iMaster NCE-Fabric Brochure
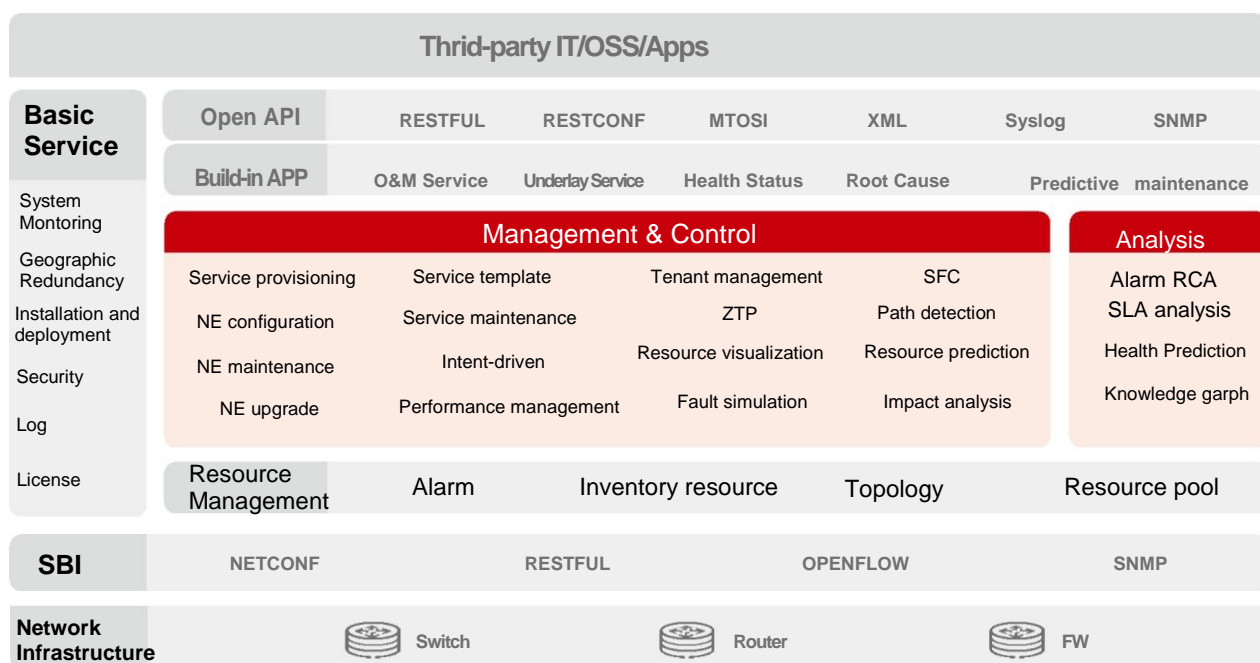
HUAWEI

Huawei iMaster NCE-Fabric Brochure

❗ Product Description

With the advent of the 5G and cloud era, innovative services such as VR/AR, live broadcast, and unmanned driving are emerging. The ever-expanding amounts of data and increasingly complex cybersecurity threats are changing the technology landscape at breakneck speed. The development of science and technology is narrowing down the gap between users and service providers, and widely distributed applications and data lead to the rise of distributed computing models. In this case, it is important to adopt a radically new approach to networking. The current rigid and largely manual lifecycle management approach is no longer sustainable for deploying, maintaining, and updating networks, and it cannot scale to meet the growing complexity. For an organization to flourish in the digital economy, the data center network needs to adapt quickly to changing business requirements or intent.

HUAWEI iMaster NCE-Fabric, an important part of Huawei CloudFabric Solution, is a network automation and intelligence platform that integrates management, control, analysis, and AI functions. It efficiently translates business intent into physical networks, provides capabilities such as full-lifecycle simplified deployment and intelligent fault remediation, and redefines service provisioning and O&M of data center networks.

❗ Architecture and Key Components

Thrid-party IT/OSS/Apps						

Basic Service	Open API	RESTFUL	RESTCONF	MTOSI	XML	Syslog	SNMP
	Build-in APP	O&M Service	Underlay Service	Health Status	Root Cause	Predictive maintenance	

Basic Service
- System Montoring
- Geographic Redundancy
- Installation and deployment
- Security
- Log
- License

Management & Control

Service provisioning	Service template	Tenant management	SFC
NE configuration	Service maintenance	ZTP	Path detection
NE maintenance	Intent-driven	Resource visualization	Resource prediction
NE upgrade	Performance management	Fault simulation	Impact analysis

Analysis
- Alarm RCA
- SLA analysis
- Health Prediction
- Knowledge garph

Resource Management	Alarm	Inventory resource	Topology	Resource pool

SBI	NETCONF	RESTFUL	OPENFLOW	SNMP

Network Infrastructure	Switch	Router	FW

iMaster NCE-Fabric is developed based on the cloud-native architecture. It adopts the service-oriented module design and supports distributed virtualization deployment. It consists of the following modules: common services, management+control+analysis, scenario-based apps, and open APIs.

· **Common service module**: provide basic network services such as alarms and logs and product engineering capabilities such as geographic redundancy and backup.

· **Management, control, and analysis module**: provides network management, service automation, analysis, and prediction capabilities.

· **Scenario-based app module**: provides service capabilities such as O&M services for different business scenarios.

· **Open API module**: provides northbound APIs to quickly interconnect and integrate with third-party applications or other management and control systems.

High lights

Zero-Waiting Service Deployment Through Intent Network

Reduces the workload of O&M personnel, improves the work efficiency of O&M personnel, and shortens the service deployment and rollout time.

Zero-Error Configuration Change Through Simulation Verification

Establishes a technical mechanism to prevent problems caused by manual misoperations, improving work efficiency and security productivity.

Zero-Interruption Intelligent O&M Through Proactive Prediction ("1-3-5 Troubleshooting")

Prevents network quality deterioration and detects faults before they occur, minimizing faults. In case of a fault, it can be quickly located and resolved, implementing easy O&M.

Key Features

Automated E2E Network Deployment

iMaster NCE-Fabric is dedicated to providing highly autonomous experience in the entire lifecycle of data center network planning, construction, maintenance, and optimization. It uses 21 types of network intents as inputs to achieve intent-centric end-to-end highly automated capabilities.

For example, in the planning phase, iMaster NCE-Fabric can perform intelligent data center network design based on user intentions, recommend network design solutions, and integrate design and network deployment, including automatic deployment and verification, to ensure that no errors occur during this phase, greatly reducing network construction time and costs.

If iMaster NCE-Fabric is used only in the network construction phase, it provides ZTP one-click simplified deployment and flexible deployment planning for basic underlay networks to meet automatic network construction requirements. Fast network infrastructure construction, upgrade, and capacity expansion; iMaster NCE-Fabric provides a simplified drag and drop network design and automatic provisioning process for logical overlay networks. The provisioning efficiency is three times the industry average, facilitating service provisioning in minutes.
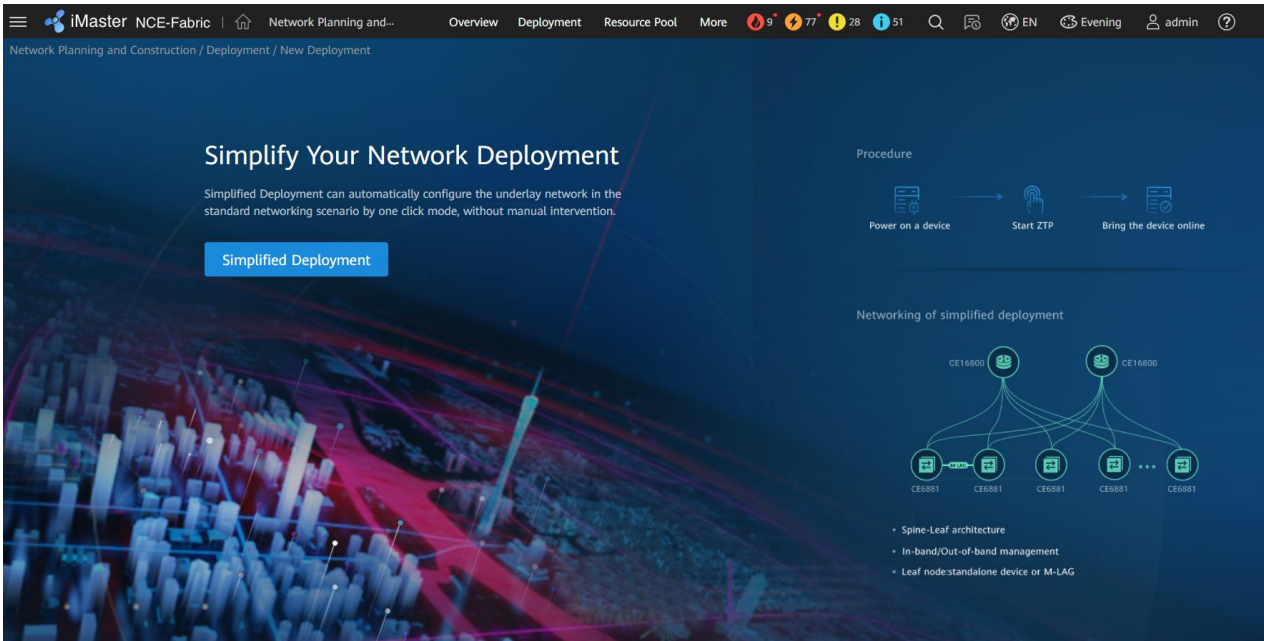
Intent-based Network Deployment

During service provisioning, traditionally, services are transferred from the service department to the network department using work orders. The network department designs the network plan based on the work orders and deploys the services. This process requires a large amount of communication, which is time-consuming and may cause requirements missing. iMaster NCE-Fabric introduces AI to implement intent-based networking in three steps:
• Understands and translates the service intent entered by administrators into network intent.
• Provides multiple preferred network models and deployment solutions based on AI model calculation and configuration plane simulation verification.
• Converts a network deployment solution into NE configurations and automatically delivers the configurations to network devices.

Change Risk Assessment

Nearly 40% of faults on a network are caused by human errors, such as logical vulnerabilities in network design, deviation from administrator intent, and misoperations. Risk evaluation of network changes and policy adjustment consumes a large amount of human resources.

iMaster NCE-Fabric provides a simulation verification module. Based on the live network configuration, topology, and resources, iMaster NCE-Fabric uses network modeling and formal verification algorithms to check whether the remaining network resources are sufficient, displays detailed connectivity relationships, and analyzes the impact of configuration changes on the original services. Therefore, network engineers can use iMaster NCE-Fabric to pre-evaluate change risks, radically resolve human-caused problems such as design logic vulnerabilities, and ensure zero network configuration errors.
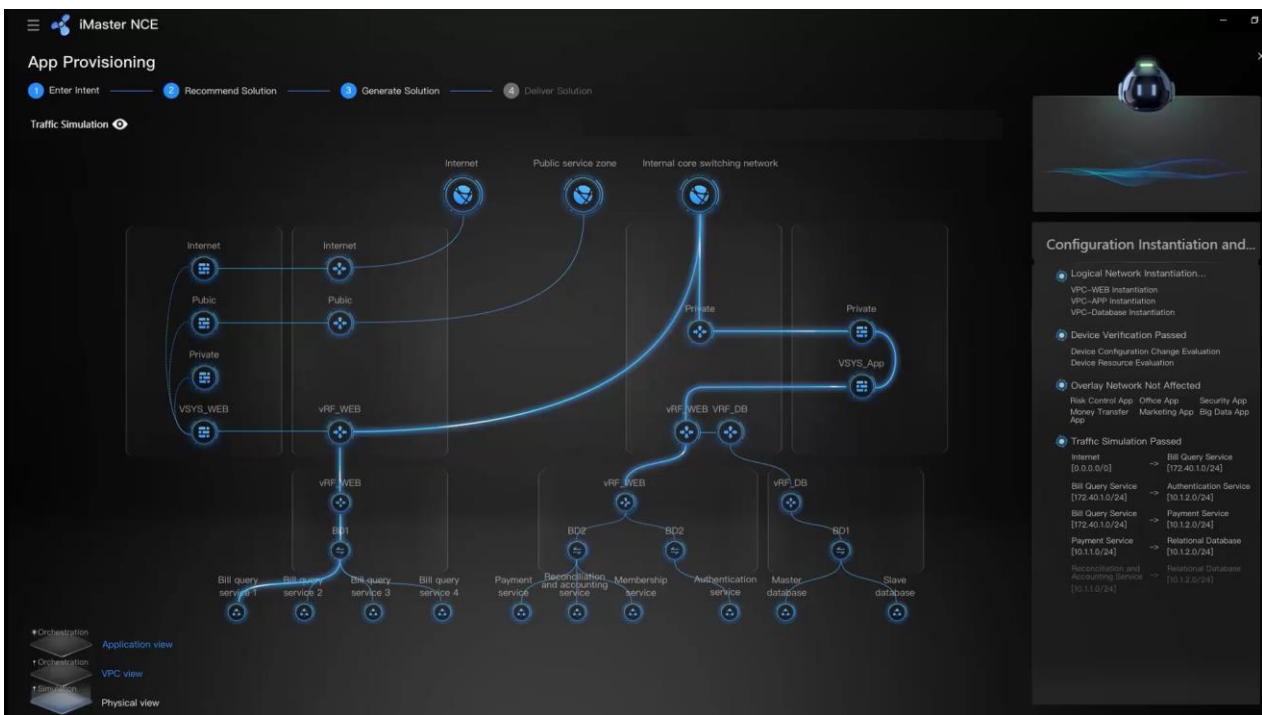
On-demand Deployment of the Container Network

With the rapid development of container technology, containers are favored by users because of their lightweight, easyto-deploy, and easy-to-port features. Container services are deployed in more data centers. However, the network where containers are running needs to be pre-deployed and is separated from the traditional VM or BM network, which lowers the deployment and O&M efficiency.

iMaster NCE-Fabric flexibly interconnects with the container orchestration system through plug-ins to implement on-demand deployment and unified management of container networks, improving O&M efficiency by more than 30%.
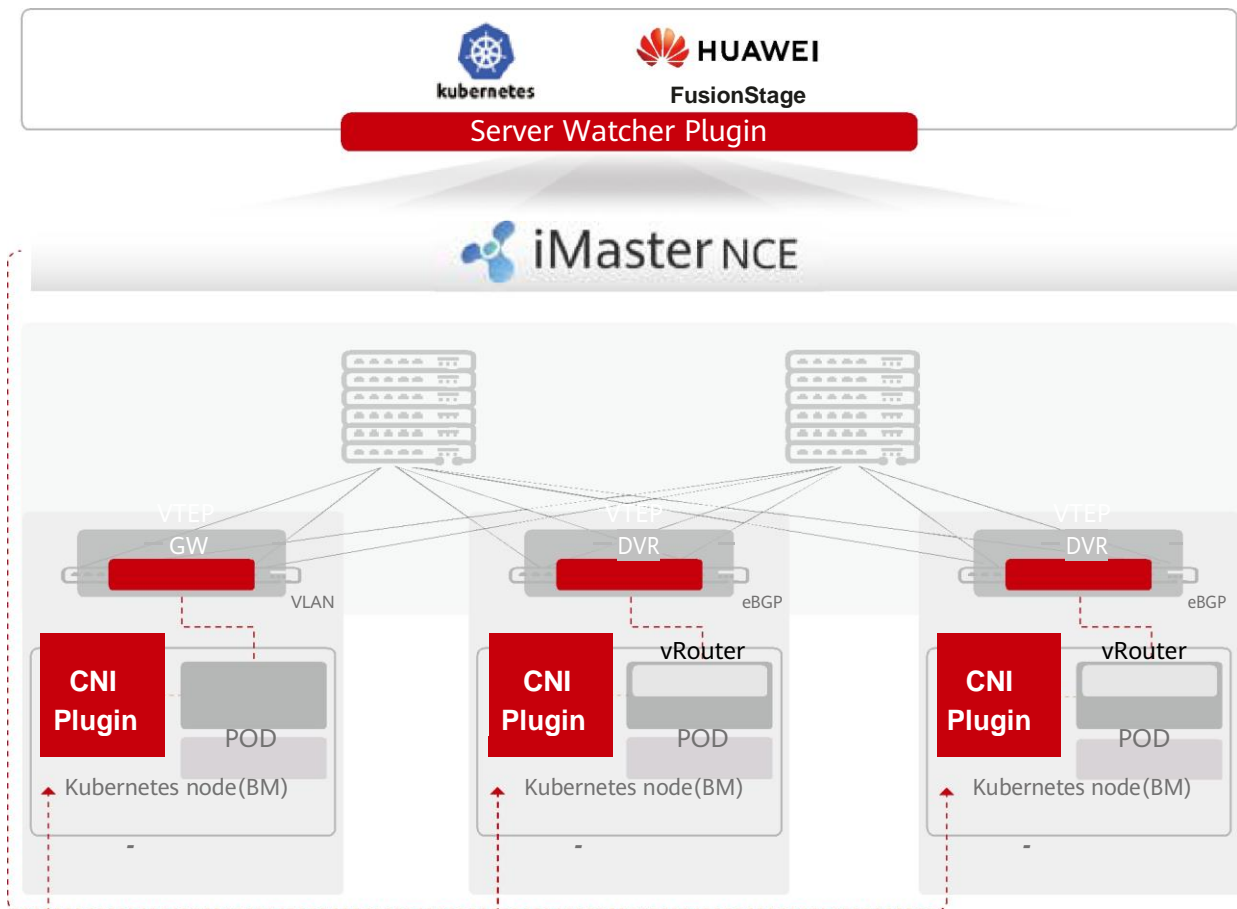
Unified management of multiple DCs

iMaster NCE provides multi-data center controllers (MDCs) for different multi-cloud and multi-DC scenarios. The MDCs can orchestrate cross-DC and multi-cloud services, display services in a unified topology, and apply to distributed multi-cloud deployment scenarios for internal and external customers of enterprises. Provides flexible multi-cloud networking solutions to meet automatic network construction requirements in multi-cloud and multi-DC scenarios.
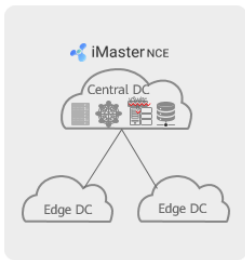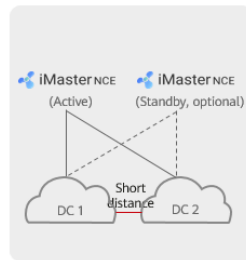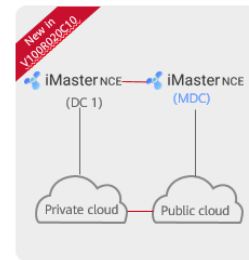

Edge DC solution   **Multi-PoD solution**   **Multi-site solution**   **Multi-cloud hybrid solution**
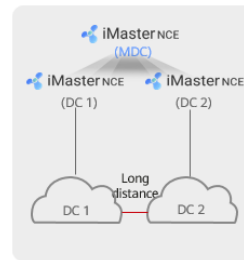
"1-3-5" Troubleshooting

Data centers are service support centers, and more importantly, value creation centers. For 98% enterprises, if their services are interrupted for 1 hour, the loss will exceed US$100,000. Customers have no tolerance for network interruptions. Currently, network O&M is performed mainly manually. Once a fault occurs on the network, it is difficult and time-consuming to locate the fault manually, which seriously affects customers' service continuity.
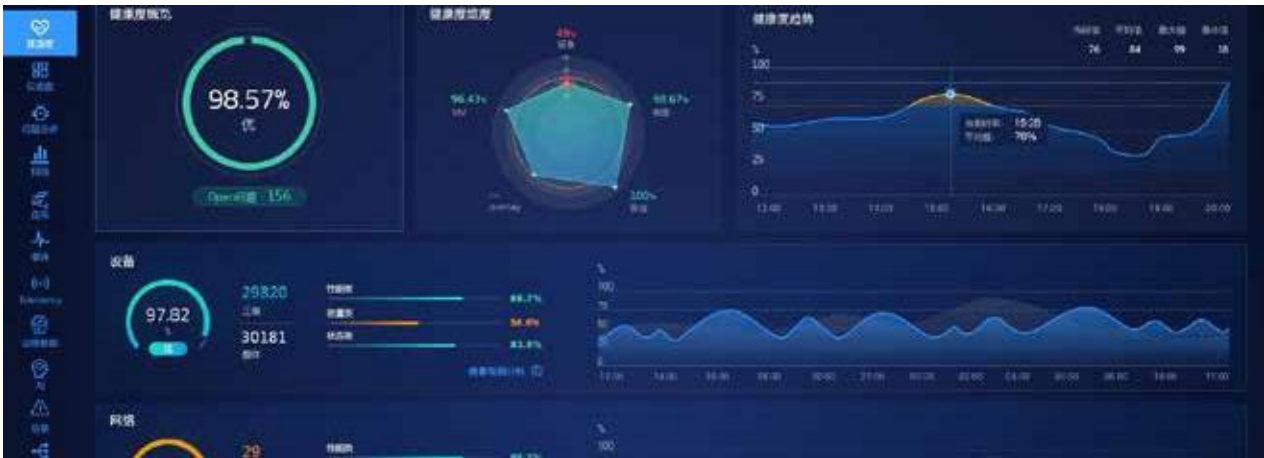
iMaster NCE-Fabric uses the Telemetry technology to collect data from the management plane, forwarding plane, and data plane on the entire network in real time, and detects faults in minutes from the service experience perspective. So far, Huawei has accumulated the O&M experience for more than 30 years and is very familiar with network fault scenarios of more than 7,800 data center customers. Based on these, iMaster NCE-Fabric has summarized 75 typical faults of 7 types and uses AI algorithms to build a network knowledge graph. Through continuous efforts in fault drills in Huawei, we can locate most faults within 3 minutes. iMaster NCE-Fabric supports intent-based fault remediation and intelligently analyzes fault impacts. It recommends emergency plans and can rectify typical faults within 5 minutes.
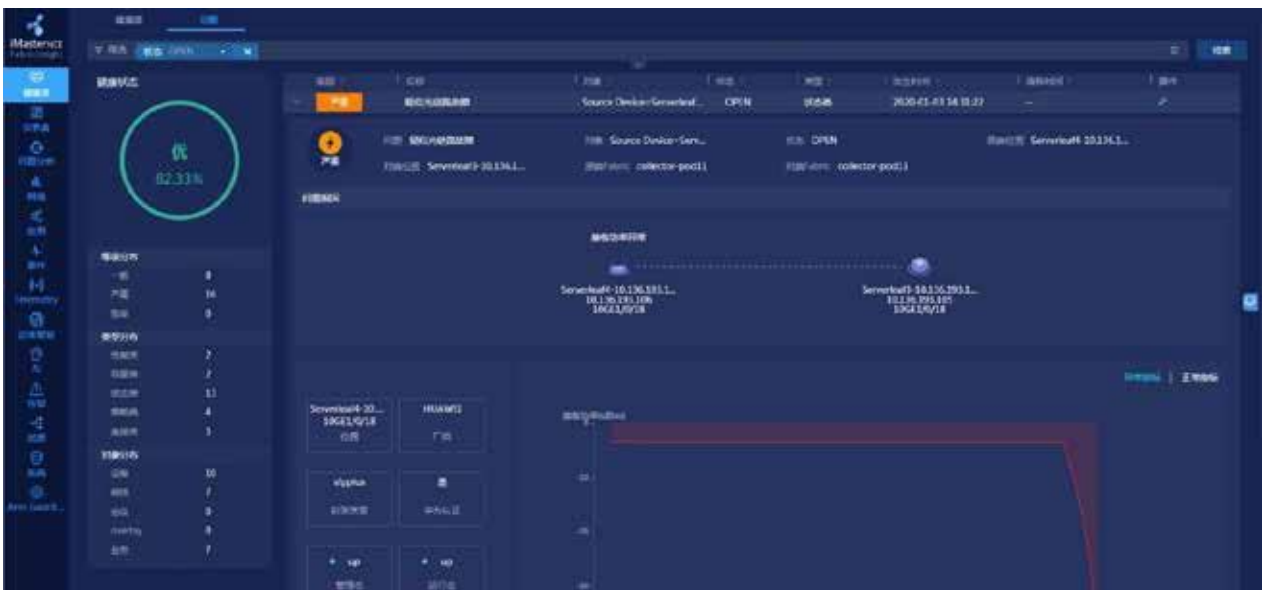
Network Health Assessment

iMaster NCE-Fabric comprehensively assesses network health based on the physical environment, resources, protocols, overlay network, and service models, and provides assessment analysis conclusions from the service experience perspective. The O&M personnel can export the assessment report in one-click mode and easily manage network health.

iMaster NCE-Fabric supports predictive maintenance. It detects network exceptions based on the dynamic baseline, intelligently predicts the optical module fault rate and port traffic, and generates warnings in advance. Compared with the traditional passive O&M, it can proactively identify network exceptions before they occur.

Specifications List

Feature	Description
NE management and control	· NE fault, configuration, accounting, performance, security (FCAPS) and basic network configuration
Network service provisioning	· iMaster NCE-Fabric can interconnect with the mainstream cloud platform OpenStack, container orchestration platform, or third-party applications. The cloud platform or third-party applications invoke the standard APIs to provision network services. · iMaster NCE-Fabric independently provisions IPv4 or IPv6 network services to implement automatic network deployment.
Zero Touch Provisioning	· Supports device go-online through ZTP and automatic faulty device replacement. · Automatically identifies and manages network devices.
Cybersecurity	· Supports traffic diversion to third-party firewalls and load balancers. · Supports microsegmentation. · Supports role-based access control. · Supports local or remote authentication (RADIUS, AD, and LDAP authentication).
SFC	· Supports IETF-based SFC model.
O&M	· Supports logical resource monitoring. · Supports visibility of the application, logical, and physical network topologies. Mappings from the application to logical topology, and from the logical topology · Provides an overlay network detection tool to perform path detection, intelligent loop detection, and connectivity detection. · Provides an overlay O&M tool to perform southbound and northbound data consistency verification, intent-based verification, and device replacement or fault impact analysis, and provide emergency plans.
Reliability	· Supports distributed clusters. · Supports active/standby geographic redundancy deployment.
Openness	· Supports southbound protocols such as SNMP, NETCONF, OpenFlow (1.3/1.4), OVSDB, JSON-RPC, and sflow · Supports northbound interfaces such as RESTful, RESTCONF, WebService, and Syslog.
Managing Capacity and Performance	·Typical configuration (three-node cluster) Number of managed physical network devices: 1,800 Number of managed physical servers: 9,000 Number of managed VMs: 180,000 VM online rate: 200/s

Feature	Description
Telemetry network monitoring	·Collects and displays performance indicators of devices, boards, chips, interfaces, queues, and optical links through Telemetry, and detects exceptions based on dynamic baselines. ·Supports millisecond-level queue congestion and packet loss detection.
Application and network visibility	·Supports physical network topology visibility and displays abnormal links and congested ports in the current or historical time period in the topology. ·Displays the application health status, interaction relationships between applications and hosts in an application, and details about TCP flows with abnormal host interaction.
Predictive maintenance	·Predicts optical link health status. ·Predicts traffic on a port.
Network health assessment	·Constructs a network health assessment system based ob the device, network, protocol, overlay network, and application flow and provides reports.
Issue analysis	·Identifies 75 typical faults of 7 types (configuration, non-fabric, hardware, resource specifications, entire network, entry, and cybersecurity) within minutes.

❗ Glossary

ADN	Autonomous Driving Network
AR	Augmented Reality
BM	Bare Metal
DVR	Distributed Virtual Router
NCE	Network Cloud Engine
SDN	Software Defined Networking
VR	Virtual Reality
ZTP	Zero Touch Provisioning

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