iMaster NCE-CampusInsight Data Sheet

Huawei campus network analyzer — iMaster NCE-CampusInsight — dynamically obtains network data in seconds, achieving user experience awareness throughout the journey. It proactively identifies common network issues, helping administrators locate faults and intelligently optimize the network in minutes.

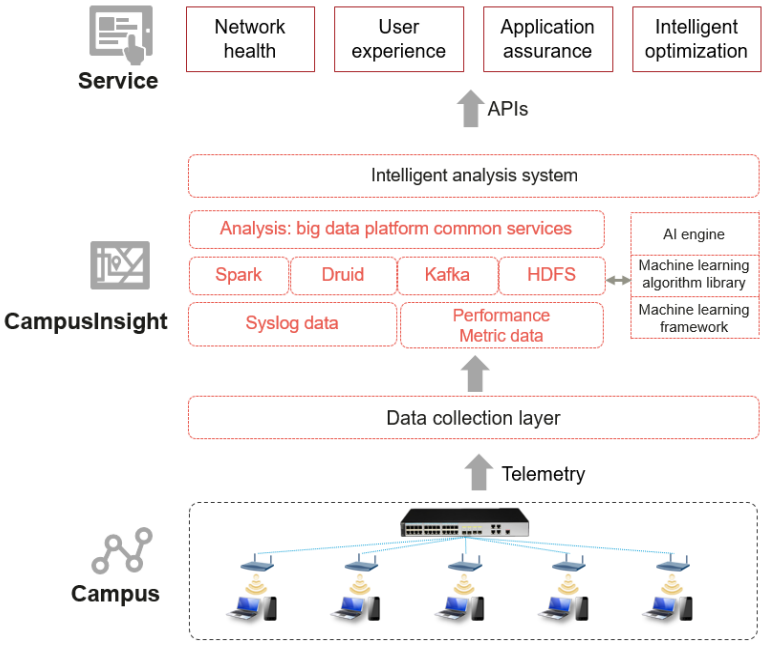
Product Description

With the development of network technologies, wireless networks have become an indispensable part of enterprise operation. From mobile office to HD video conference to guest reception, network experience is closely related to employee working efficiency and customer satisfaction. However, as the enterprise scale expands, network application scenarios are becoming more complex, making the network environment that is difficult to measure become more complex than ever. Traditional O&M methods cannot proactively detect issues, resulting in low efficiency in fault rectification and bringing heavy burden to IT O&M personnel.

Huawei iMaster NCE-CampusInsight is an intelligent network analysis platform that has totally transformed traditional network resource monitoring. The platform collects network data in real time through Telemetry, learns network behavior, and identifies fault patterns based on big data analytics and Machine Learning (ML) algorithms. This helps O&M personnel proactively identify 85% of faults before they occur to deliver premium Wi-Fi LAN-WAN experience in an E2E manner.

Key Components

Built based on big data platform, CampusInsight uses the Streaming Telemetry technology to collect device data in quasi-real time, analyzes features and calculates baselines based on machine learning algorithms, automatically identifies and locates network faults, and performs network optimization. It also displays analysis results on a graphical user interface (GUI).



Highlights

Network health 360, proactively identifying 85% of potential network faults

- **Multi-dimensional network health evaluation:** Periodically pushes reports for LAN-WAN network health analysis.
- **Minute-level fault demarcation and locating:** Proactively identifies 200+ issues of eight types, predicting potential risks in advance.

User experience 360, reducing 90% of complaints

- **E2E user experience visibility:** Provides visualized experience for each user at any time, facilitating fault backtracking.
- **Protocol tracing for the access process:** Quickly locates user access issues, analyzes root cause, and provides rectification suggestions.

Application assurance 360, reducing the fault locating time by 95%

- **Intelligent application identification:** Uses AI technologies to identify 1000+ mainstream applications, proactively detecting the application quality.
- **Minute-level locating of application issues:** Uses the exclusive in-band flow measurement technology to implement fault demarcation and locating within minutes.

Intelligent optimization 360, improving network performance by 58%

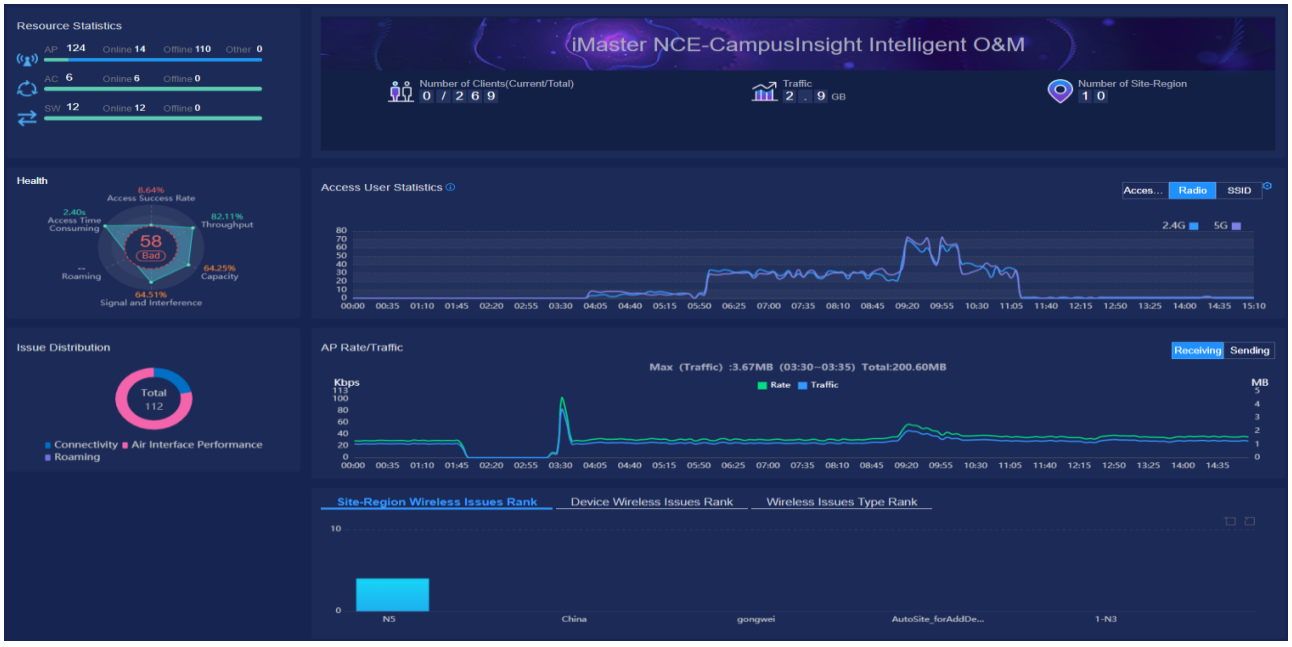
- **Predictive optimization:** Predicts the load of APs and performs automatic optimization on wireless networks, improving the network-wide performance by over 50% (Tolly-verified).
- **AI roaming:** Establishes roaming baselines based on different terminal types and performs differentiated roaming steering, improving the roaming success rate by 70%.

Key Features

Network Health 360

Multi-dimensional Data Analysis on Dashboard, Easily Understanding Network Status

The multi-dimensional data statistics view is provided based on hierarchical areas. Administrators can quickly grasp the overall network information by viewing the health, resource status, access client statistics, and issue distribution of each region or site.



Multi-dimensional Evaluation of Network Health, Driving Proactive Network Optimization

The wired network health module displays the overall evaluation result of campus wired client experience quality based on the device environment, device capacity, network performance, network status, and network protocol. CampusInsight can quickly demarcate common wired network issues, intelligently perform root cause analysis, and provide rectification suggestions.



The wireless network health module displays the overall evaluation result of campus wireless client experience quality based on the access success rate, time required for access, RSSI and interference, roaming fulfillment rate, capacity health, and throughput fulfillment rate. CampusInsight can analyze the distribution of metrics and objects in depth to clearly determine the network quality. It can also provide comparison and analysis of different time ranges and regions and send quality evaluation reports in real time or periodically through emails, helping administrators proactively optimize networks. CampusInsight can drive continuous improvement from poor experience to good experience.



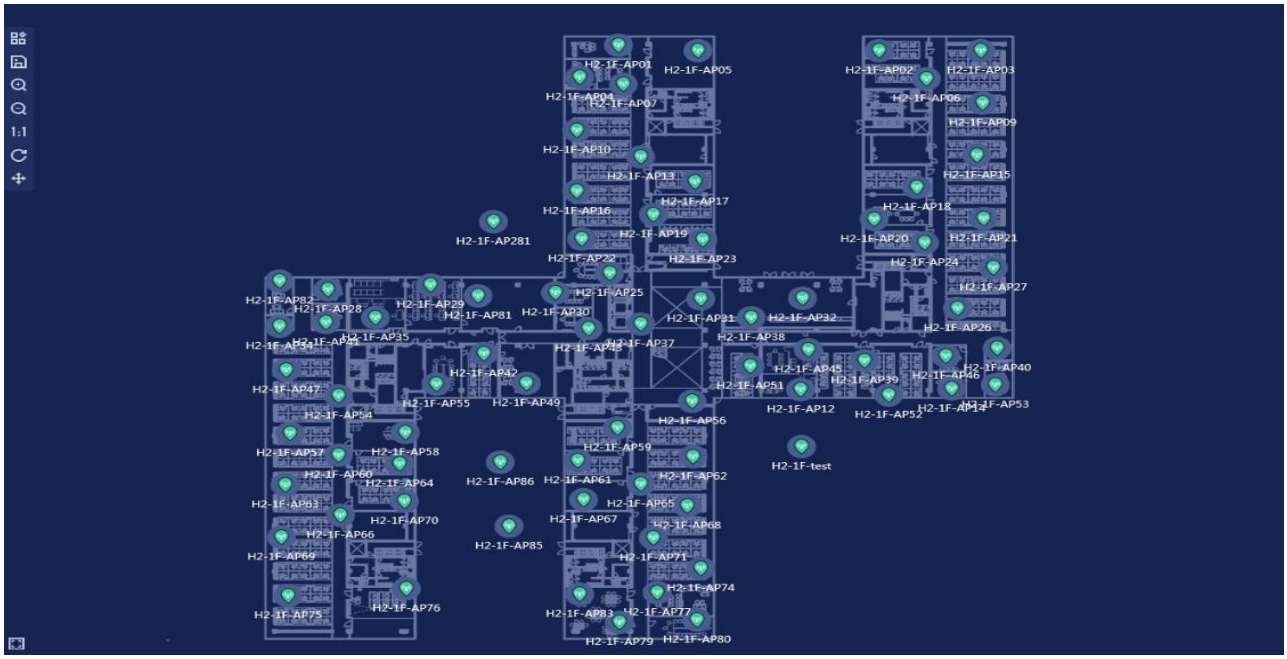
3D Building Topology, Intuitive Display of the Entire Network Status

The service topology displays key network KPIs and issues by site, region, building, and floor, including the number of users, traffic volume, network status, access, congestion, and error packet issues. CampusInsight can quickly locate users in one-click mode and display user journey by building or floor, facilitating fault backtracking.



Graphical Topology Management, Displaying Issue Location and Distribution

For planned regions or sites, administrators can import background images, deploy APs, and perform various topology operations such as zooming in, zooming out, and searching. Issue distribution can be displayed based on APs, helping administrators troubleshoot issues based on AP locations.



Issue Statistics Overview, Quickly Evaluating Issue Impacts

CampusInsight displays the overall issue trend, dimension-based issue distribution, issue status attribute (active/inactive), and number of affected clients, helping administrators evaluate the issue timeliness and impact scope.



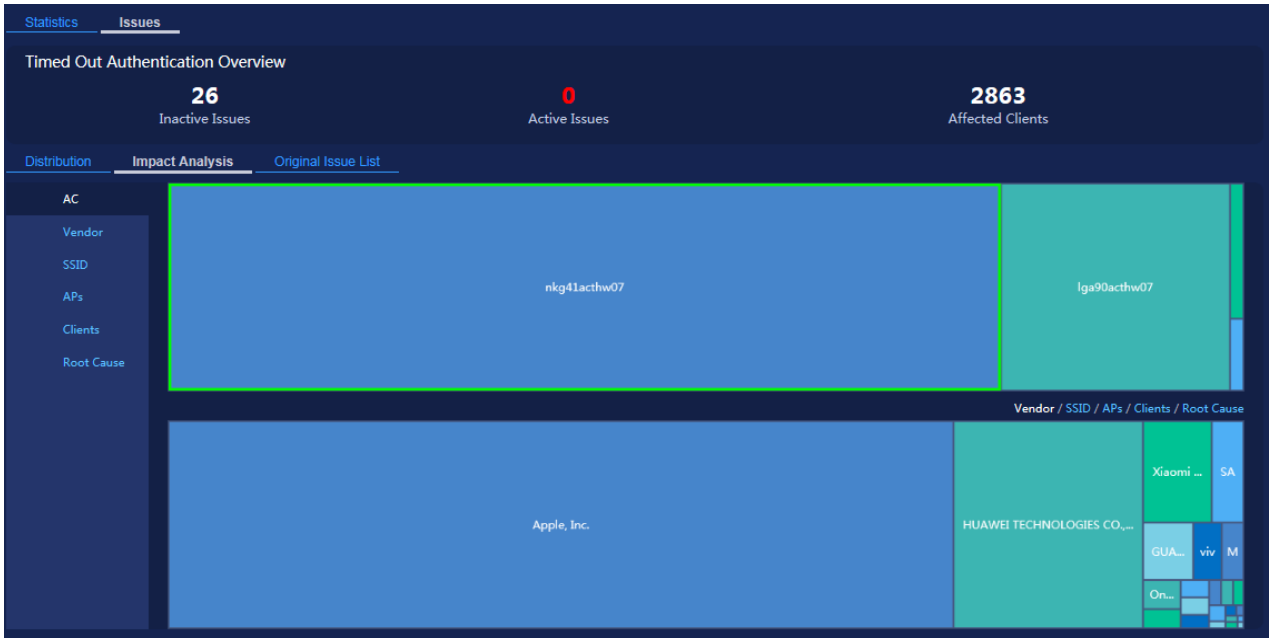
Multi-dimensional Issue Distribution, Quickly Focusing on Points with More Issues

The heatmap can display the number of issues occurred on different devices, number of affected clients, and issue change trend. Administrators can perform cross-time and cross-space comparison and analysis to view devices and time ranges with more issues. This enables the administrators to quickly focus on issue points and conduct proactive O&M.



Correlative Impact Analysis, Quickly Analyzing and Demarcating Issues

Issue impacts can be displayed in multiple dimensions based on the AC, vendor, SSID, AP, client, and root cause. Impacts on different objects are displayed in area charts. The larger the area is, the greater the impact is. By comparing the area distribution, administrators can determine whether an issue is a group issue or an individual issue. Multi-dimensional correlation analysis is supported to quickly locate root causes of issues through layer-by-layer drilling.



Historical Network Behavior Playback, Quickly Tracing Issues

The aggregated issue information list can be viewed, helping administrators play back historical network behavior. The aggregated issue information includes the associated device, duration, number of affected clients, and number of occurrences of each issue.



Root Cause Analysis and Rectification Suggestions, Assisting Issue Closure

Administrators can view details about an issue, including the duration, activeness, distribution trend, and impact scope. In addition, the system can match fault scenarios based on the fault knowledge base, automatically identify root causes, and provide rectification suggestions, helping administrators to troubleshooting and rectifying the issue. In addition, the system can compare the faulty devices with other devices to quickly identify high-risk objects, providing a basis for proactive optimization.



Dynamic Baseline-based Exception Detection, Proactively Identifying Connectivity Issues

Administrators can view the overall issue distribution during client going-online and globally review the network access quality. Connectivity issues are classified at the association, authentication, and DHCP phases, helping administrators to demarcate faults. Distribution of affected APs and affected clients can be displayed in area charts, helping administrators quickly determine the impact scope and affected objects and take specific measures.

In addition, CampusInsight uses the machine learning algorithm to learn a large amount of network feature data and create the baseline. In addition, CampusInsight dynamically adjusts the baseline based on the changes of network feature data. By comparing the actual network data with the dynamic baseline, administrators can identify exception points before network quality deterioration.



Client Experience Trend and Distribution, Proactively Identifying Performance Issues

Administrators can view the overall issue distribution during network use and globally review network performance experience. The proportion and trend of clients with good, medium, and poor experience can be displayed based on metrics such as the RSSI, negotiated rate, and packet loss rate, helping administrators quickly detect client experience on the live network.

Distribution of affected APs and affected clients can be displayed in area charts, helping administrators quickly determine the impact scope and affected objects and take specific measures.



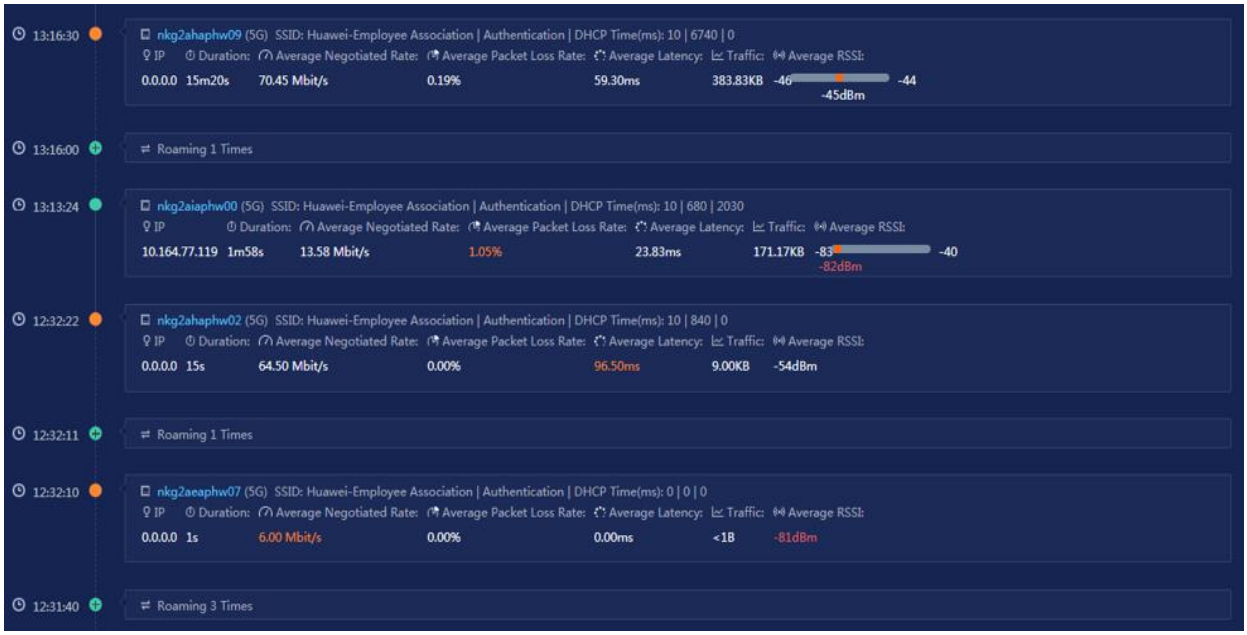
User Experience 360

Full-Journey Experience Visualization, Guaranteeing Experience for Each User at Any Time

Administrators can search for a specific client by the client MAC address and client name. In addition, administrators can draw a profile of a client to view basic client information, metric overview, connectivity issue distribution, and experience trend.



Administrators can draw the client journey based on the client access history. By playing back client experience on the network, administrators can check client experience (who, when, which AP is connected, what is the experience, and what issues occur) on a profound basis. This helps administrators detect network experience from the client perspective.



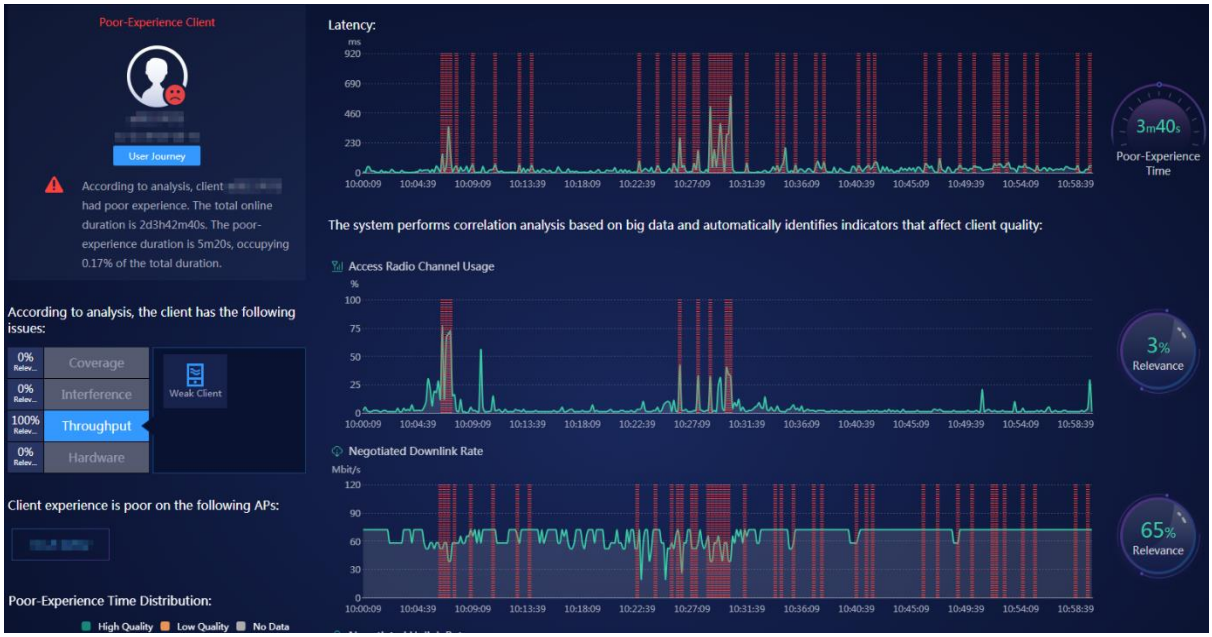
Protocol Tracing, Identifying Individual Connectivity Issue in a Refined Manner

CampusInsight allows users to trace the process for a client to access the network at three phases (association, authentication, and DHCP) and displays the protocol interaction results and consumed time, helping O&M personnel precisely locate the request/response phase where the issue occurs and analyze the client access process in a refined way.



Correlative Analysis of Poor-Experience Clients, Mining Potential Issue Causes

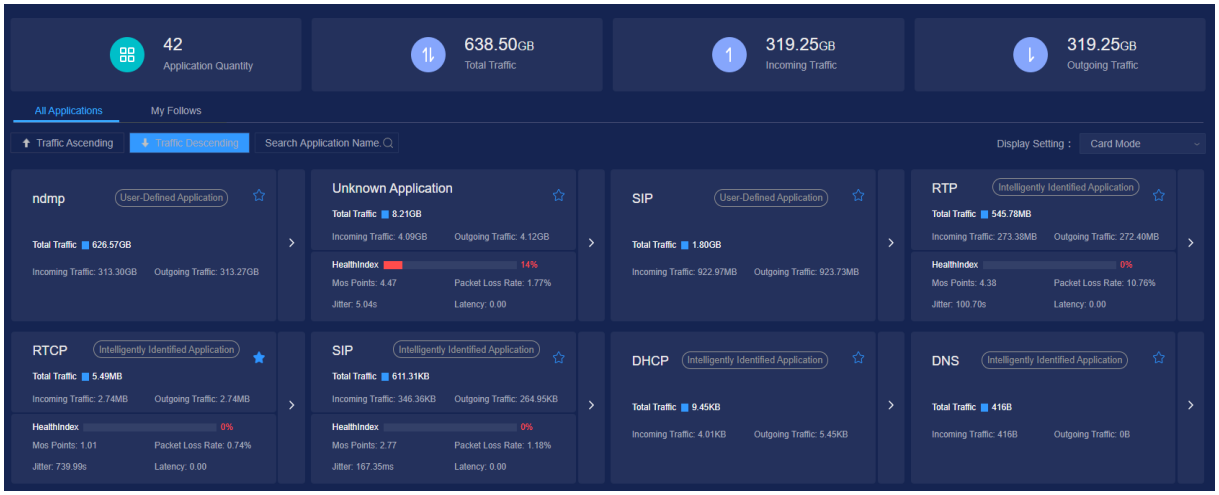
CampusInsight can determine poor-experience clients based on dynamic learning algorithms and client KPIs. By intelligently classifying network issues (into coverage, interference, throughput, and hardware issues), CampusInsight can identify the internal association between these types of issues and client quality and display quantified correlation KPIs, helping O&M personnel find root causes and potential causes of issues.



Application Assurance 360

Real-time Application Identification and Traffic Analysis, Quality Awareness, and Fault Locating, Ensuring E2E Application Experience

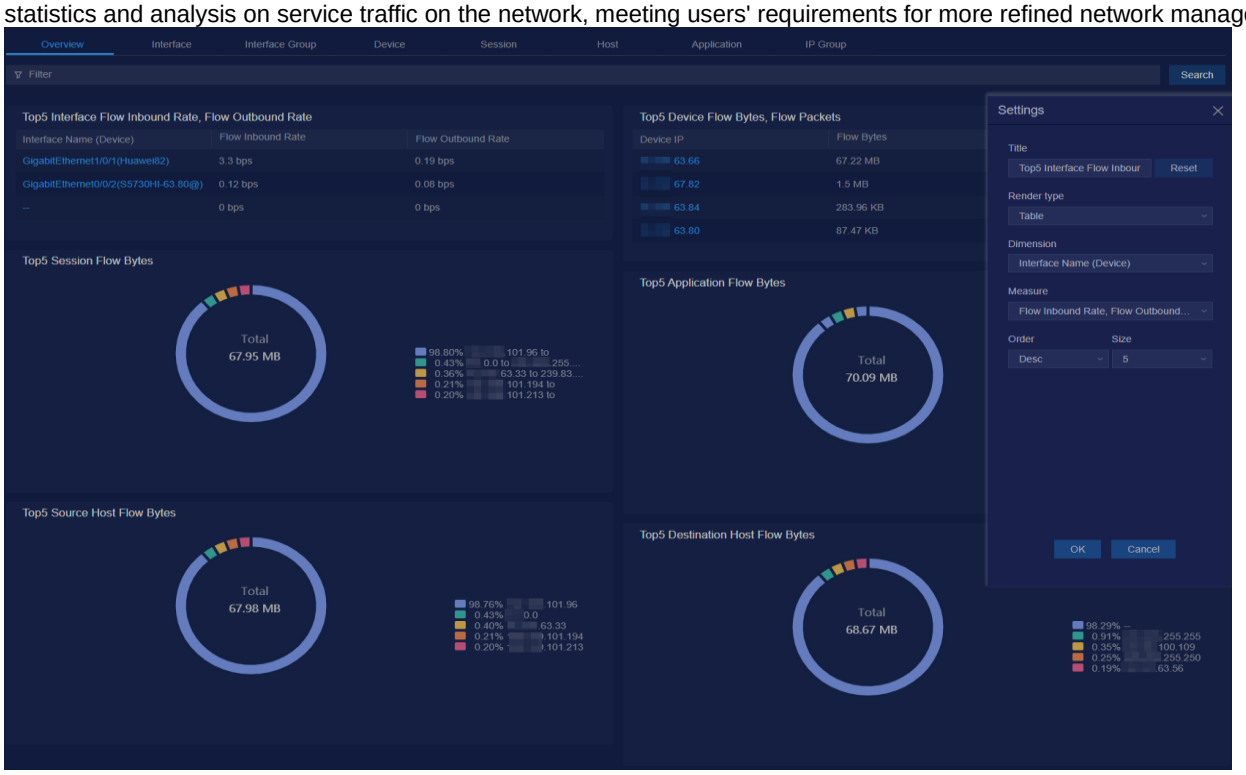
With application identification technology, CampusInsight accurately identifies more than 1000 mainstream applications and their traffic usage on the entire network, including WeChat, DingTalk, Webex, Zoom, and Skype.



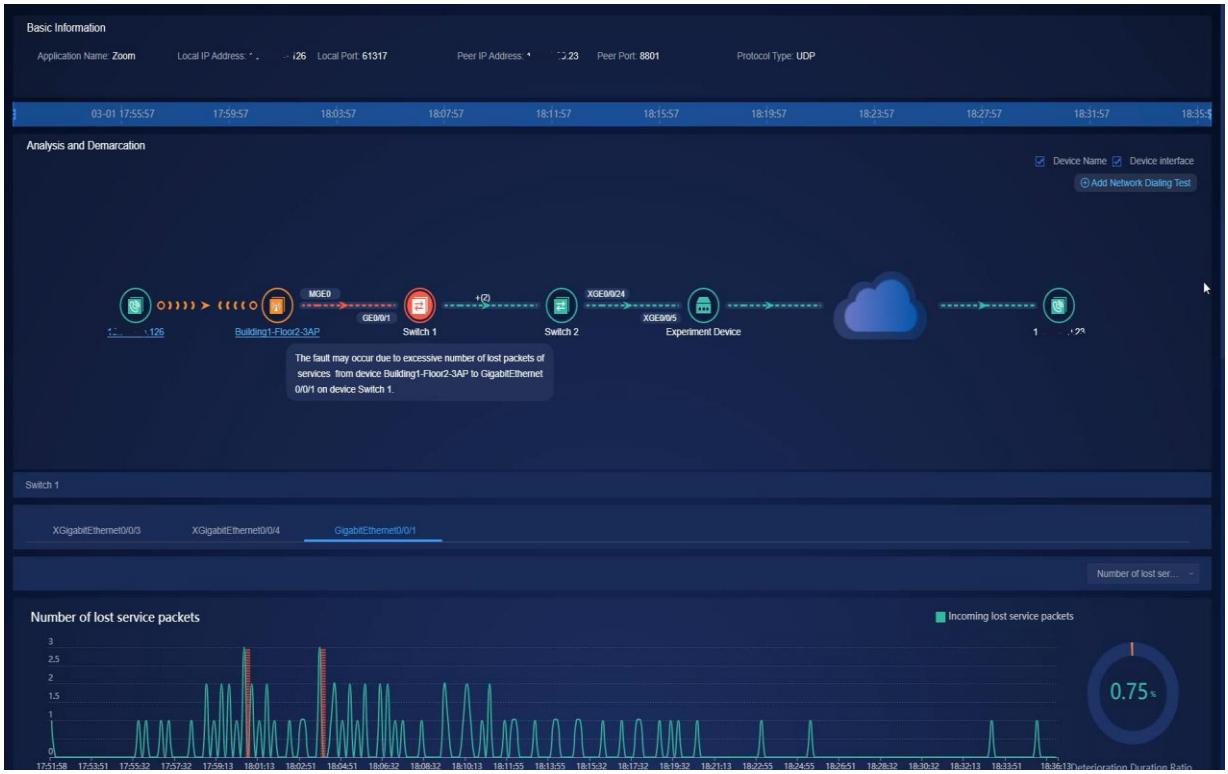
It displays the traffic usage and specific users of each application, as well as the application usage of each user on the client journey page.



In addition, CampusInsight uses the NetStream technology to define network applications and provides multi-dimensional statistics and analysis on service traffic on the network, meeting users' requirements for more refined network management.



Through exclusive eMDI technology and AI algorithms, CampusInsight can detect the quality of mainstream applications in real time and identify poor-QoE applications. It uses iPCA 2.0 to implement network quality measurement based on actual service flows and display the path of service flows in real time, including the devices at both ends and the devices and ports through which each service flow passes. In addition, CampusInsight performs fault mode analysis over the paths to intelligently locate the faulty devices or ports in a short period of time.



Intelligent Optimization 360

Intelligent Radio Calibration, Improving the Network-Wide Performance by 50%+

Scenario 1: Manual Calibration, Providing Optimal Channel Planning Suggestions Based on Neural Network Simulation Feedback

Leveraging radio and neighbor information of APs, CampusInsight evaluates the radio scores and number of APs for which radio calibration needs to be performed, simulates the calibration effect in real time through AI algorithms, and provides corresponding channel adjustment suggestions. In this way, the radio calibration time and potential errors are minimized during Wi-Fi network deployment.



CampusInsight displays neighbor and conflict information before and after simulation based on the AP topology on each floor, and provides corresponding channel optimization suggestions.



Scenario 2: Automatic Calibration and AI-Powered Predictive Calibration

After intelligent radio calibration is enabled for the first time, CampusInsight intelligently identifies edge APs, predicts the AP loads, and provides calibration suggestions through AI algorithms based on data from the past seven days. Then, according to the suggestions, APs perform automatic calibration periodically or in real time. In addition, CampusInsight will record the automatic calibration records and compare gains before and after intelligent radio calibration. As verified by Tolly, intelligent radio calibration improves the average physical-layer bandwidth of terminals by more than 50%, reduces the average interference rate by 49%, and reduces the average channel utilization by 36%.



CampusInsight will compare key network metrics before and after the calibration each time intelligent radio calibration is performed. The key metrics include the average physical-layer bandwidth of terminals, average interference rate, and average channel utilization. In addition, CampusInsight displays the APs involved in each calibration as well as the differences in channel, power, and frequency bandwidth for each AP before and after the calibration.



AI Roaming

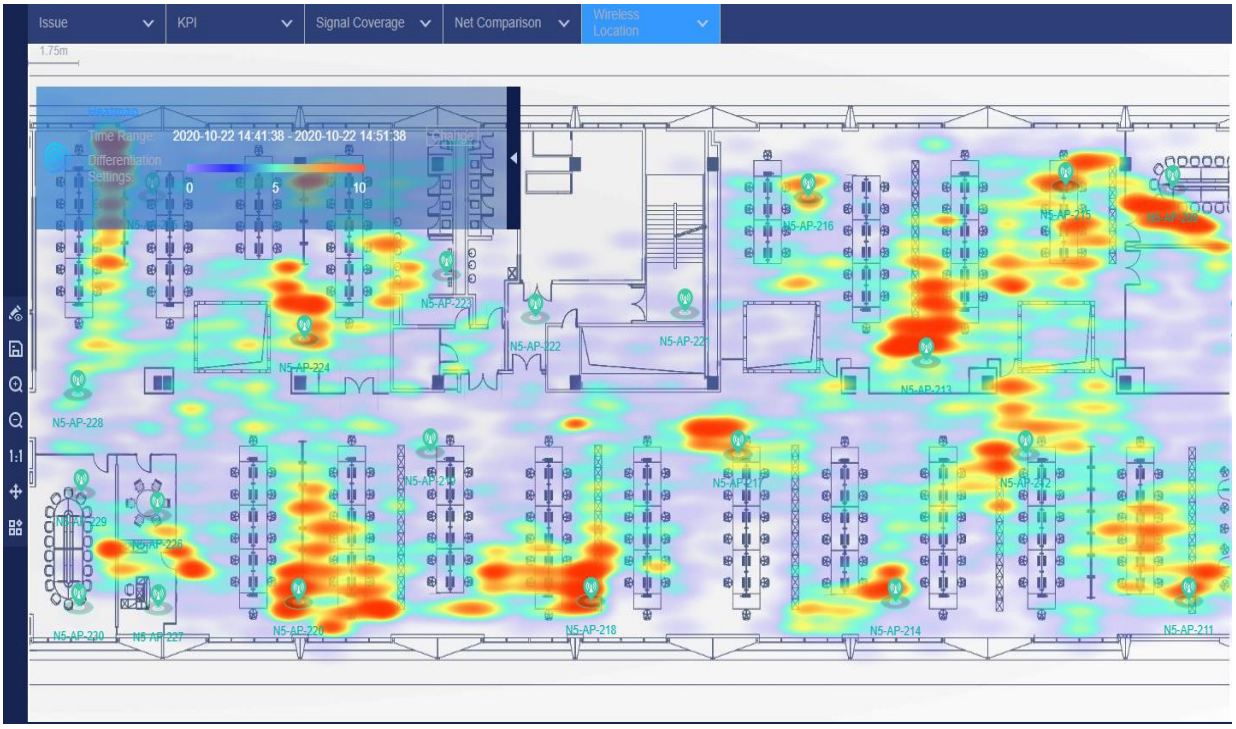
CampusInsight performs profile training for terminal roaming behaviors based on big data and reinforcement algorithms, and implements differentiated roaming steering policies based on terminal models and operating systems. This increases the roaming success rate and reduce packet loss and latency during roaming, improving terminal roaming experience.



Other Value-added Services

RSSI-based Wireless Positioning, Achieving Refined O&M Based on Terminal Locations

With the RSSI-based wireless positioning function, CampusInsight provides the client heatmap, terminal path, and available path of each floor, as well as Wi-Fi and non-Wi-Fi interference sources, helping O&M personnel quickly troubleshoot faults.



CampusInsight also supports location analysis of Wi-Fi users, including new and old user detection statistics, frequency distribution, and detection duration distribution. In addition, it provides open APIs to connect to third-party service systems or applications in special scenarios, for example, densely populated areas in shopping malls and schools during epidemics.

Composition

CampusInsight provides basic edition and value-added packages. The basic edition provides the following functions.

Feature	Description
Multi-dimensional network status visualization and client experience awareness throughout the journey	• Displays multi-dimensional data statistics views based on different levels and regions. • Supports user-defined views and displays key statistics information about networks and users on the screen in carousel mode. • Displays issues about network access, network congestion, device status, and error packets from the perspective of buildings. • Searches users from the perspective of buildings and displays information about buildings that users passed by in a specified period of time. • Allows administrators to import topology views and plan AP locations to intuitively view fault location distribution. • Automatically discovers the topology corresponding to the physical network, displays the network information in the topology view, and monitors the entire network in real time. • Displays the radio heatmap by AP location. • Allows administrators to import network planning data to be compared with the actual network running data, displaying the differences between them. • Allows administrators to view the full-journey experience, including who, when, which AP to connect, experience, and issues. • Supports device profiles and allows administrators to view the health status of switches, APs, and routers. • Displays spectrum analysis results based on APs, including full-channel status monitoring, Wi-Fi interference sources, and non-Wi-Fi interference sources. • Generates dialing test reports for multi-vendor network comparison in real time and

Feature	Description
	allows administrators to intuitively learn the Wi-Fi network experience through dialing tests on apps. • Traces the network access process of a client, including detailed protocol information at the association, authentication (supporting 802.1X authentication, Portal authentication, MAC address authentication, HACA authentication and PSK authentication), and DHCP phases. The protocol information includes the interaction result and time used. If the interaction fails, the failure causes are also displayed. • Correlatively analyzes poor-experience clients. When the experience of a client deteriorates, CampusInsight identifies quantified correlation KPIs based on the KPI similarity analysis algorithm, which effectively improves the accuracy of root cause identification.
Automatic identification and proactive prediction of network issues	• Supports automatic identification of common network issues based on big data analytics and ML algorithms: connectivity, air interface performance, roaming, device environment, device capacity, network performance, network status, and network protocol issues. The issues include authentication failure, weak-signal coverage, dual band-capable clients prioritizing 2.4G, and network congestion. • Supports learning and dynamic baseline drawing on network behavior to predict the change trend and detect exceptions through data comparison. • Intelligently analyzes data reported at the second level and establishes a network health evaluation system from multiple dimensions. CampusInsight evaluates and ranks regions based on indicator weights, driving continuous improvement from poor experience to good experience and gradually improving the network quality. The dynamic baseline comparison between the local region and other regions for each indicator can be viewed. CampusInsight provides associated root cause indicators, enabling in-depth root cause analysis. Different time or areas can be selected for comparison and analysis and sends network health reports are sent to the administrators in real time or periodically by emails. • Establishes roaming baselines based on different terminal types, intelligently determines the optimal roaming time, and provides users with intelligent and lossless roaming experience.
Intelligent demarcation and root cause analysis of network issues	• Supports the issue distribution view, allowing administrators to view the number of issues on different devices and the number of affected clients. This helps administrators quickly focus on the affected devices where and the time range. • Supports issue impact analysis views, allowing administrators to filter impact factors from multiple dimensions and drill down layer by layer to quickly locate the issue root cause. • Analyzes the root causes and provides rectification suggestions to assist quick issue closure.
Open northbound APIs, providing various data for intelligent analysis	• Supports different secondary development capabilities based on data characteristics. Three types of interfaces can open the raw data and analyzed data to third-party systems, including network O&M and IT service systems, thereby offering richer intelligent analysis data. **(1)** RESTful NBI: opens resource data (device, interface, link, and board data), health data (health issue and health evaluation data) and terminal session data to external systems. **(2)** SNMP NBI: reports alarm data to a third-party system through SNMP. **(3)** Kafka NBI: consumes data collected by CampusInsight using Telemetry through the consumer API provided by Kafka.

The value-added packages are classified into application analysis value-added packages, network optimization and self-healing value-added packages as well as network wireless location value-added packages. The application analysis value-added packages provide the following functions.

Feature	Description
Application visualization and traffic analysis	• Accurately identifies more than 1000 mainstream applications through application identification, including Zoom, Microsoft Teams, DingTalk, and WeChat. • Identifies user-defined applications. • Analyzes the network-wide application traffic and number of users based on applications and displays the application usage of each user on the client journey page. • Collects statistics on application traffic from dimensions of interfaces, devices, and hosts. Constraints: • Non-encrypted RTP and TCP applications are supported in IPv4 scenarios. • Switches, ACs (excluding native ACs), and APs of V200R021C00 and later versions are supported. In addition, application identification or NetStream must be enabled on devices. For details about the specifications, refer to the CampusInsight specification query tool.
Application quality insights and poor-QoE analysis	• Uses exclusive eMDI technology and AI algorithms to detect the quality of mainstream applications in real time and identify poor-QoE applications. • Uses iPCA 2.0 to implement network quality measurement based on actual service flows and display the path of service flows in real time, including the devices at both ends and the devices and ports through which each service flow passes; Performs fault mode analysis over the paths to intelligently locate the faulty devices or ports in a short period of time. Constraints: • Non-encrypted RTP and TCP applications are supported in IPv4 scenarios. • Switches, ACs (excluding native ACs), and APs of V200R021C00 and later versions are supported, and eMDI and iPCA 2.0 must be enabled on devices. For details about the specifications, refer to the CampusInsight specification query tool.

The network optimization and self-healing value-added packages provide the following functions.

Feature	Description
Intelligent radio calibration	• **Real-time simulation feedback**: CampusInsight evaluates wireless network channel conflicts based on the neighbor and radio information of devices on each floor and provides calibration suggestions. (Simulation feedback is not supported for regions for which no floor is planned.) • **Big data-powered predictive calibration and post-calibration gain display**: CampusInsight identifies highly loaded APs and edge APs through AI algorithms based on historical big data, drives devices to perform differentiated radio calibration based on the big data analytics results, and intuitively displays all calibration records and calibration gains. The records include both intelligent radio calibration and local calibration records.
AI roaming	CampusInsight establishes the roaming baseline based on different terminal types and performs differentiated roaming steering to provide users with better roaming experience.

The wireless network location value-added package provides the following functions.

Feature	Description
RSSI-based wireless positioning	• Displays the client distribution heatmap based on the specified time period. • Allows administrators to view locations of all terminals with Wi-Fi enabled, location of individual users, and available paths within a specified period. • Anonymizes terminal MAC addresses. • Locates Wi-Fi and non-Wi-Fi interference sources, including identifying and displaying the locations of interference sources. • Supports Wi-Fi user location analysis, including new and old user detection statistics, frequency distribution, detection duration distribution, user capture rate, and associated

Feature	Description
	user ratio. Constraints: • Only Wi-Fi RSSI-based network positioning is supported. • Only indoor wireless positioning is supported. • Positioning accuracy: < 10 m, 60% accuracy (independent radio scanning), 50% accuracy (non-independent radio scanning); Positioning delay: < 20s • Wireless positioning data can be stored for a maximum of seven days.

Networking

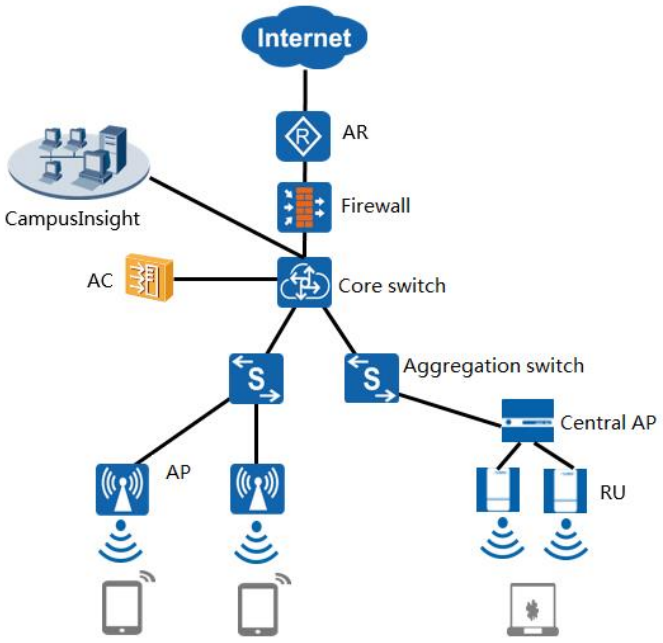
CampusInsight supports the following networks:

- All WLAN ACs (including native ACs) + Fit APs
- All WLAN ACs (including native ACs) + Central APs + RUs
- X7/X3-series switches
- AR routers

Note: Wired networks in SVF networking are not supported.

Remarks:

- To identify DHCP-related connectivity issues, you need to use the AC as a DHCP server or enable DHCP Snooping on the AC.



Ordering Information

CampusInsight provides a three-month trial license. To apply for the trial license, visit the ESDP at http://app.huawei.com/isdp/.

More Information

For more information about Huawei CampusInsight, visit the following link: http://e.huawei.com

Copyright © Huawei Technologies Co., Ltd. 2022. All rights reserved.

No part of this document may be reproduced or transmitted in any form or by any means without prior written consent of Huawei Technologies Co., Ltd.

Trademarks and Permissions

HUAWEI and other Huawei trademarks are trademarks of Huawei Technologies Co., Ltd.

All other trademarks and trade names mentioned in this document are the property of their respective holders.

Notice

The purchased products, services and features are stipulated by the contract made between Huawei and the customer. All or part of the products, services and features described in this document may not be within the purchase scope or the usage scope. Unless otherwise specified in the contract, all statements, information, and recommendations in this document are provided "AS IS" without warranties, guarantees or representations of any kind, either express or implied.

The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

Huawei Technologies Co., Ltd.

Address:Huawei Industrial Base Bantian, Longgang Shenzhen 518129 People's Republic of China

Website:e.huawei.com