FabricInsight

AI Technology Simplifies Data Center Network O&M

[Product Overview]

FabricInsight is a data center network analyzer launched by Huawei. It provides ubiquitous network application analysis and visualization functions to streamline applications and networks.

Based on the big data analysis technology, FabricInsight collects massive real service packets through the Telemetry, provides correlation analysis between internal applications and networks of the data center, and displays the application map and network quality in real time, helping customers quickly identify fault and proactively identify risks before services are affected.

[Product Description]

With continuous development and commercial use of technologies such as cloud computing, big data, and artificial intelligence, enterprise are deepening their digital transformation, covering various business forms including office, production, and testing. Traditional data centers can no longer catch up with development, and cloud-based transformation has become an inevitable trend. However, the current data center cloudification solutions in the industry focus on "Resource virtualization and resource utilization improvement" and "Automatic deployment and cloud-based strategies", and on the other hand overlook network management difficulties and challenges brought by the data center scale and traffic surge. Traditional manual O&M cannot effectively deal with complex application migration policies, unstable service experience quality, difficult fault locating, and large-scale security policy management.

Huawei data center network analyzer FabricInsight abandons the resource status-based traditional monitoring mode. It detects fabric and application status in real time, streamlines networks and applications, monitors networks from the perspective of applications, helps customers detect network and application problems in a timely manner, and ensures continuous and stable application running.

[Key Components]

FabricInsight provides second-level collection of real flow on the entire network in Telemetry mode, analyzes and displays network data based on the big data intelligent algorithms, and provides northbound APIs to interconnect with upper-layer application systems.

FabricInsight
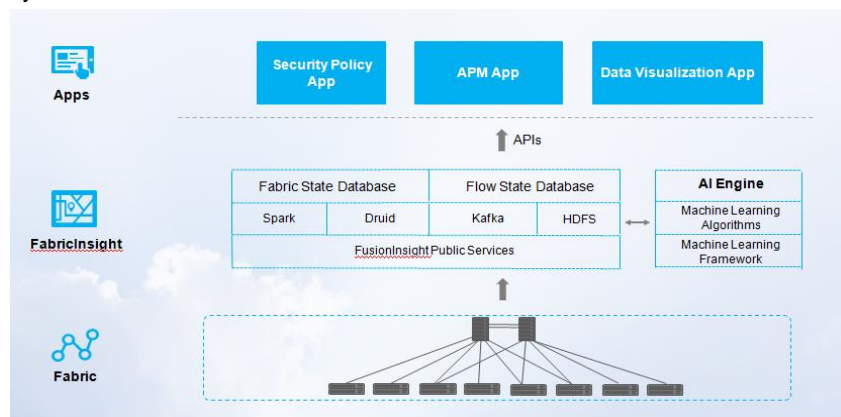
[Benefits]

Mutual visibility between applications and networks, facilitating second-level fault identification

- Second-level display of service flows and network-wide KPIs through Telemetry
- Analysis of correlation between services, network paths, and network devices, visualizing network health status

Training the knowledge inference engine using AI, achieving minute-level fault locating

- Training the knowledge inference engine using machine learning, supporting minute-level root cause diagnosis for 75 types of faults
- Millisecond-level detection of historical microbursts, and accurate fault playback

Predictive maintenance using AI

- Dynamic baseline construction based on ML/AI and identification of issues at the device, queue, and port levels
- Proactively predicting traffic or optical module faults, reducing the fault rate by up to 68%

[Key Features]

DashBoard: multi-dimensional data analysis and graphical display

FabricInsight provides multi-dimensional Top N statistical views for hosts, applications, sessions and fabrics to help users detect network quality through multi-dimensional analysis.

## Management of mutual access relationship between applications (ADM) and visualization of network policies

FabricInsight provides an application view, which can intuitively display the actual interaction relationships between services based on the network-wide real service flows. When a new service goes online, the network administrator can sort out the service relationship and complete the policy configuration based on the network-wide application association

map. In addition, the network administrator can quickly detect non-compliant access and traffic and take related measures.


Mutual visibility between applications and networks for quick fault analysis and demarcation

FabricInsight provides the intra-application visibility function. In the application details view, you can view the nodes with abnormal interaction to locate performance problems and analyze specific bottlenecks through the association with networks. In addition, FabricInsight provides the function of collecting statistics on and filtering abnormal events for users to quickly focus on abnormal events and quickly identify the service network health in the application based on the interaction diagram and heatmap of clusters in the application.
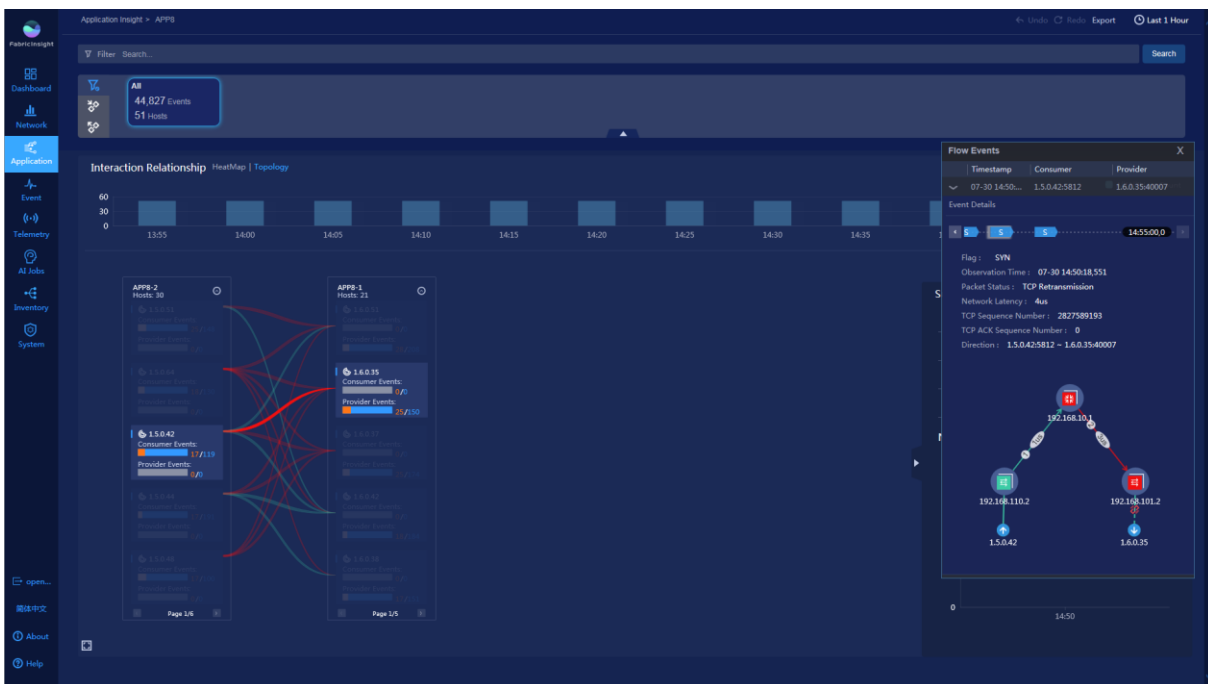

Live-network quality evaluation, visualizing network abnormalities

FabricInsight provides the network view, performs intelligent analysis of TCP flow status and detects abnormal flows based on big data, displays network quality in real time through indicators such as delay and traffic, and quickly identifies and analyzes abnormal flows on the network.
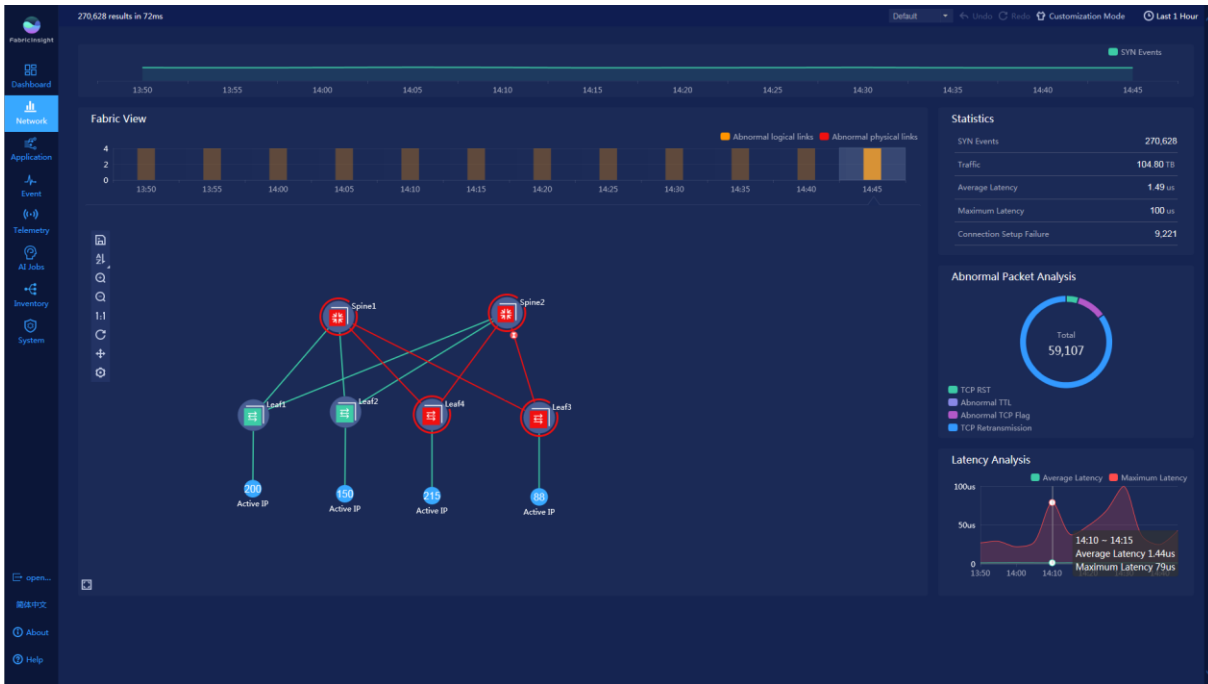

In addition, FabricInsight supports network change visualization. By comparing device configuration changes using snapshots, FabricInsight can quickly identify network changes such as Up Route, BD, Static Route, Dynamic Route, Host Route, Gateway Route, MAC, ARP, VRF, and Running Config.
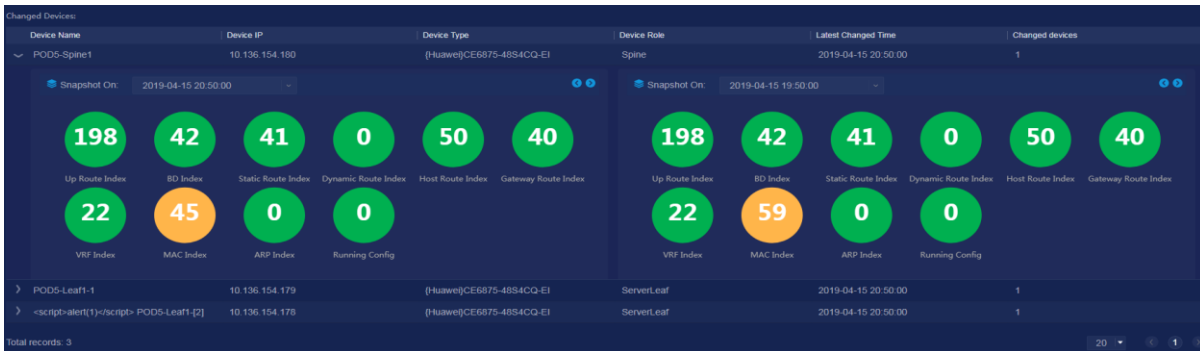

Network exception detection based on dynamic baselines and intelligent identification of service changes

FabricInsight collects statistics on metrics of devices, boards, queues, and interfaces in real time based on the GRPC, displays the top ranking of metrics in the area distribution chart, and displays the trend chart of top 5 metrics in real time.
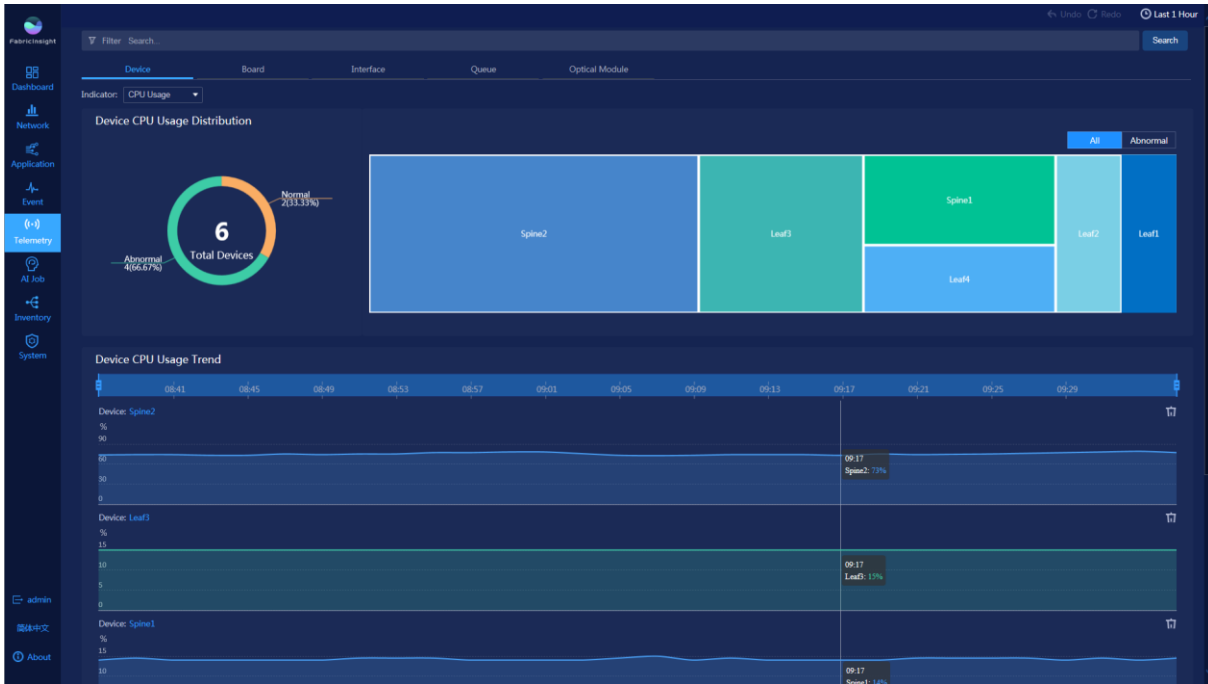
Based on machine learning algorithms, FabricInsight displays the dynamic baseline range of each metric to quickly locate the time point when the baseline exception occurs and proactively identify faults before service interruption. In addition, FabricInsight automatically associates exception points with the affected service flows. You can view data such as connection setup failure flow behavior on the device at the exception time point.
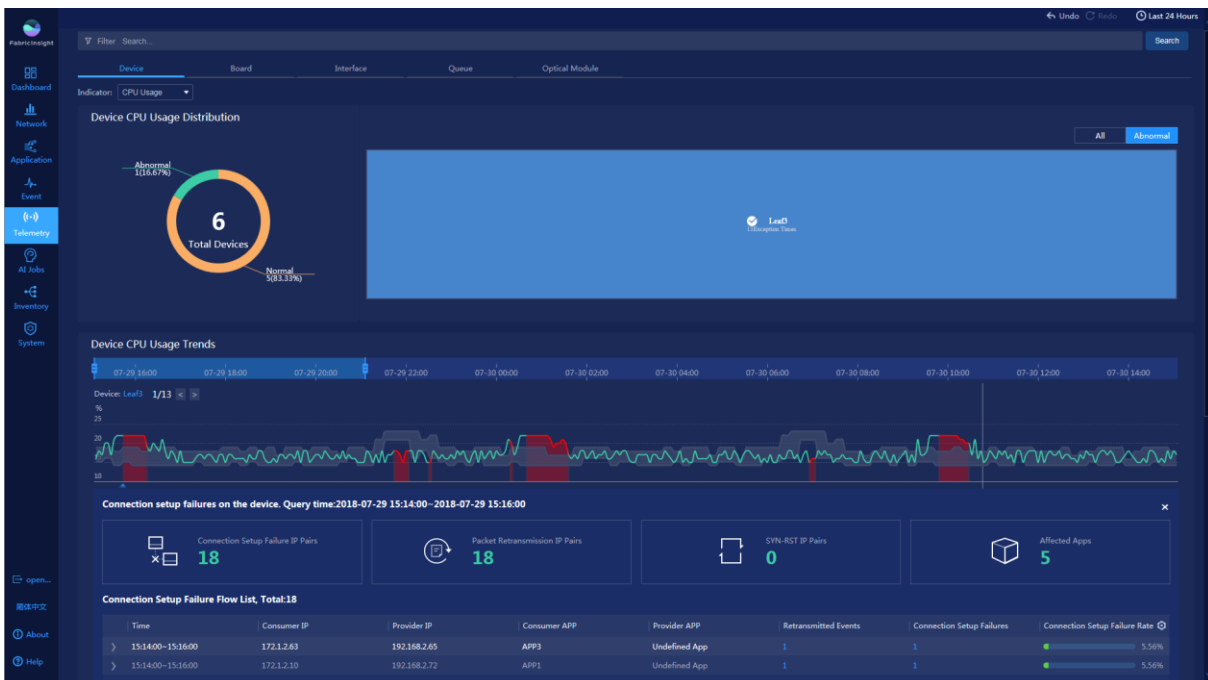
Predictive maintenance using machine learning, effectively reducing the network fault rate

FabricInsight provides the capability to predict faults of optical modules. Based on the Big Data and machine learning algorithms, FabricInsight can detect optical module faults and predict the optical module faulty probability to identify abnormal optical modules before services are affected. In addition, FabricInsight displays basic attributes of optical

modules on the entire network and the trend of optical module metrics in the last 14 days. Users can evaluate the deterioration of optical modules based on the data to better troubleshoot faults.

In addition, FabricInsight supports traffic forecast based on the RX and TX bandwidth utilization of interfaces, and displays the traffic prediction results for the next 12 weeks.


Training the knowledge inference engine using AI, achieving minute-level locating for 75 types of faults

FabricInsight continuously conducts fault drills in Huawei, sorts out 75 types of faults (7 categories in total) based on Huawei's 30+ O M experience and network fault scenarios of 7800+ data center customers, and builds the knowledge inference engine using AI automatic learning and training results to improve the system immunity.

From the service aspects, FabricInsight summarizes faults as typical application quality, network service, and security compliance issues for intelligent recognition and analysis of service faults, helping O&M personnel analyze the impact and quickly rectify faults.

● Application quality issues

FabricInsight can intelligently detect and analyze the following issues: continuous service interruption, intermittent service interruption, and host ports not listened. Based on the IP triplet, FabricInsight can identify services with abnormal TCP connection setup on the network, enabling users to quickly view active and historical issues and affected sessions, hosts, and applications. In addition, FabricInsight can analyze the abnormal event trend and network-wide connection setup information, helping users quickly collect and analyze issues.
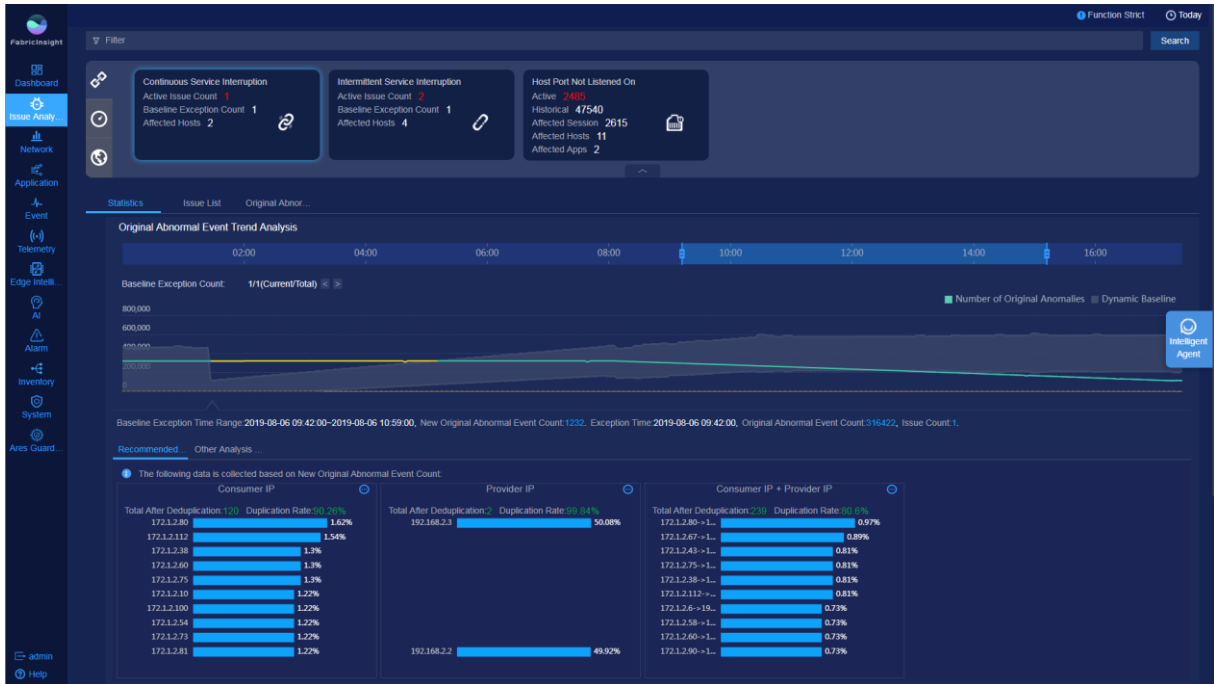
For abnormal events, FabricInsight collects data such as service flow paths, device configurations, entries, and abnormal logs, generates network snapshots, and rectifies faults based on knowledge inference, helping locate root causes in minutes.
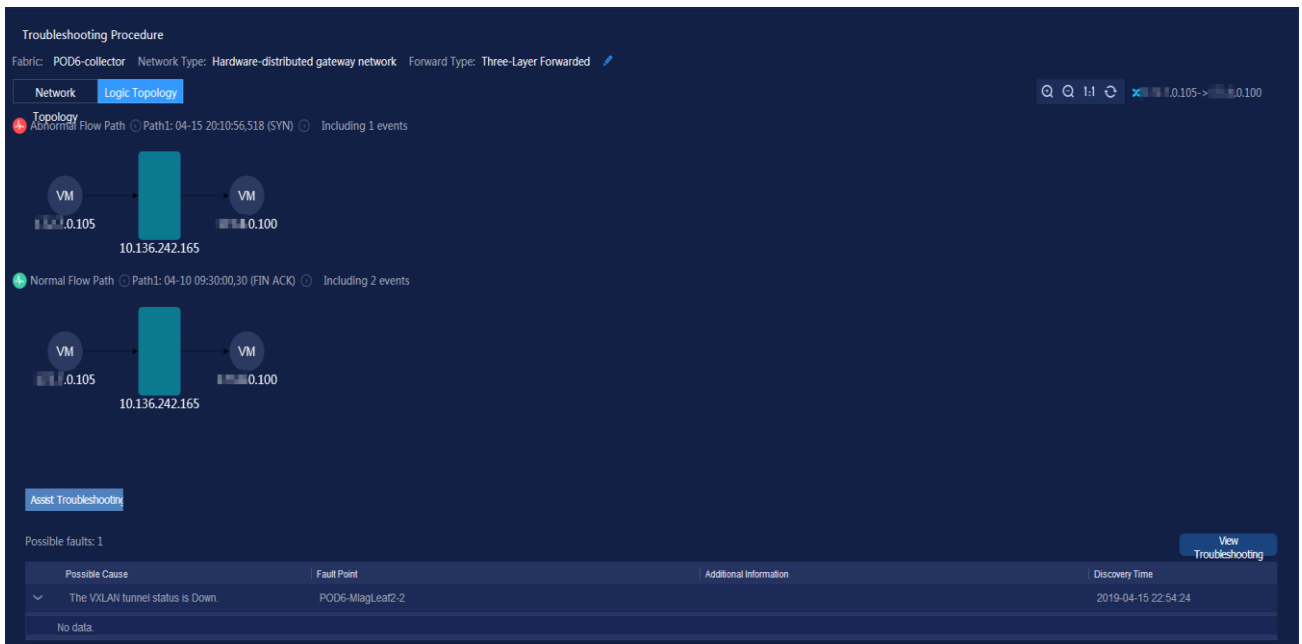

- Network service issues

  FabricInsight can proactively check whether the entry resource usage of the network device forwarding plane on the fabric is abnormal. The issues include the following: TCAM resource insufficiency, insufficiency or abrupt changes of FIB, ARP, and MAC address entry resources. FabricInsight can locate such an issue to the specific board, chip, and resource type.

- Security compliance issues

  FabricInsight can quickly detect security compliance issues and proactively identify potential non-compliant traffic interactions, suspicious SYN flood attacks, and suspicious port scanning attacks. FabricInsight comprehensively analyzes related data to identify the location of the suspicious attack source, analyzes the attack impact on the target host, and helps users audit non-compliant traffic.
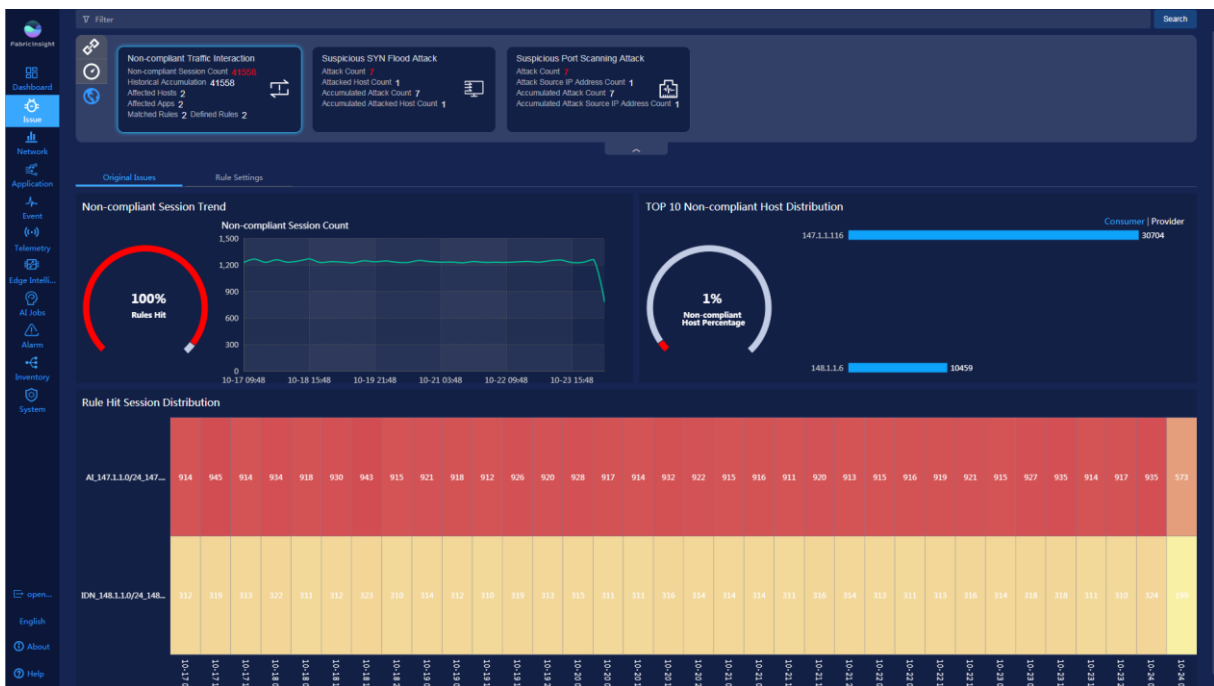

Associating software and hardware with edge intelligence and comprehensively analyzing specified flows

Based on the intelligent switch chip, FabricInsight provides edge intelligence and can comprehensively analyze UDP/TCP flows as required. The intelligent chip obtains and analyzes all the flows passing through the VM passes through in real time, including flow characteristics, packet loss, RTT delay, and traffic, and reports the analysis result to FabricInsight. Compared with reporting raw data, reporting analyzed data reduces the data volume by 99%, greatly reducing the impact on the analysis server. In addition, FabricInsight correlates and analyzes the data of the application network, network paths and network devices, compares the path delay hop by hop, and locates the packet loss point in minutes.
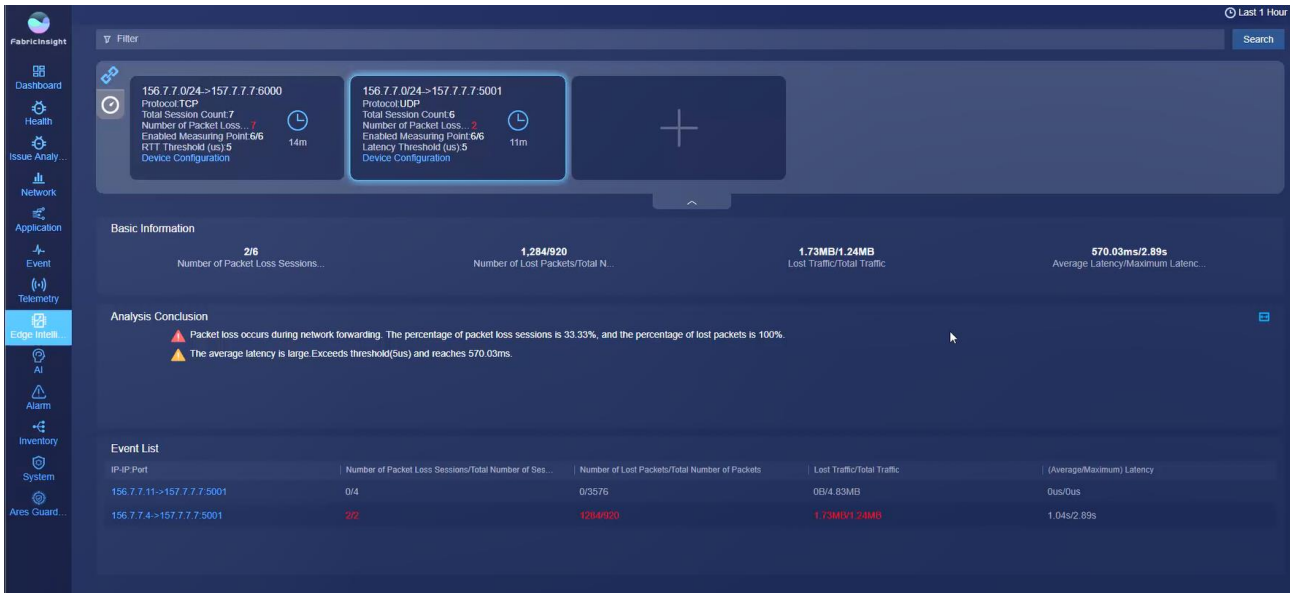
Comprehensive RoCE flow analysis and AI-based Fabric visualization

For distributed storage, HPC, and AI networking scenarios in data centers, FabricInsight supports RoCE flow analysis and collects session statistics based on the source IP address, source QP, destination IP address, and destination QP. In this manner, users can view KPI details such as the number of packet loss events, RTT, read throughput, and write throughput of a single session in the source and destination directions and the multi-dimensional trend.
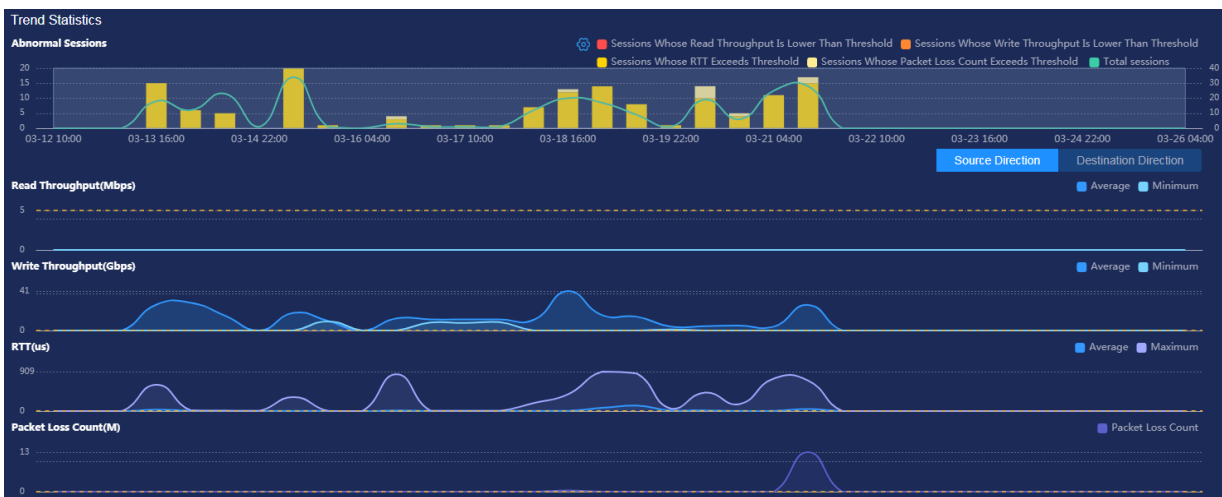
[Product Components]

FabricInsight consists of the basic package and value-added package based on functions and features. The following table describes the Telemetry network analysis functions of the basic package.

Feature	Description
Network status visualization	● Supports visualized and multi-dimensional top N statistics of Fabric data. ● Displays the Fabric network topology. ● Supports visualization of network configuration changes. ● Displays device abnormality logs and trends. ● Enables users to view detailed information about packet loss events.
Network abnormality detection	● Displays the key performance indicators (KPIs) of devices, boards, chips, interfaces, queues, and optical links in a trend chart. ● Displays dynamic baselines and detects abnormalities of KPIs of devices, boards, and interfaces. ● Supports millisecond-level queue congestion and packet loss detection.
Predictive maintenance	● Supports optical link health status prediction. ● Displays the forecast results of the RX and TX bandwidth utilization of interfaces in the next 12 weeks.
Network service issue detection and analysis	● Supports detection and analysis of TCAM resource insufficiency, and insufficiency or abrupt changes of FIB entry resources, ARP entry resources, and MAC entry resources.

The following table describes the service flow analysis functions provided by the value-added package of intelligent flow analysis.

Feature	Description
TCP service flow analysis	● Supports visualized top N statistics and analysis of hosts, applications, and sessions. ● Allows users to view the number of SYN events, abnormal TCP events , traffic, and delay in a specified period. ● Enables users to view details about packet loss events. ● Combines packets for analysis in the 1:1 NAT mapping scenario. ● Supports abnormal flow fault reasoning and one-click troubleshooting.
Application and network association analysis	● Analyzes application health status. ● Analyzes interaction between applications and displays application interaction relationships in the topology. ● Supports intra-application interaction analysis and mutual visibility between applications and networks.
Intelligent analysis of application quality or security compliance issues	● Supports detection and analysis of application quality issues, including continuous or intermittent services interruption, and host ports not listened. ● Supports detection and analysis of security compliance issues, including non-compliant traffic interaction, suspected SYN flood attacks, and suspected port scanning attacks.

Feature	Description
Visualization of all RoCE flows	- Supports visualized network topology views. - Collects statistics on the trends of RoCE network read throughput, write throughput, RTT, and packet loss. - Supports RoCE flow analysis and abnormal session trend statistics.
Edge intelligence analysis	- Support intelligent traffic analysis based on the triplet rules of the specified TCP source IP address, destination IP address, and destination port. The system can display information such as the number of sessions with packet loss, total number of sessions, number of lost packets/total number of packets/traffic in the request direction, number of lost packets/total number of packets/traffic in the response direction, and application interactions based on the specified rule. - Support intelligent traffic analysis based on the triplet rules of the specified UDP source IP address, destination IP address, and destination port. The system can display information such as the number of sessions with packet loss, total number of sessions, number of lost packets, total number of packets, discarded traffic, total traffic, average latency, maximum latency, and application interactions based on the specified rule.

[Operating Environment]

FabricInsight supports hardware configurations of physical servers and VMs. To avoid unexpected problems, configure the system according to the following software and hardware configuration requirements.

| Management Scale	Recommended Huawei Server Configuration	System Configuration
Physical cluster server with 128 GB memory: If only basic packages are purchased,no collector is required. The initial three analyzer and one collector nodes manage 3000 flows per second. One analyzer node needs to be added each time when 1000 flows are increased per second. The RoCE flow analysis function must be configured with the 256G physical server.	**Analyzer:** **TaiShan 200 (Model 2280) Server** CPU: 2*48Core/2.6GHz Memory: 128 GB Hard disk: 6*1800GB-SAS 2.5inch Network port: 4*GE+1*4GE	OS: Huawei-developed EulerOS Database: Huawei Gauss100 OLTP
	Collector: **TaiShan 200 (Model 2280) Server** CPU: 2*48Core/2.6GHz Memory: 64 GB Hard disk: 2*1200GB SAS HDD Network port: 2*4 GE Elec-port	OS: Huawei-developed EulerOS
Physical cluster server with 256 GB memory: If only basic packages are	**Analyzer:** **TaiShan 200 (Model 2280) Server** CPU: 2*48Core/2.6GHz	OS: Huawei-developed EulerOS Database: Huawei

Management Scale	Recommended Huawei Server Configuration	System Configuration
purchased,no collector is required. The initial three analyzer and one collector nodes manage 8000 flows/seconds. One analyzer node needs to be added for each increase in 5000 flows/second. The RoCE flow analysis function must be configured with the 256G physical server.	Memory: 256 GB Hard disk: 12*1800GB-SAS 2.5inch Network port: 4*GE+2*10GE	Gauss100 OLTP
	Collector: **TaiShan 200 (Model 2280) Server** CPU: 2*48Core/2.6GHz Memory: 64 GB Hard disk: 2*1200GB SAS HDD Network port: 2*4 GE Elec-port	OS: Huawei-developed EulerOS
Customer-provided VM: If only basic packages are purchased,no collector is required. The initial three analyzer and one collector nodes manage 3000 flows per second. One analyzer node needs to be added each time when 1000 flows are increased per second. The RoCE flow analysis function must be configured with the 256G physical server.	**Analyzer VM types: FusionSphere(KVM)6.5** VM resource configuration (exclusive use of memory and CPU resources): CPU: 32vCPU Memory: 128 GB System disk: 900 GB Data disk: 7T The random read and write speed of the hard disk is greater than or equal to 100 MB/s. Network port: At least one network port is required and two are recommended. The network port bandwidth is 1 Gbit/s.	OS: Huawei-developed EulerOS Database: Huawei Gauss100 OLTP
	Collector VM type: FusionSphere(KVM)6.5 CPU: 32 vCPU Memory: 64 GB Hard disk: 600 GB Network port: At least two GE network ports are required. Note: The random read and write speed of the hard disk is greater than or equal to 100 MB/s.	OS: Huawei-developed EulerOS

[Deployment Scenarios]

The supported networks are as follows:

- Hardware-centralized gateway networking

- Hardware-distributed gateway networking

- Pure IP networking (Host Overlay)
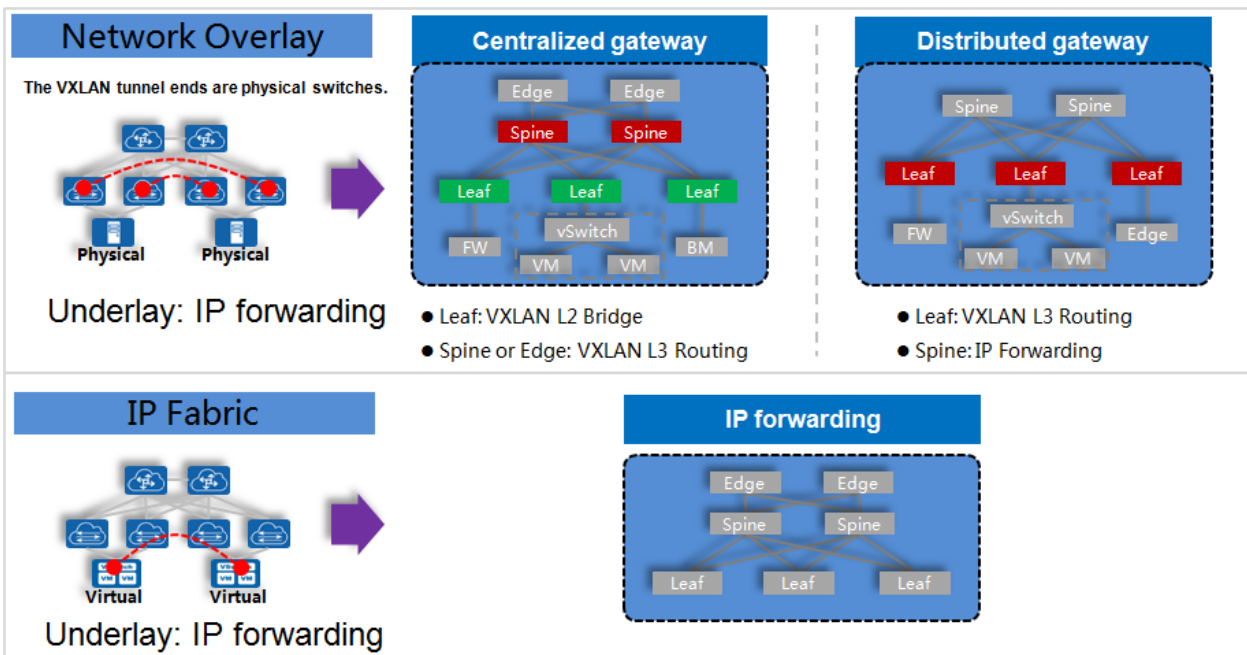
Remarks:

(1) The underlay network is based on IP forwarding.

(2) SVF networking is not supported.

(3) IP address overlapping scenarios (for example, multi-tenant and VPC scenarios) are not supported.

(4) Other networking modes such as traditional layer-2 networking (including the VLAN and STP), TRILL networking, and MPLS VPN are not supported.

[Ordering Information]

Module		Type	Description
Software subscription	**Software package**		
	Basic package of intelligent network analysis	Mandatory	This module is purchased based on the number of CloudEngine switches in the data center.
	Value-added package of intelligent flow analysis	Optional	This module is purchased based on the number of VMs or PMs in the data center.
	Big data analysis license - per node	Mandatory	This module indicates the number of big data analysis nodes.
	SnS		
	Basic package of intelligent network analysis - SnS	Mandatory	This module corresponds to the basic package of FabricInsight intelligent network analysis, which has the same number. You can choose 1 year or 5 years for the SnS.

Module		Type	Description
	Value-added package of intelligent flow analysis - SnS	Optional	This module corresponds to the value-added package of FabricInsight intelligent flow analysis, which has the same number. You can choose 1 year or 5 years for the SnS.
	Big data analysis license - per node - SnS	Mandatory	This module corresponds to the big data analysis license - per node. You can choose 1 year or 5 years for the SnS.
Hardware subscription	Analysis server	Optional	This module indicates the number of servers required by the FabricInsight analyzer.
	Collection server	Optional	This module indicates the number of servers required by the FabricInsight collector. If reliability is required, configure two servers for each fabric.

FabricInsight can provide a 180-day trial license. You can obtain the license from Huawei local sales department.

More

For more information about the Huawei FabricInsight, visit http://e.huawei.com

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