方舟科技
FANGZHOU TECHNOLOGIES

Technical exchange report on data center construction

Guiyang Fangzhou Technology Co., Ltd

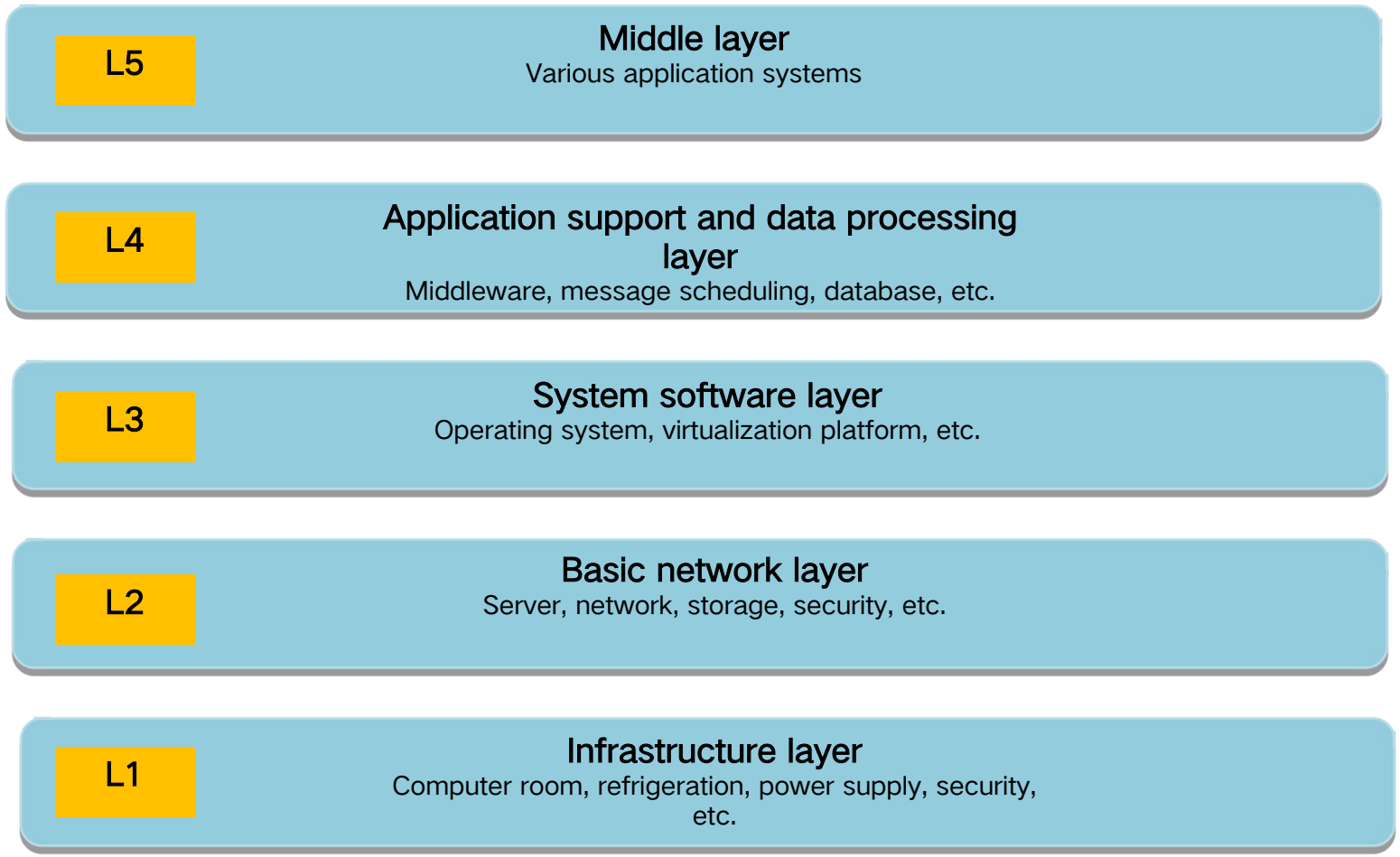
March 2024

Catalogue

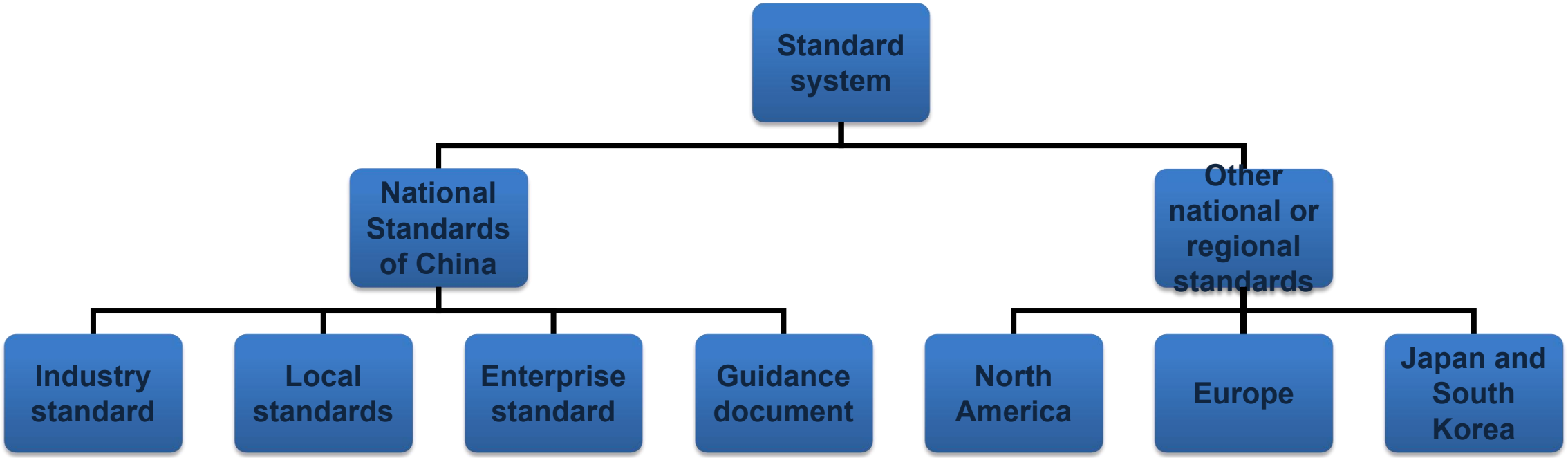
1. Data center infrastructure construction standards

方舟科技 FANGZHOU TECHNOLOGIES

1.1 overall structure of data center



1.2 Infrastructure standard system



1. Data center infrastructure construction standards

方舟科技 Fangzhou Technologies

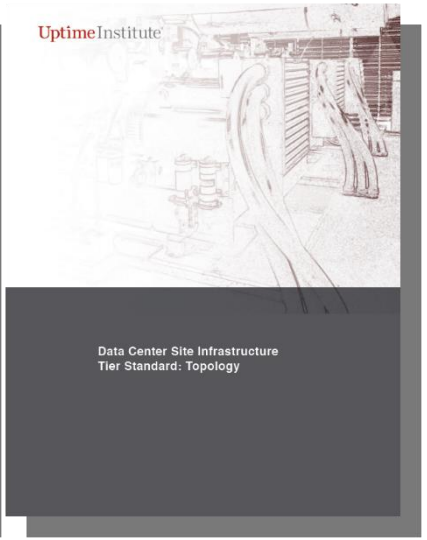
1.3 Common infrastructure standards

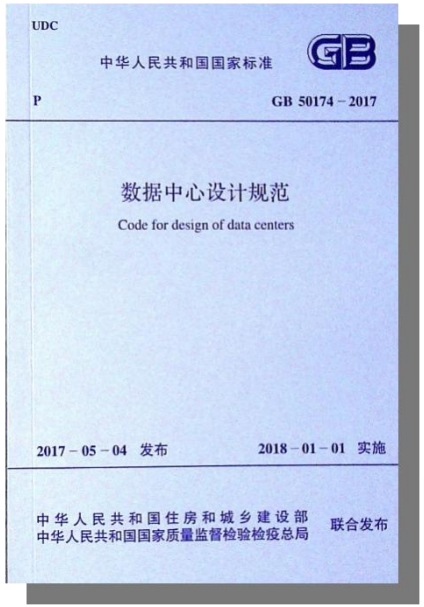
1) Various standards in China

- GB 50174-2017《Code for design of data centers》
- GB 50311-2016《Code for engineering design of generic cabling system》
- GB 50016-2014E《Code for fire protection design of buildings》
- YD 5193-2014《Design Specifications for Internet Data Center Engineering》

2) Various standards of other countries or regions

- Uptime Institute
- ANSI/TIA942-2017《Telecommunications Infrastructure Standard for Data Centers》
- ANSI/BICSI002《Data Center Design and Implementation Best Practices》
- BSEN50600-2016 《IT-Data center facilities and infrastructures》





1.4 Classification and comparison of China standards and other standards.

According to the availability, maintainability, safety and importance of the data center infrastructure, the standards classify the computer room from the aspects of site selection, building structure, computer room environment, safety management and quality requirements for power supply.

GB50174	TIA-942	Uptime	System configuration	Nature
Class A	T4	Tier IV	2N, 2(N+X) dual system running at the same time.	Fault tolerance type
/	T3	Tier III	(N+X) "Dual System": One for use and one for standby.	Parallel maintainable type
Class B	T2	Tier II	N+X single system	Redundant type
Class C	T1	Tier I	N single system	Fundamental type

1.5 Data Center Industry Comparison

	Internet giant	Emerging internet	Government departments at all levels	Basic telecom operator
Number of racks	When the national strategic layout is carried out, the demand is large.	Great growth potential and high demand uncertainty.	Self-owned and self-built computer room, with integration trend and policy orientation in the future.	Under the premise of competition and complementary resources, the possibility of cooperation is great.
Grade requirement	Own standard	Performance cost orientation	Common national or international standards	Standard reference only, pragmatism, customer orientation
Power density	Medium high density	High power	Medium and low power level	Medium-power
Function division	Configure as standard	Configure as required	Configure as standard	Compact layout, flexible and variable, divided by power density
New technique	Accept	Accept	Relatively conservative	Accept
Bandwidth requirement	High, three-wire access	High, three-wire access	Regular, private line	High, three-wire access
Network architecture attribute	Divided by business system	Divided by business system	Network architecture is complex	Divided by business system
Pue	The lower, the better	The lower, the better	Less attention	The lower, the better

2. Overall introduction of data center infrastructure

方舟科技 Fangzhou Technologies

2.1 Data Center Scale

Size classification of data centers in China:

Classify	Overall floorage (Square meters)	Standard rack (Frame)	Number of servers (Taiwan)
Very large data center	Building area ⩾60000	Rack ⩾10000	Server ⩾150000
Large data center	18,000 ⩽ Building area < 60,000	3000⩽ Rack < 10000	45000⩽ server < 150000
Medium-sized data center	3000⩽ Building area < 18000	500⩽ Rack < 3000	7500⩽ server < 45000
Small data center	Building area < 3000	Rack < 500	Server < 7500

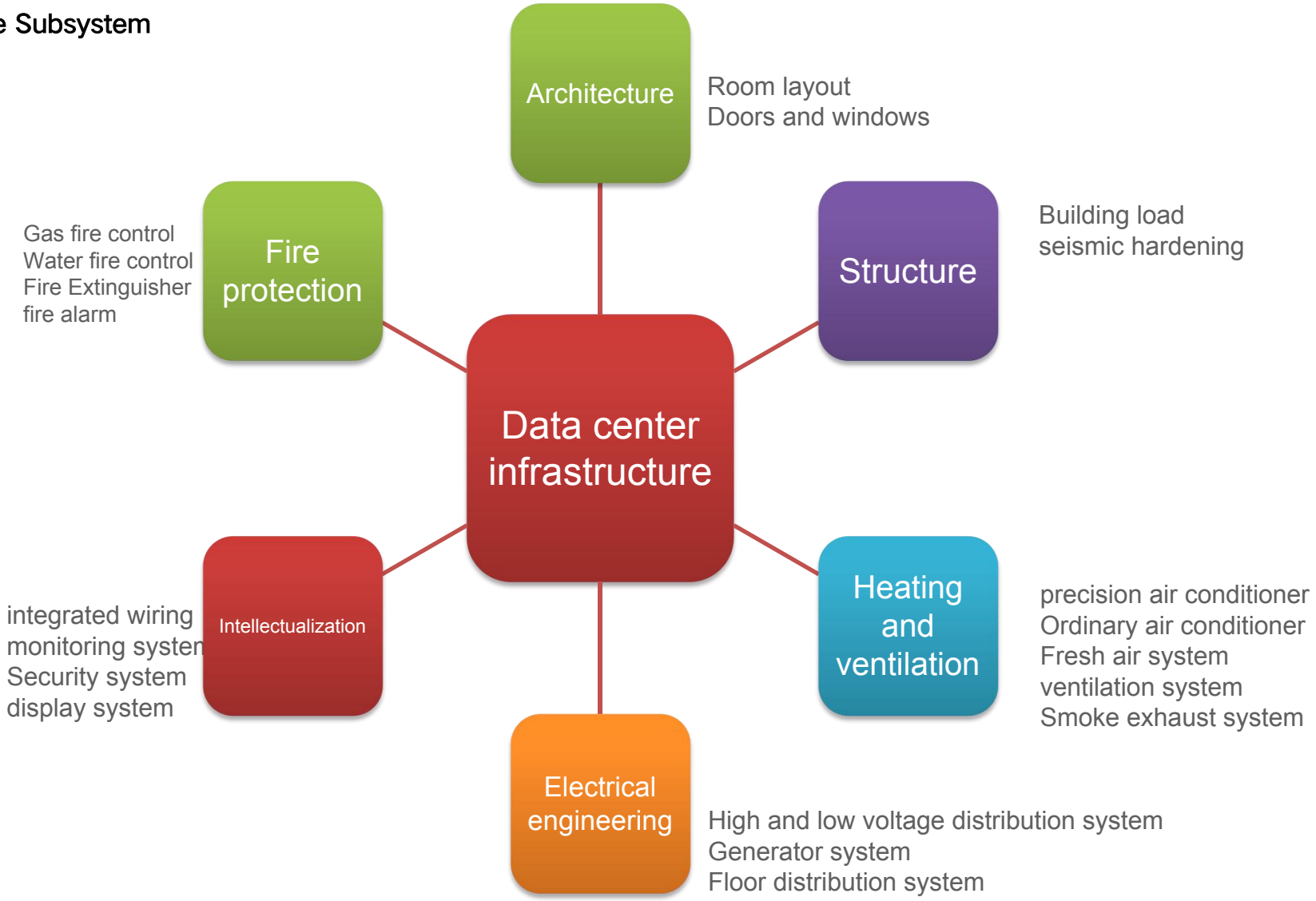
Remarks: The above calculation is based on 6 square meters/rack (referring to the average construction area occupied by a single rack) and 15 2U servers/rack.

Classify	National or regional type data centre	Provincial level data centre	City level data centre	County level and below data centre
Very large data center	※	※		
Large data center		※	※	
Medium-sized data center		※	※	
Small data center			※	※

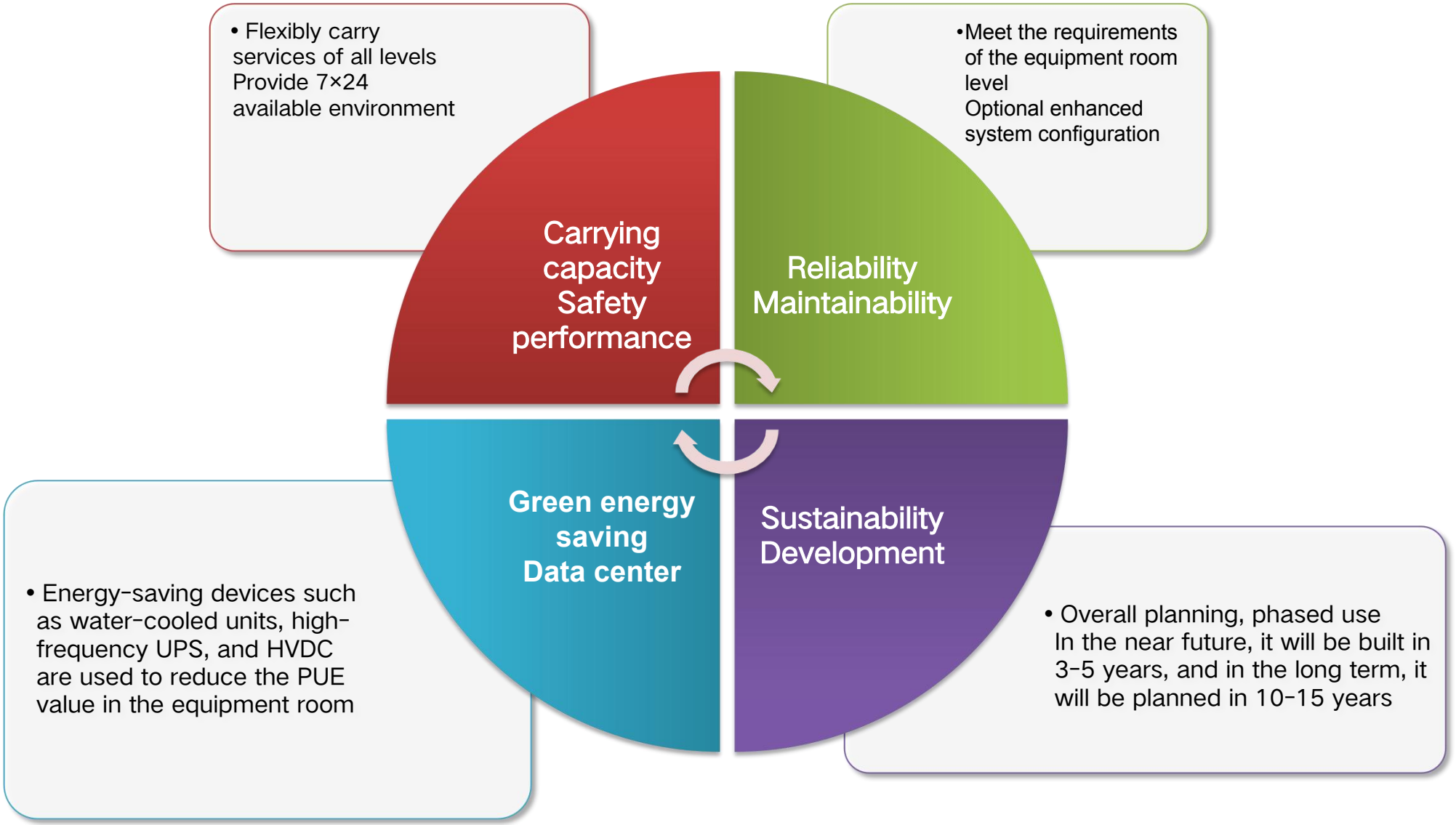
2.2 Data Center Planning Focus

方舟科技 Fangzhou Technologies

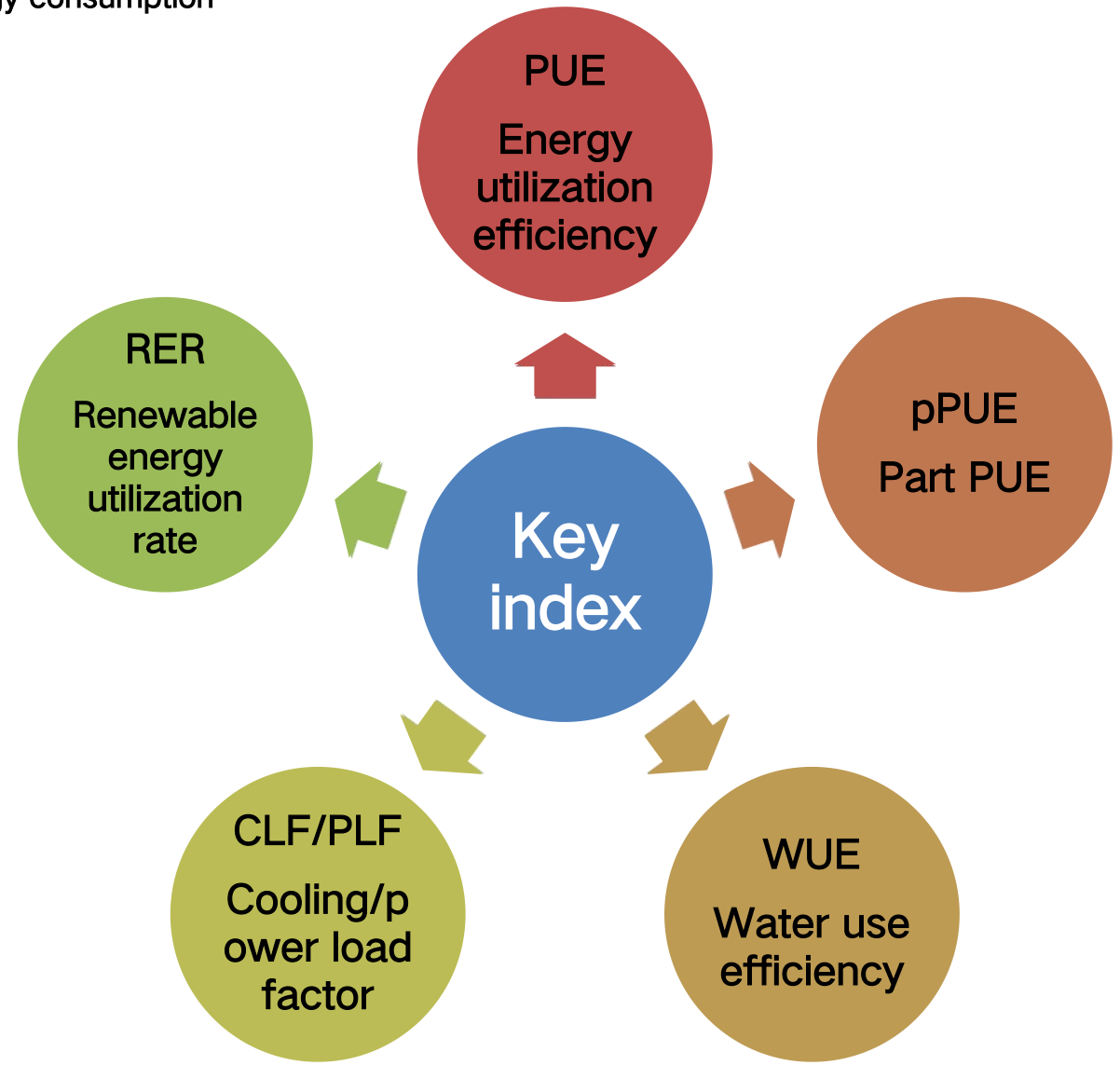
2.3 Data Center Infrastructure Subsystem



2.4 Data Center Construction Objectives



2.5 Key indicators of data center energy consumption



3.1 Data Center Building Subsystem

The data center mainly includes the main room, auxiliary area, support area, and administrative area

主机房

- Comprise a server room, a network room and a storage room.
- The main engine room generally accounts for 40% ~ 60% of the building area (empirical value).

辅助区

- Including wire feed room, test room, monitoring center, spare parts library, printing room, maintenance room, etc.

支持区

- Including power distribution room, diesel generator room, uninterruptible power supply system room, battery room, air conditioning room, power station room, fire control facilities room, etc.

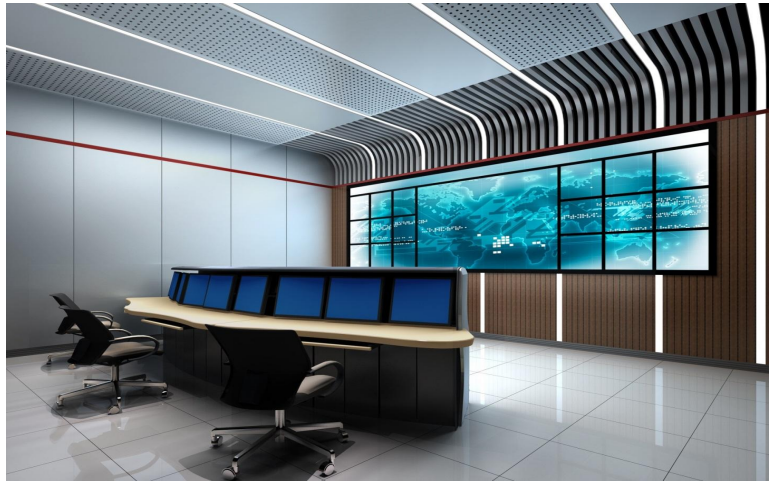
行政管理区

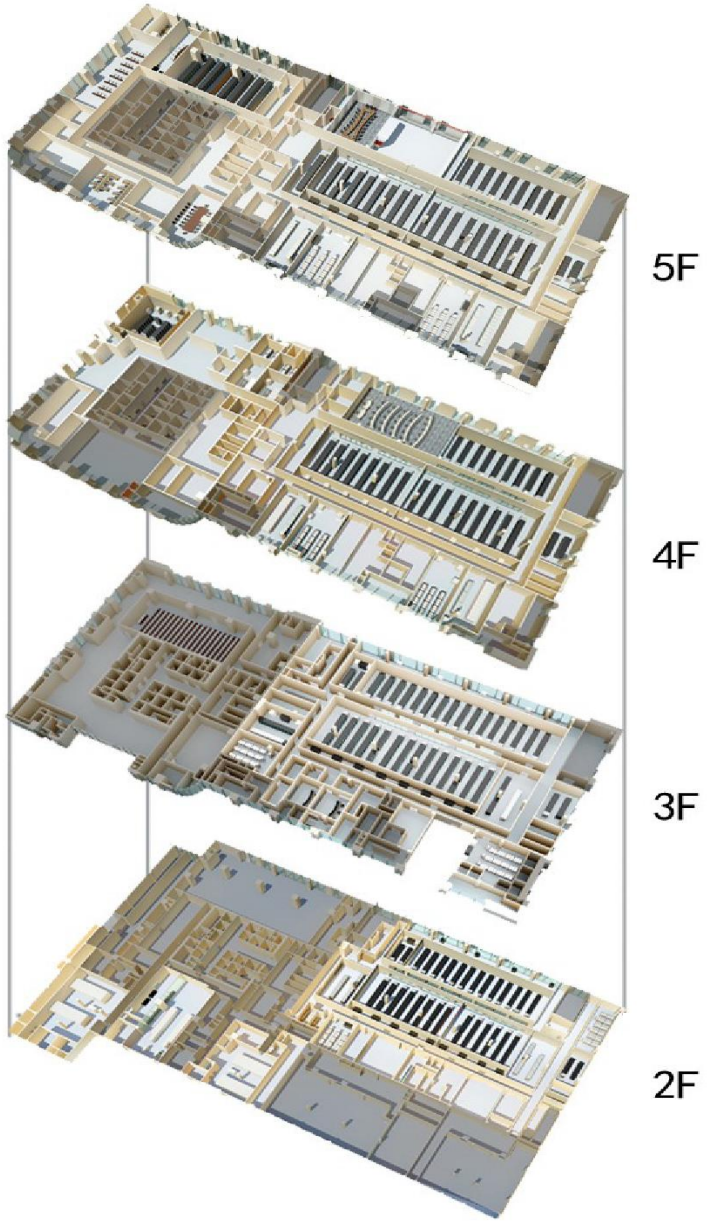
- Including staff office, lobby, duty room, washing room, dressing room and user's studio.

3. Introduction of data center infrastructure subsystem

方舟科技 Fangzhou Technologies

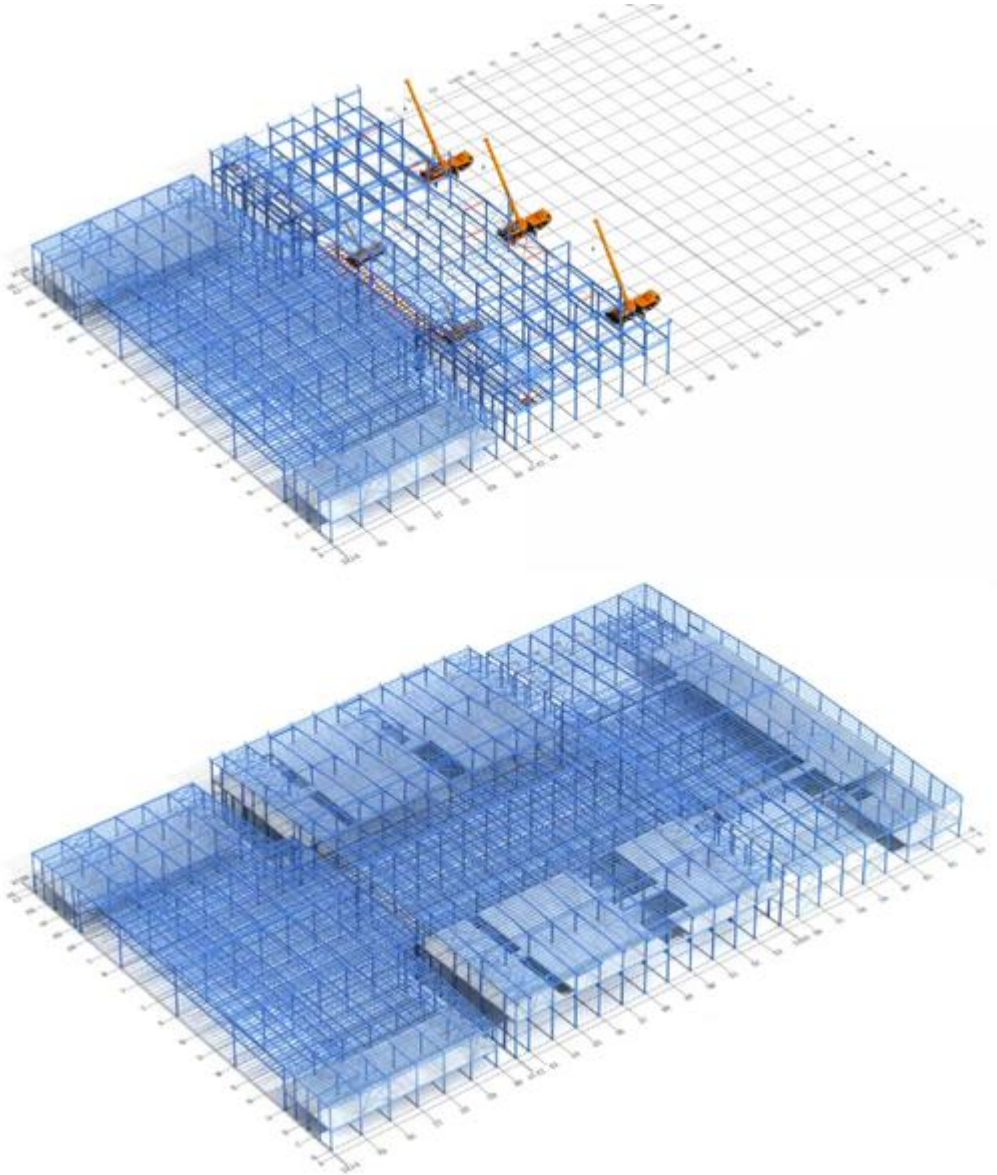
3.1 Data Center Building Subsystem





3.2 Data Center Structure Subsystem

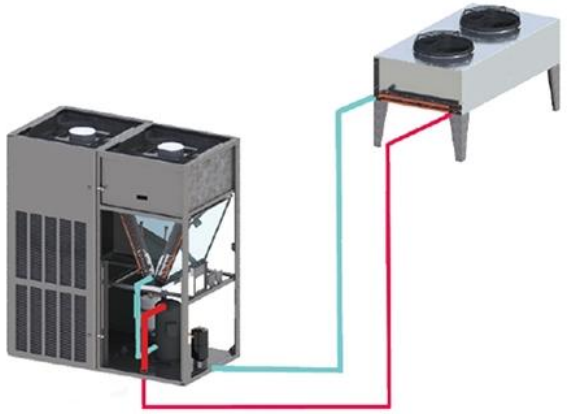
Computer room category	Equivalent uniformly distributed live load value of floor
	KN/m²
Main engine room	8~12
Incoming room	8
Test room	8
Uninterruptible power supply system room	16
Battery room	16
Air conditioning room	10
Air conditioning outdoor unit platform	3.5
Transformer room	8
Diesel generator room	On demand
Cylinder room	10
Corridor	3.5
Other	6

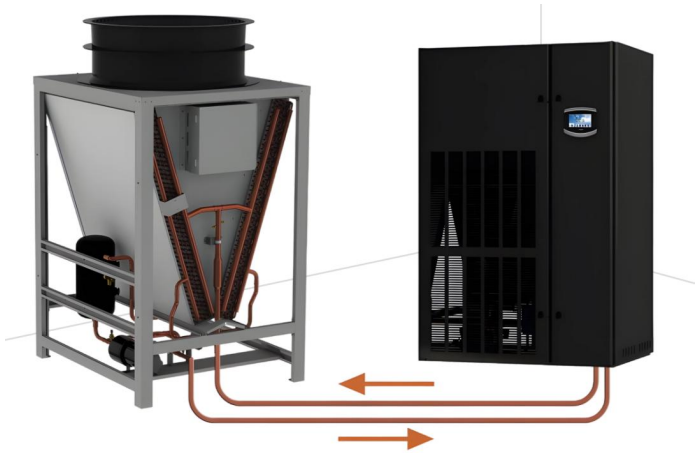


方舟科技 FANGZHOU TECHNOLOGIES

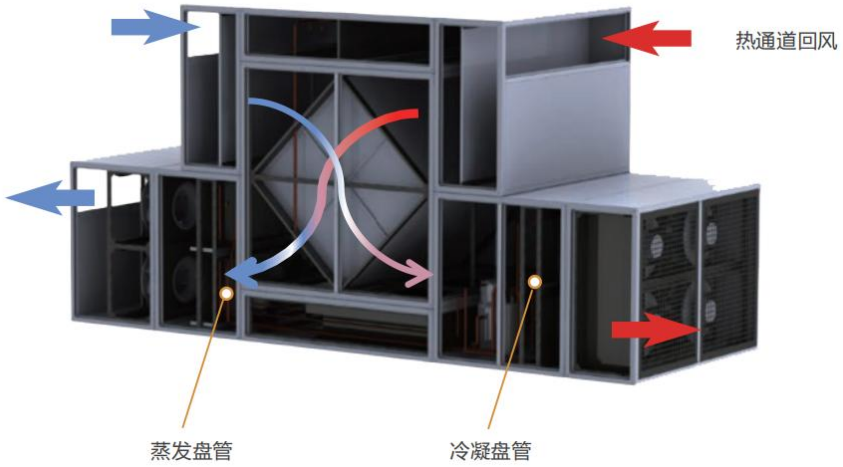
3.3 HVAC subsystem of data center

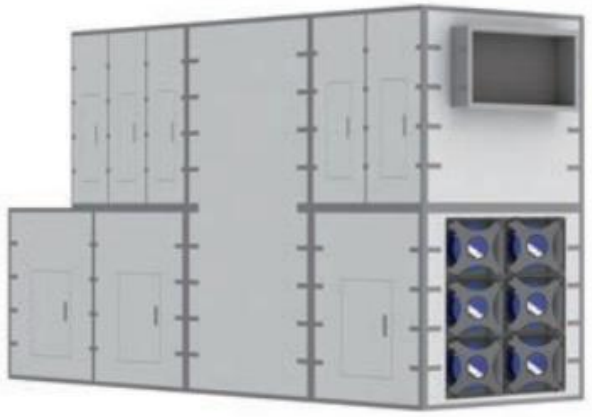
1) Direct expansion precision air conditioning

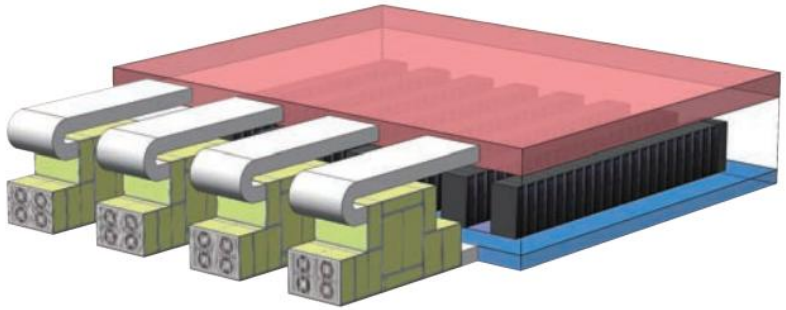




2) Indirect evaporative fresh air unit



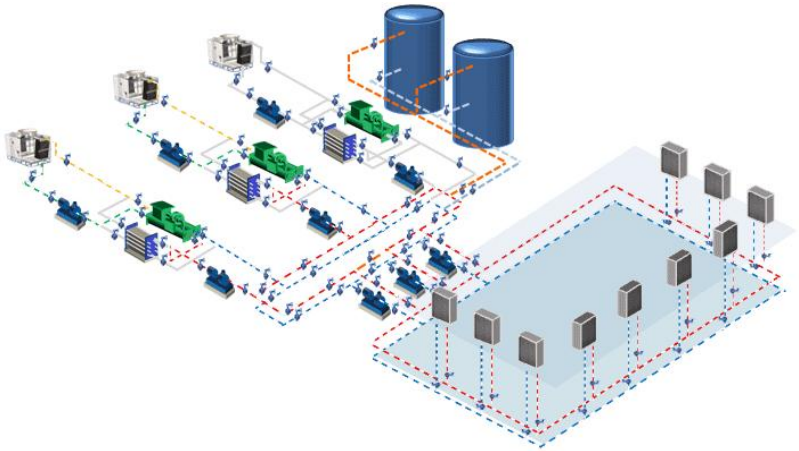




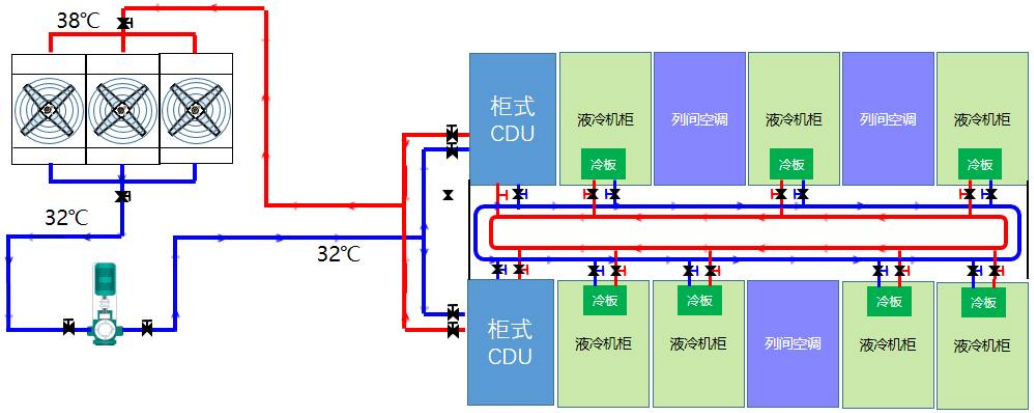
方舟科技 FANGZHOU TECHNOLOGIES

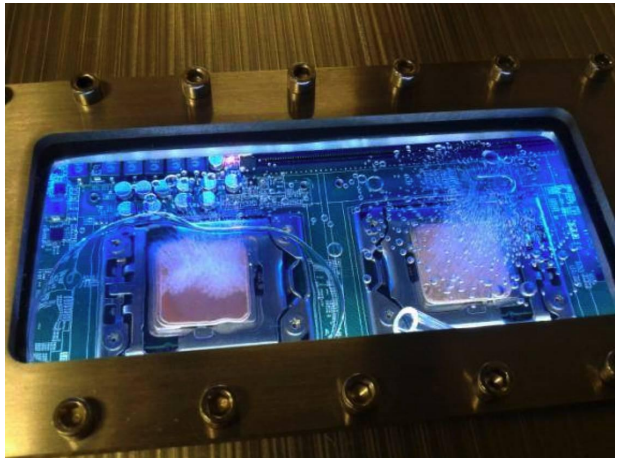
3.3 HVAC subsystem of data center

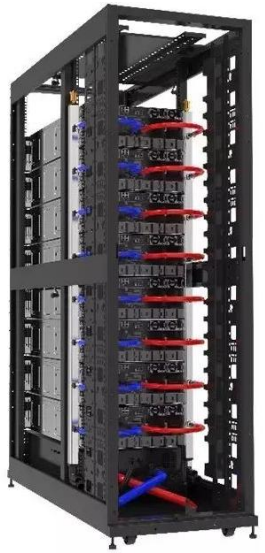
3) chilled water air conditioning system



4) Liquid cooling air conditioning system



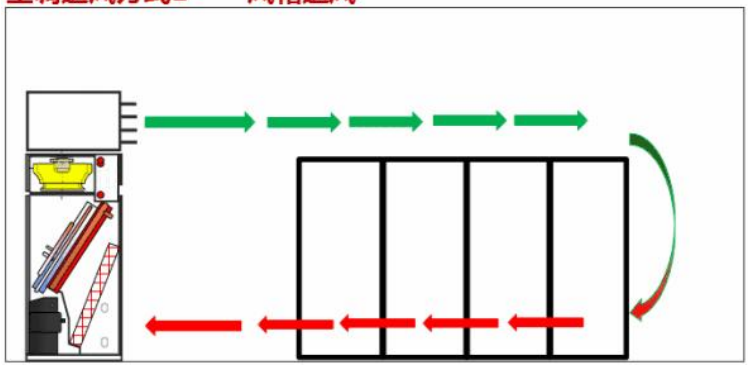




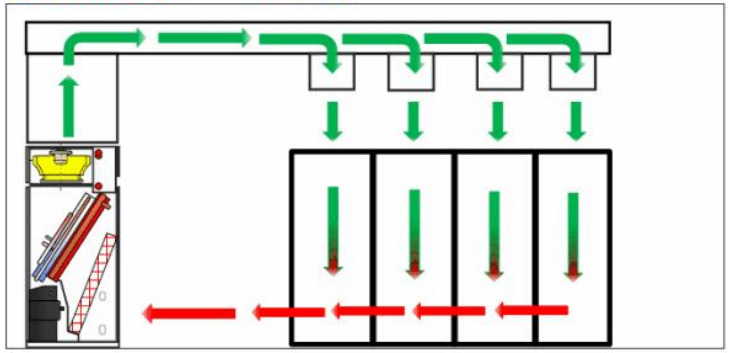
方舟科技 Fangzhou Technologies

3.3 HVAC subsystem of data center

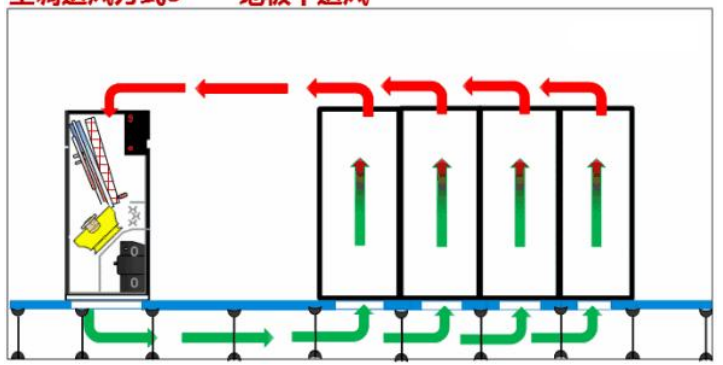
空调送风方式1——风帽送风



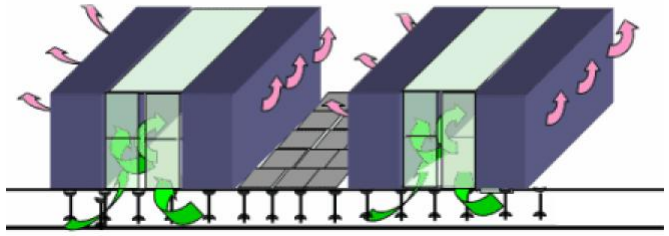
空调送风方式2——风管送风



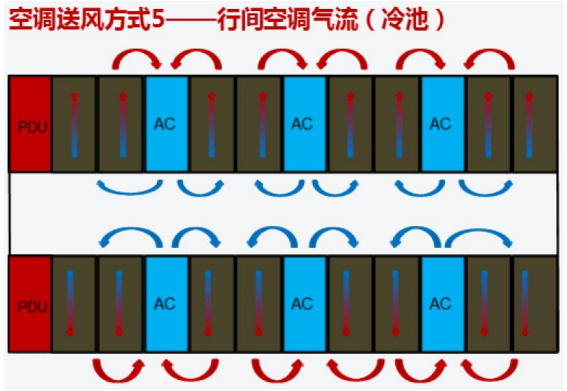
空调送风方式3——地板下送风



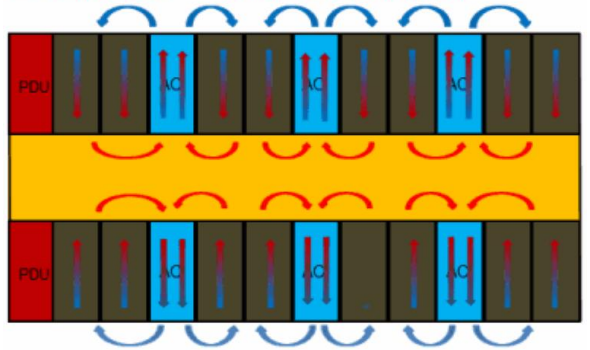
空调送风方式4——冷池气流组织



空调送风方式5——行间空调气流（冷池）

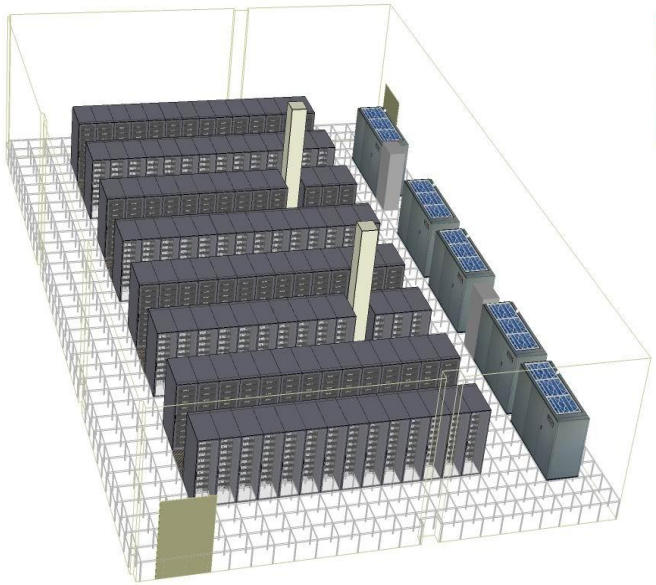


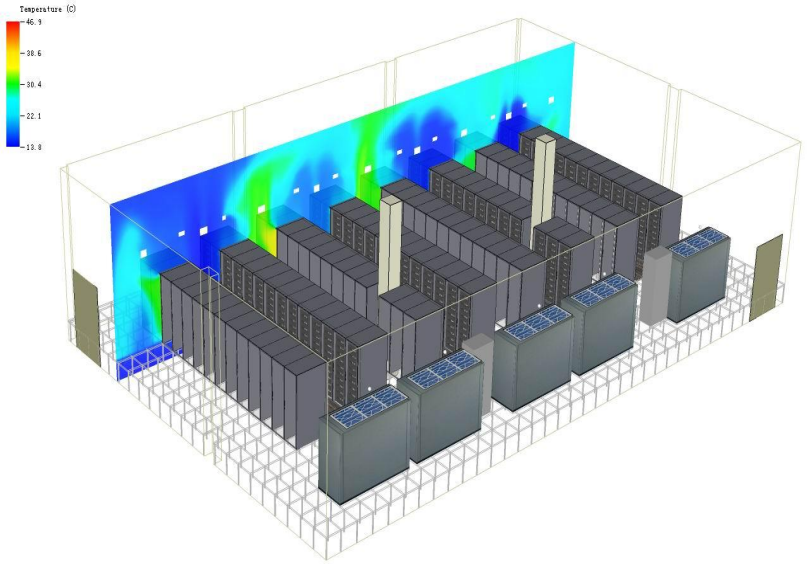
空调送风方式5——行间空调气流（热池）

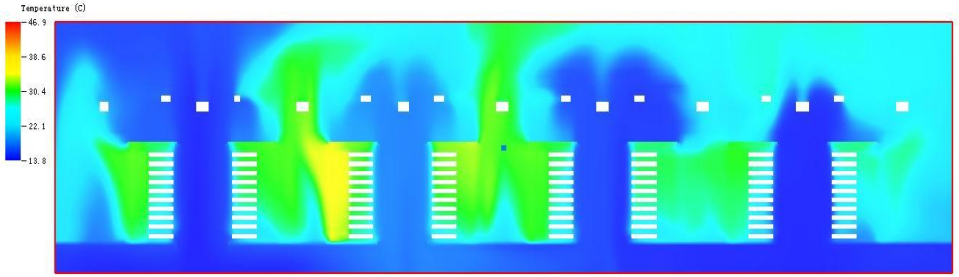


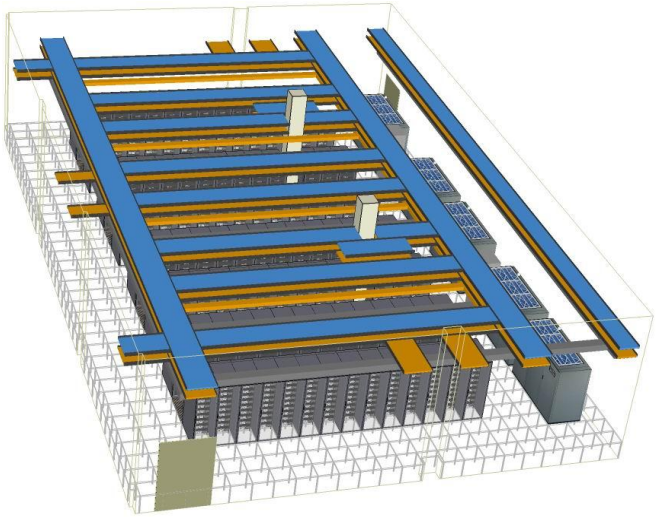
3. Overall introduction of data center

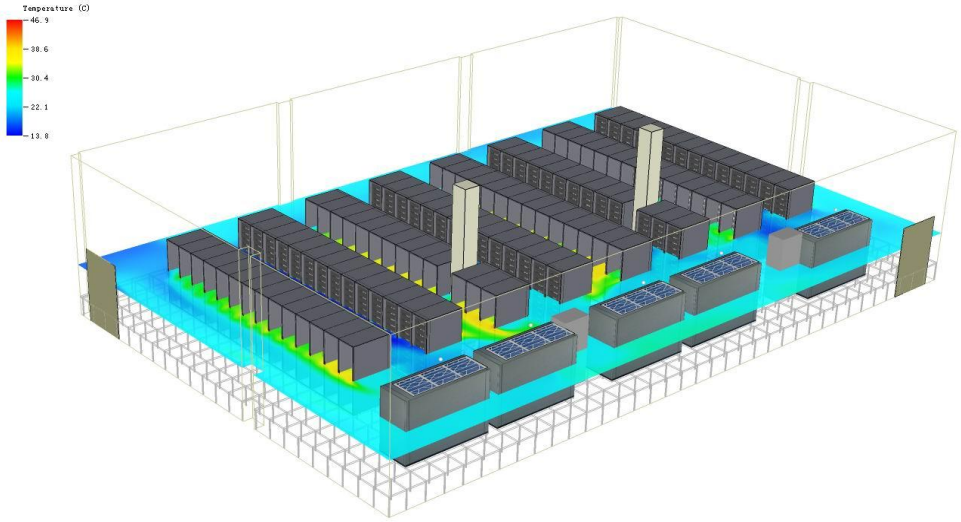
3.3 HVAC subsystem of data center

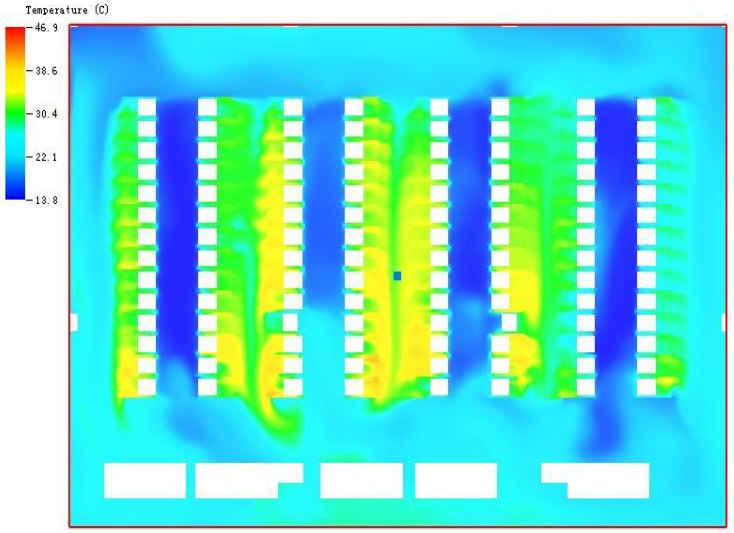








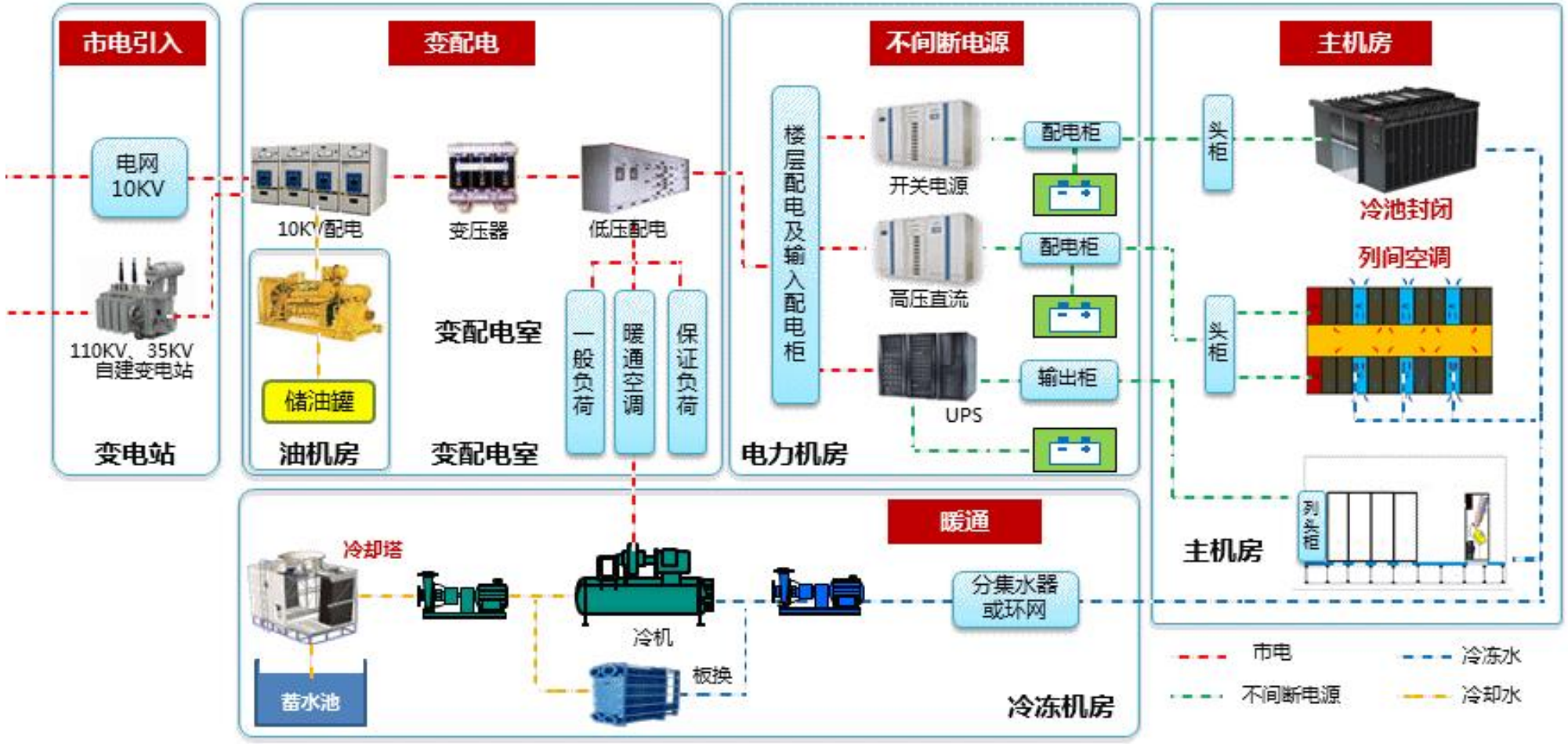




方舟科技 Fangzhou Technologies

3.4 Data Center Electrical Subsystem

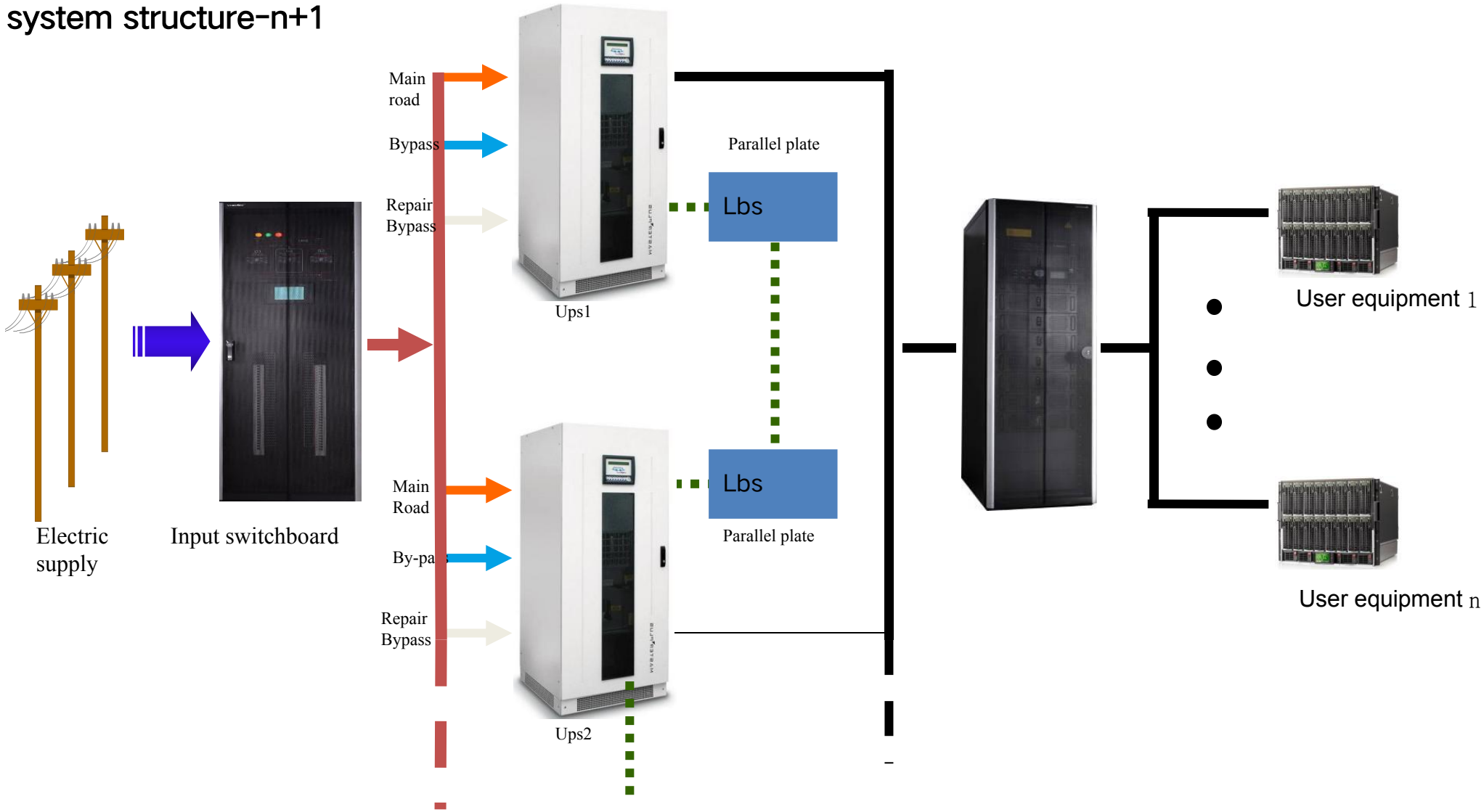
1) Overall architecture



3. Overall introduction of data center

3.4 Data center electrical subsystem

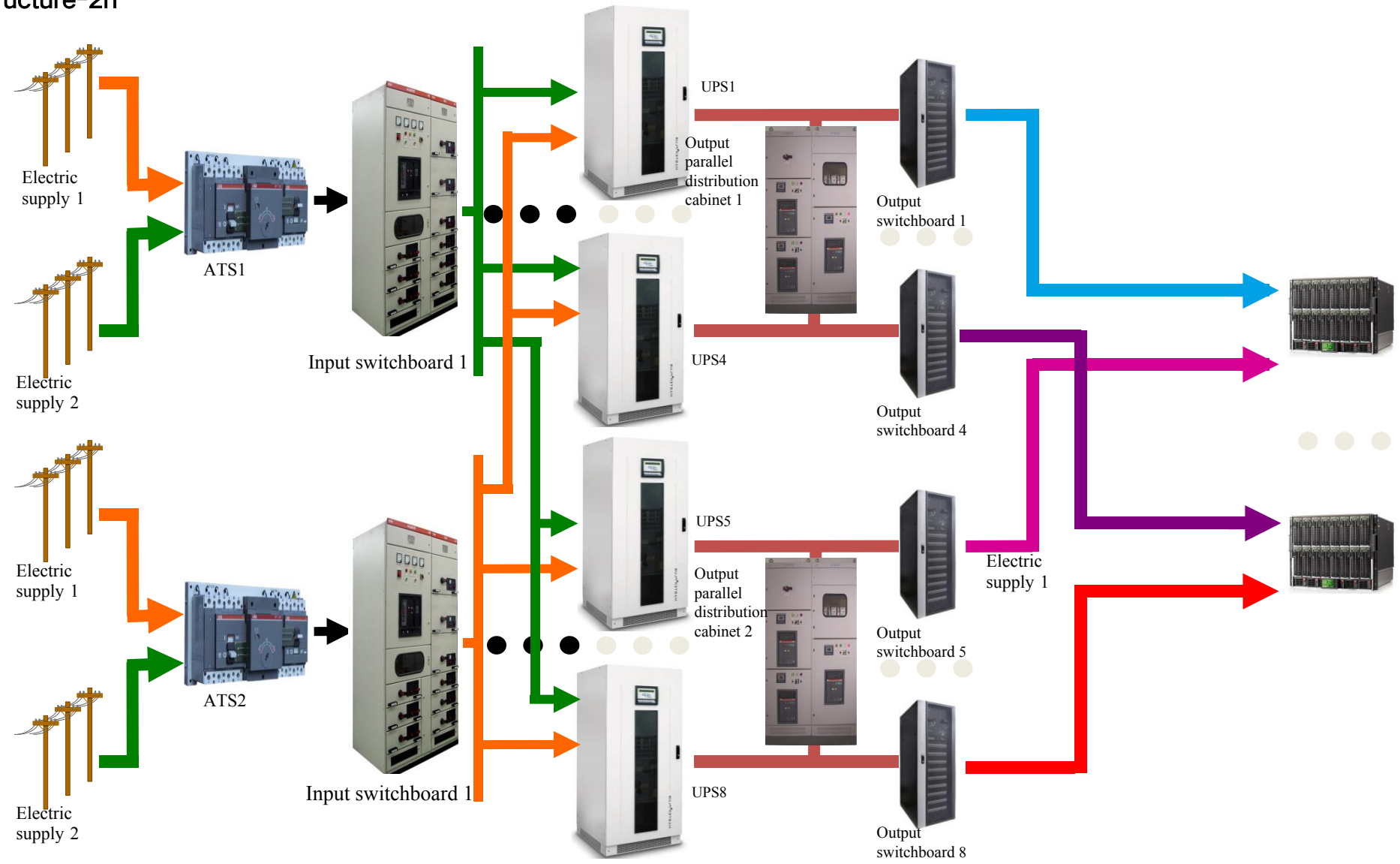
2) UPS system structure-n+1



方舟科技 FANGZHOU TECHNOLOGIES

3.4 Data Center Electrical Subsystem

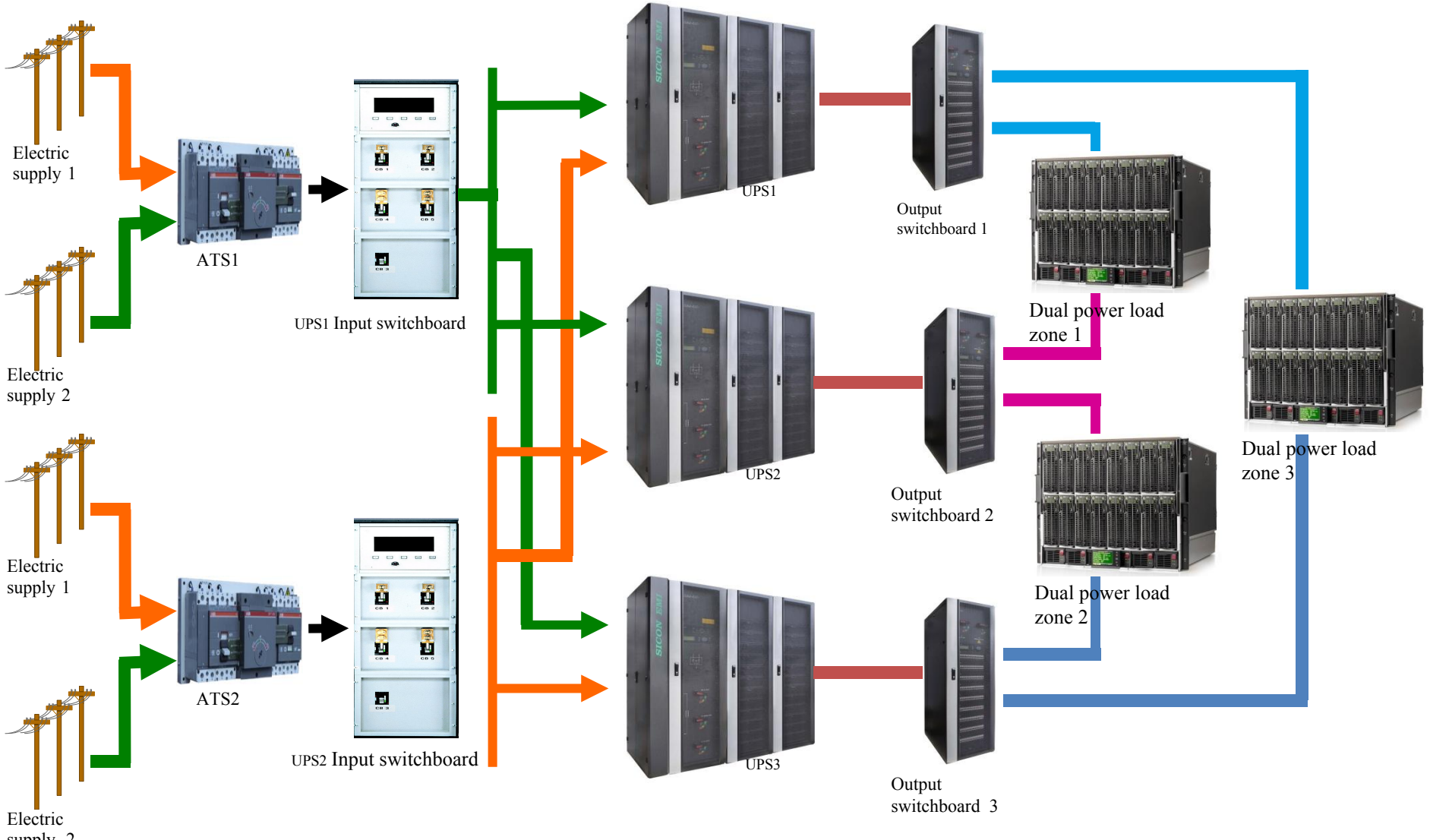
2) UPS system structure-2n



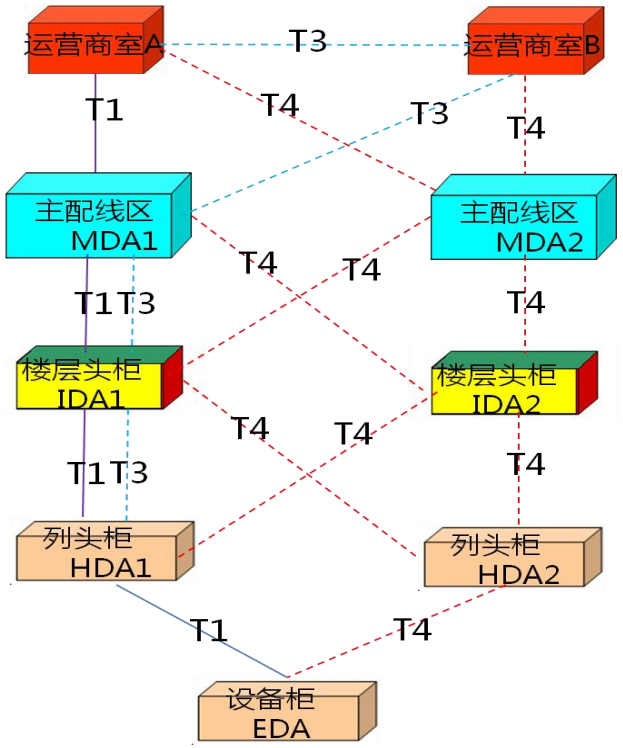
方舟科技 FANGZHOU TECHNOLOGIES

3.4 Data Center Electrical Subsystem

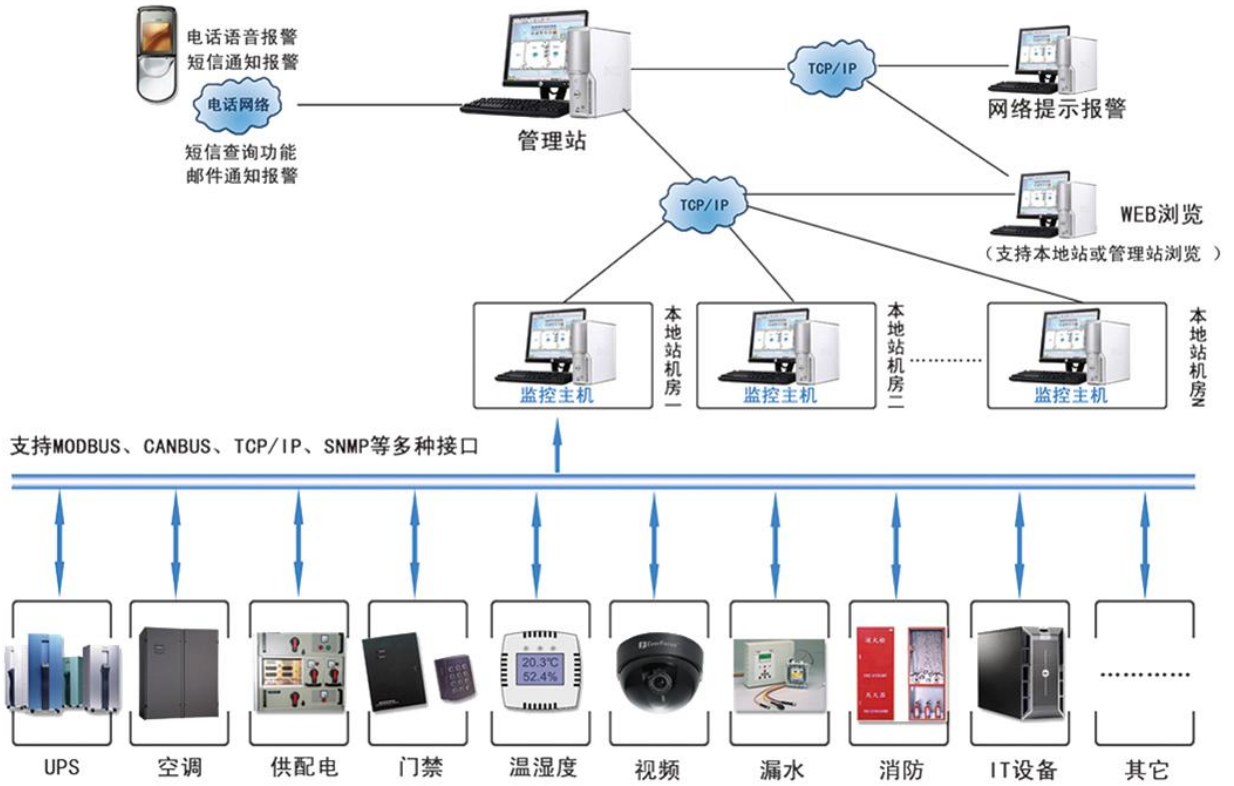
2) UPS system structure-3N



3.5 Intelligent subsystem of data center



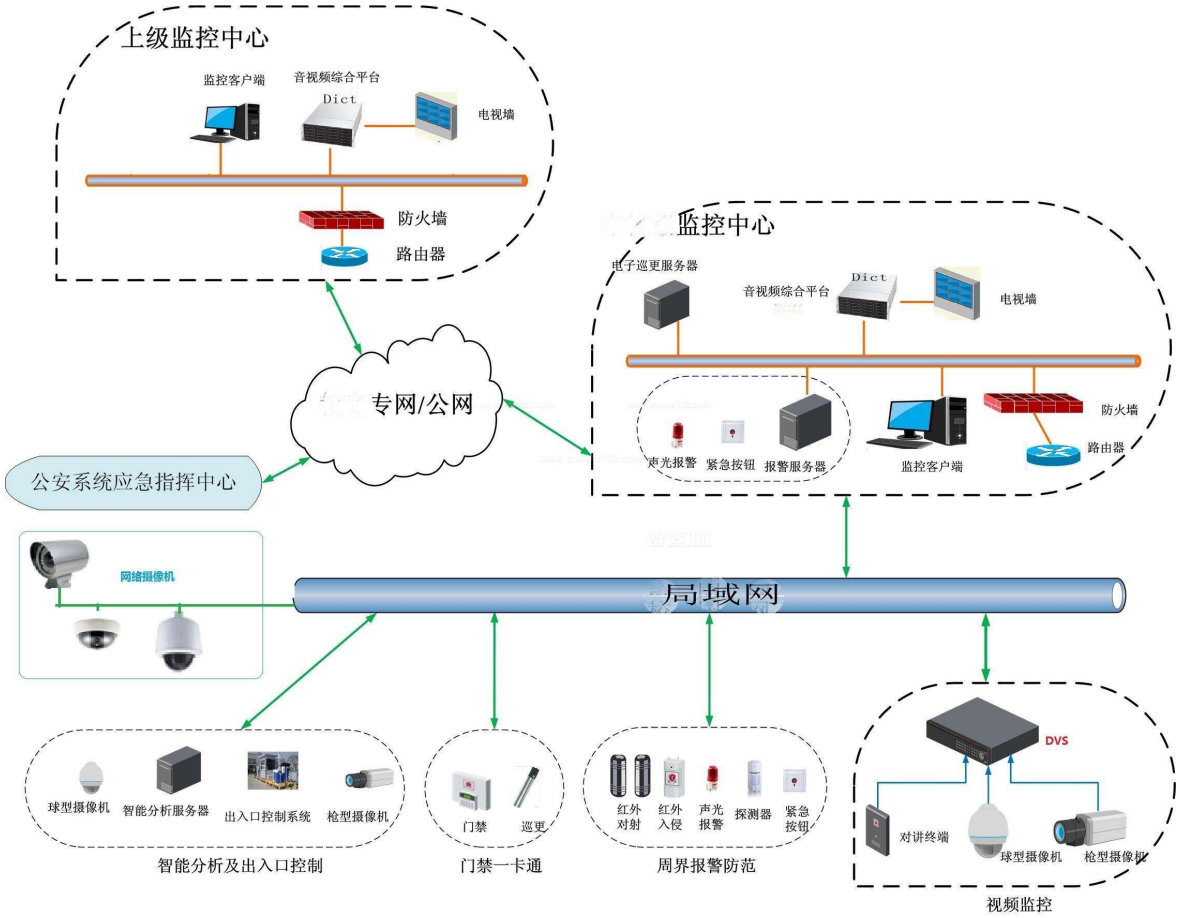
Premises Distributed/ Distribution System



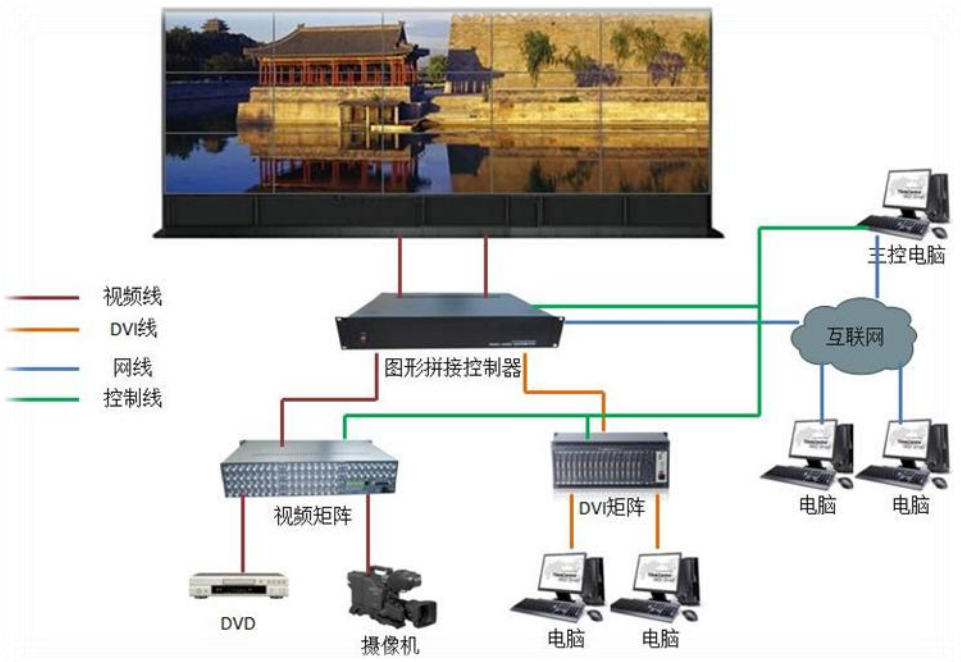
Power environment monitoring system

方舟科技 FANGZHOU TECHNOLOGIES

3.5 Intelligent subsystem of data center



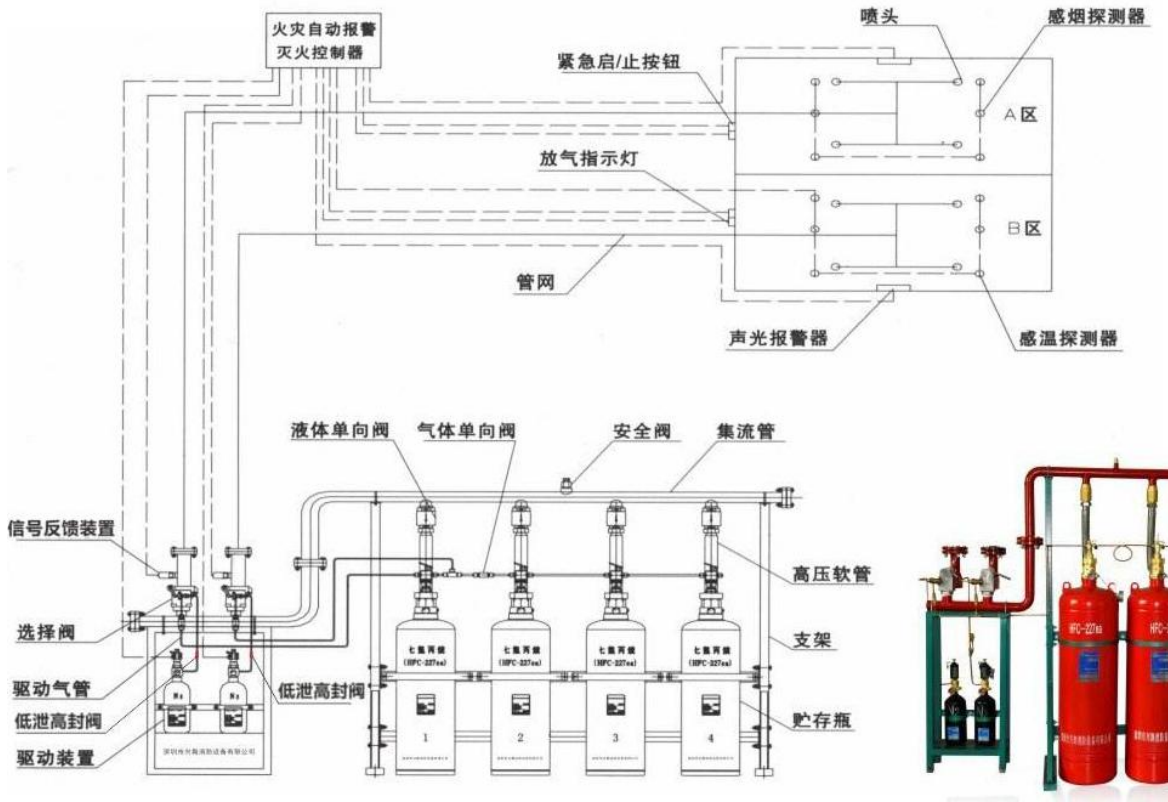
Security system

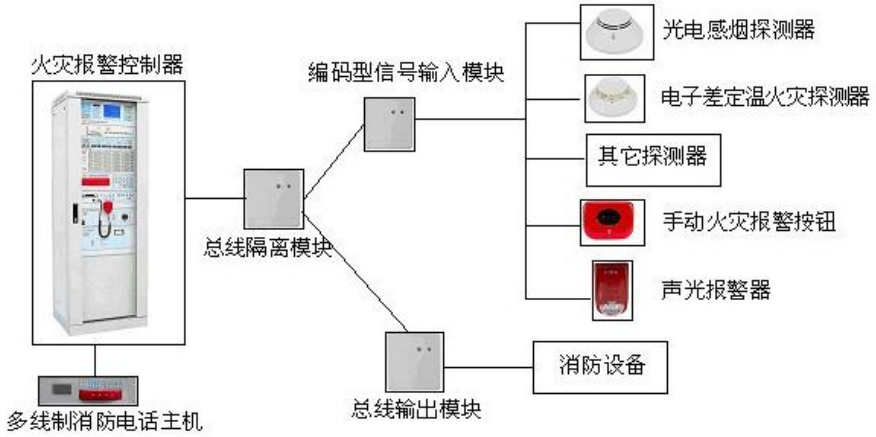


Display system

方舟科技 FANGZHOU TECHNOLOGIES

3.6 Data Center Fire Protection Subsystem





4. Significance of data center construction

方舟科技 FANGZHOU TECHNOLOGIES

The need for Islamabad smart city planning and construction	• Provide basic guarantee for the construction of smart cities Realize efficient and smart government application Drive the development of smart industries We will accelerate the implementation of smart people's livelihood
The need for a smart livelihood	• Smart medical care. Intelligent transportation Wisdom education Intelligent community
The need for smart industries	• Electronic commerce Smart media Smart tourism Smart power
The need for information security	• The trend of centralized data management is becoming more and more obvious, and the data management service including disaster backup and recovery has become the most urgent problem to be solved after customer data centralization. Large amounts of information can be fully secured.

4. Significance of data center construction

方舟科技 Fangzhou Technologies

Economize investment	• After the construction of the smart city data center, the resource sharing of the machine room and platform can be realized. It can reduce the construction of data center rooms and platforms of various government units, and reduce the capital investment of informatization construction of various enterprises in Islamabad
decrease operating costs	• After the construction of the smart city data center, after the centralized maintenance of the system platform, the maintenance personnel of each unit can be reduced, and the cost can be reduced, and the average annual labor cost can be saved and the energy consumption can be reduced.
Promote regional economic development	• The construction of this project is of great significance to Islamabad's employment, consumption, tax revenue, land development and urban function expansion in the surrounding areas
Meet the informatization needs of Islamabad city	• Communication facilities are the infrastructure of the whole society, and the completion of this project can better meet the information needs of Islamabad and effectively promote social, economic, cultural and other aspects of communication

- Founded in 1998 in Guizhou, China, Fangzhou Technology is a high-tech big data enterprise dedicated to smart city construction, a new smart (safe) city solution provider, and one of China's top 100 security enterprises.
- Since undertaking the first safe city project in Guizhou province in 2005, Fangzhou Technology has been focusing on the construction of smart (safe) city project for 19 years, and now we have participated in the construction of safe city project in nearly 30 cities. We have set up R&D institutions and service teams in Chengdu, Beijing, Hong Kong and Pakistan.