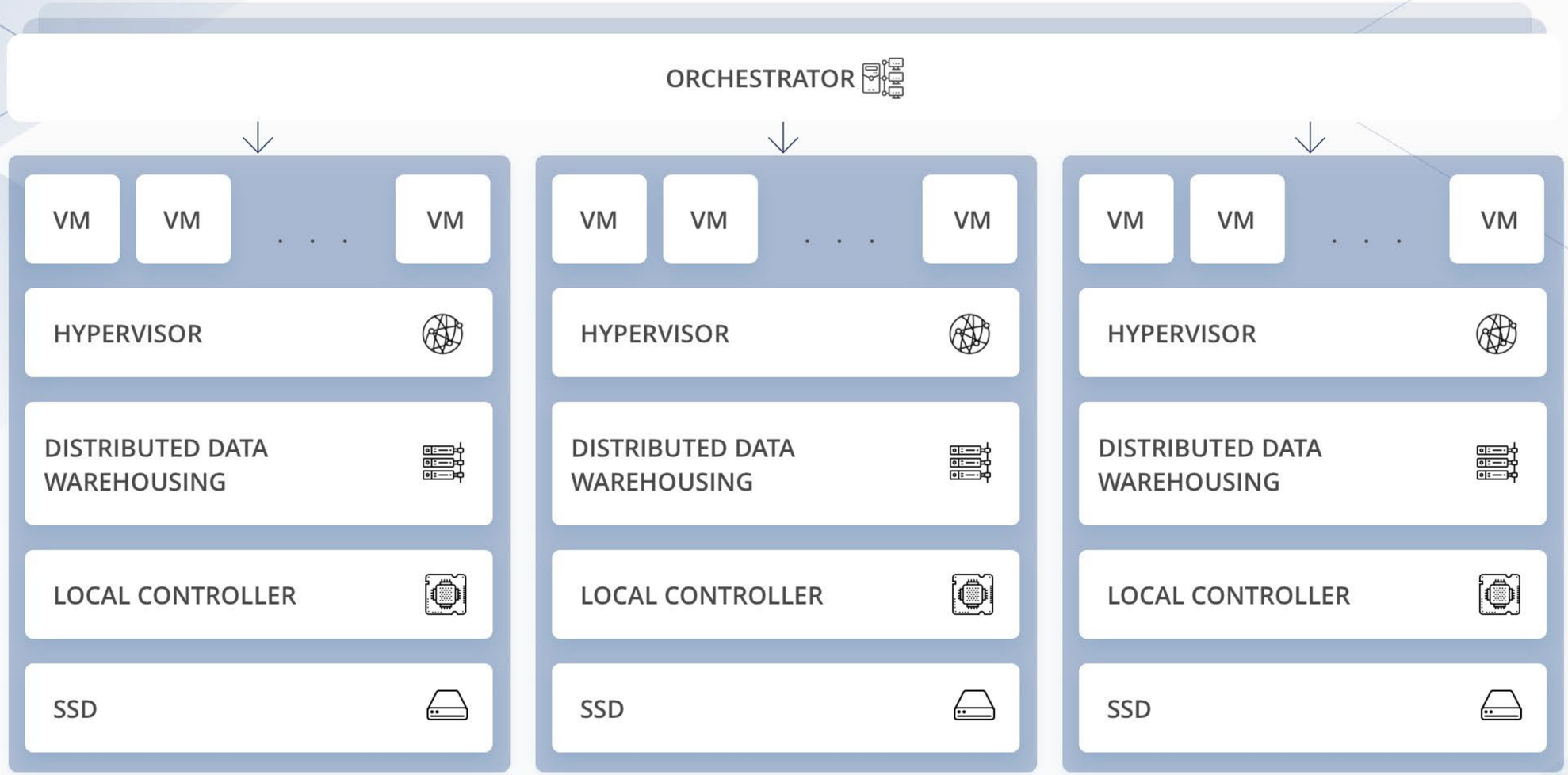
DISTRIBUTED INFORMATION NETWORKS

A TYPICAL SOLUTION FOR BUILDING A DATA CENTER

POSSIBLE PLATFORM APPLICATION CASES

Hyperconvergent system - one of the standard solutions based on the LIQUID CUBE platform, providing a wide range of tasks, high reliability and efficiency

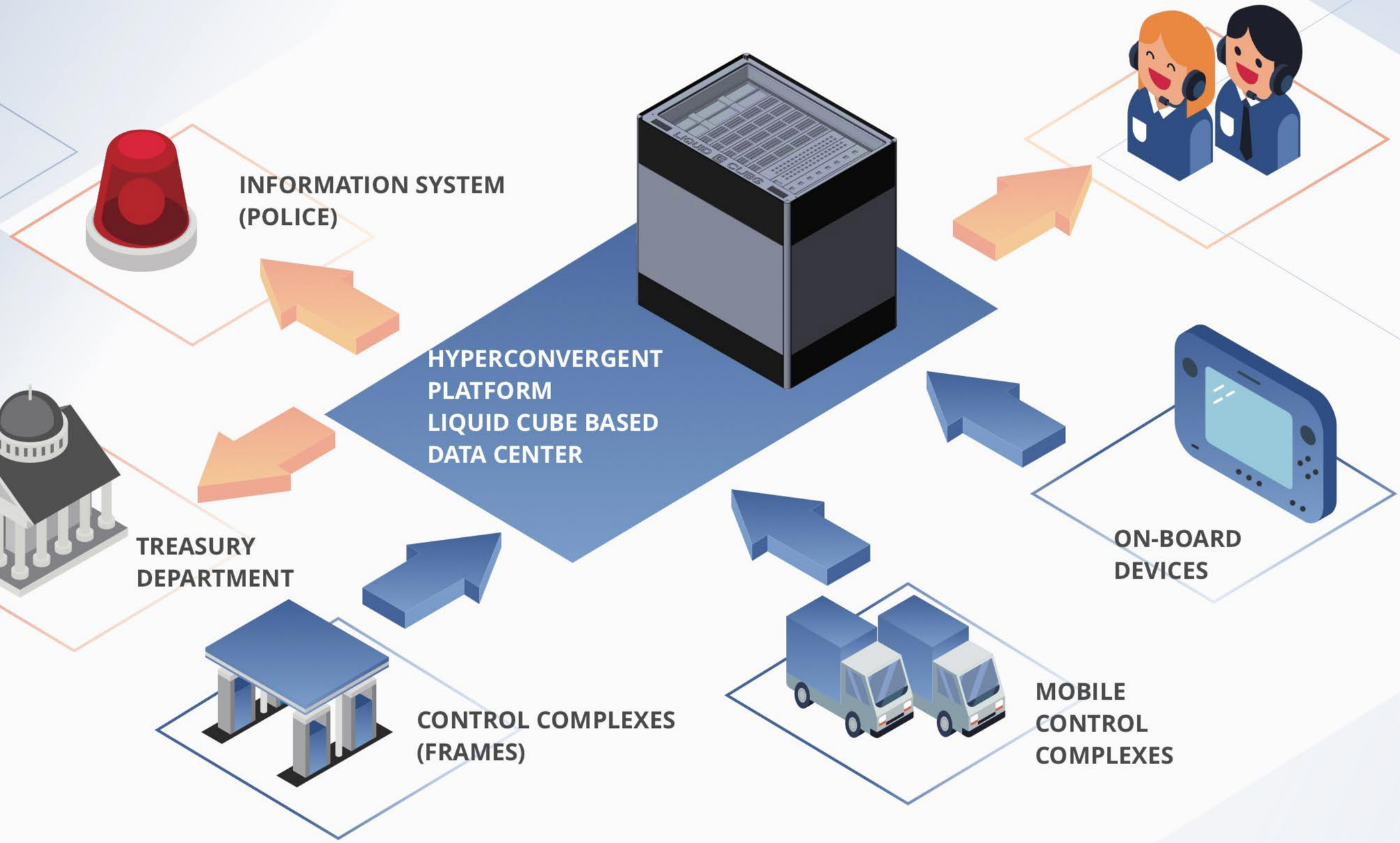
STRUCTURE OF CONSTRUCTION



- Typical nodes are aggregated into one cluster - the block
- Individual nodes storage resources are combined into a single distributed data store
- Adding new nodes / blocks increases the computing and storage resources
- The orchestrator can operate on any cluster node

POSSIBLE PLATFORM APPLICATION CASES

TRANSPORT TOLL COLLECTION SYSTEM

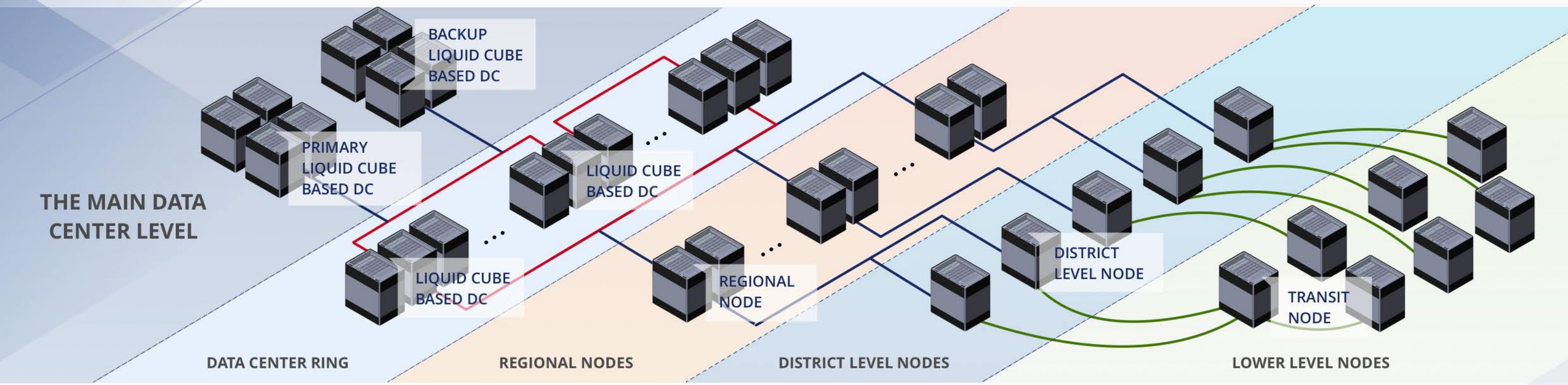


POSSIBLE PLATFORM APPLICATION CASES

DISTRIBUTED INFORMATION NETWORKS

Hyperconvergent platform LIQUID CUBE provides the ability to build distributed networks from corporate (corporate cloud) to the regional level.

Flexibility and scalability is achieved due to the ability to diversify the platform with network resources, processing power and storage.



DATA CENTER LEVEL

REGIONAL LEVEL

DISTRICT LEVEL

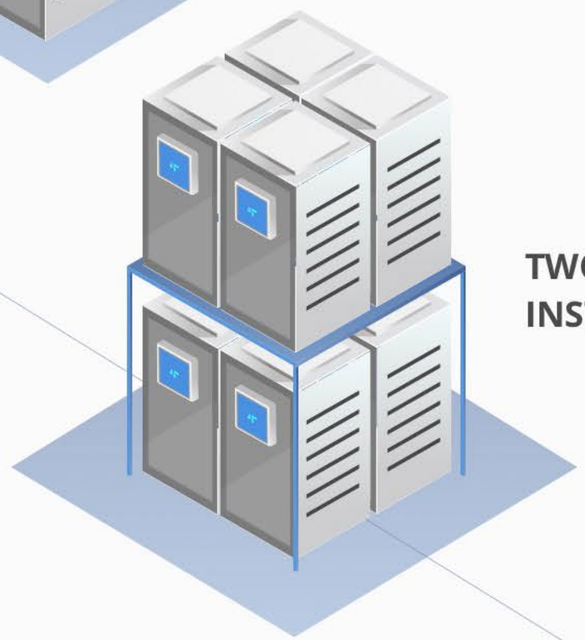
ACCESS NODES LEVEL

The distributed processing and data storage combined with the ability of rapid deployment and operation in any climate zone virtually anywhere (including deployment outside buildings and capital facilities), as well as the high energy efficiency of the LIQUID CUBE platform, enables the deployment of a system of any scale with the total cost of ownership minimization.

THE BASE SOLUTION FOR DATA CENTER CREATION

STANDALONE INSTALLATION

BLOCK OF 4 PLATFORMS INSTALLATION



TWO-LEVEL INSTALLATION

- Saving space / data center space reduction due to the innovative Liquid Cube design
- Multi-level allocation possibility (no air masses movement)
- Allocation without the capital construction
- Industrial solutions for installation and maintenance