

Huawei GPON EMS NCE-FAN Operation Manual - Official Technical Overview & Hardware Datasheet

HUAWEI GPON EMS NCE-FAN OPERATION MANUAL

OFFICIAL TECHNICAL OVERVIEW & HARDWARE DATASHEET

EXECUTIVE SUMMARY

Huawei iMaster NCE-FAN (Network Cloud Engine - Fixed Access Network) is the industry's premier intelligent management and control system purpose-built for next-generation optical access networks. As the cornerstone of Huawei's Intent-Driven All-Optical Network, NCE-FAN revolutionizes traditional complaint-driven operations by introducing an automated, AI-powered framework that spans service provisioning, intelligent operations and maintenance (O&M), and experience assurance .

This comprehensive system empowers Telecom Carriers and Internet Service Providers (ISPs) to transition from reactive troubleshooting to proactive, predictive network management. By integrating advanced big data analytics, machine learning, and a robust telecom foundation model, NCE-FAN delivers a carrier-grade solution that guarantees an exceptional broadband experience for end-users while simultaneously optimizing operational costs. The system supports a full spectrum of PON technologies—including GPON, XG-PON,

XGS-PON, and the emerging 50G-PON standard — making it a future-proof investment for any fiber-to-the-home (FTTH) infrastructure .



ARCHITECTURE & CHASSIS DESIGN

The NCE-FAN system is architected upon a microservices-based cloud-native platform that provides a unified, 360-degree view of the entire access network. The high-level architecture is composed of three primary planes that facilitate a seamless interaction between the physical network and the digital operations environment.

- **MANAGEMENT & CONTROL PLANE:** This plane serves as the central nervous system of the NCE-FAN, enabling automated service provisioning through cloud-based authentication and plug-and-play policies. It orchestrates the

entire lifecycle management of network elements, from initial deployment and configuration (Zero-Touch Provisioning) to performance and fault management . The platform includes a Software-Defined Networking (SDN) controller module that simplifies Operations Support System (OSS) integration through service-level Application Programming Interfaces (APIs), enabling a programmable and automated service fulfillment process.

- DATA & ANALYTICS PLANE: This plane is the intellectual core of NCE-FAN, housing the big data and AI engine responsible for intelligent O&M and experience assurance. Through sub-second data collection from the access and home networks, it builds a comprehensive digital twin of the physical infrastructure. It employs sophisticated algorithms for data feature mining and AI-driven pattern recognition to extract actionable intelligence from raw telemetry data . This plane actively identifies and predicts network faults and user experience degradation, shifting the paradigm from reactive troubleshooting to proactive maintenance .

- CONVERGENCY & INTERFACES: The NCE-FAN standardizes network information modeling to provide open and standard interfaces that support integration with various network management systems (NMS), OSS/BSS, and field engineering support tools (FMEMate). This allows for the creation of a closed-loop automation system, where intelligent analysis results are fed

directly back into provisioning and maintenance workflows.

HARDWARE FEATURES

While NCE-FAN is a software-centric platform, its operation is intrinsically linked to the Huawei hardware ecosystem, serving as the commanding interface for a range of OLTs (Optical Line Terminals), ONTs (Optical Network Terminals), and ODN (Optical Distribution Network) elements. The core hardware features managed and optimized by the system include:

- **EXTENSIVE PLATFORM COMPATIBILITY:** NCE-FAN provides centralized management for a vast portfolio of Huawei access equipment, including but not limited to the MA5800, EA5800, and MA5600 series OLTs . It supports the management of large-scale network deployments, scaling to manage up to 80,000 ONTs in its lite version and supporting hundreds of thousands in its full carrier-grade deployment .
- **AI-POWERED INTELLIGENT FAULT DIAGNOSIS:** The system utilizes an AI engine that has learned extensive fault models, including over 20 optical fault types (e.g., low optical power, excessive fiber bending) and over 10 home network device types (e.g., access points, mobile phones, cameras). This capability allows it to remotely identify and locate root causes of service

degradation, such as Wi-Fi channel interference or configuration errors, thereby significantly reducing the frequency of costly on-site visits .

- INTELLIGENT EXPERIENCE & NETWORK QUALITY VISUALIZATION: A key hardware-facing feature is the Customer Experience Index (CEI) scoring model, which provides a quantifiable measure of user experience for broadband services. This is enabled by the system's ability to visualize end-to-end network topology and provide 24/7 playback of Key Performance Indicators (KPIs). This facilitates the remote demarcation of faults and precise identification of performance bottlenecks, such as underperforming routers or bandwidth constraints .

- AUTOMATED SERVICE PROVISIONING & MODULAR EXPANSION: NCE-FAN automates the entire device deployment lifecycle. By leveraging cloud-based authentication and plug-and-play policies, it enables remote soft commissioning and automatic configuration of new OLTs and ONTs, dramatically improving deployment efficiency . This automation is crucial for managing the modular expansion of the network, allowing carriers to add new line cards and services without significant manual intervention.

- HIGH AVAILABILITY & REDUNDANCY: Designed for carrier-grade reliability, the NCE-FAN platform features robust high-availability mechanisms, including

local high availability and disaster recovery solutions. This ensures continuous service operation and data integrity, safeguarding the management plane against hardware or software failures .

COMPLIANCE & STANDARDS

The NCE-FAN platform is engineered and validated to meet the highest industry standards and regulatory compliance requirements essential for global telecom operations.

- **INDUSTRY STANDARDS:** Fully compliant with ITU-T (International Telecommunication Union - Telecommunication Standardization Sector) standards for GPON, XG-PON, and XGS-PON. The platform is designed to be fully interoperable with Huawei's existing network ecosystem and supports the latest F5G (Fifth-Generation Fixed Network) initiatives, positioning it at the forefront of optical access network evolution . The CEI (Customer Experience Index) measurement model developed by Huawei has been incorporated into the CCSA TC6 standard, setting a global benchmark for quantifying and managing broadband user experience .

- **SECURITY & DATA PROTECTION:** The system architecture adheres to stringent security protocols for data collection and analysis, ensuring user privacy. It

provides secure access control, comprehensive user management, and detailed audit logs to meet the compliance requirements of various national and international regulatory bodies .

TECHNICAL SPECIFICATIONS

Parameter	Specification
Form Factor	Software-based Carrier-Grade Platform / Virtual Appliance
Supported Technologies	GPON, XG-PON, XGS-PON, 50G-PON
Management Capacity	Lite: Up to 80,000 ONTs; Standard: >100,000+ ONTs (Scalable)
High Availability	1+1 Local HA; Geo-Redundant Disaster Recovery
Key Functions	Topology, Performance, Alarm, Inventory, NE Software Management
Network Management	Access/Home Network Management & Automation
Analysis & Assurance	Access Broadband Assurance (CEI Scoring Model)
Fault Identification	Proactive Identification of Home-Side, Network-Side & Cloud Faults

System & Common	System, Alarm, User, and Log Management
Interfaces	Service-Level APIs, Web GUI, OSS Integration Interfaces

ORDERING OPTIONS

Huawei offers NCE-FAN in various licensing and deployment models to cater to the diverse scale and requirements of different network operators.

- NCE-FAN LITE: An entry-level solution designed for small and medium-sized networks, providing core management, monitoring, and automation capabilities with support for up to 80,000 ONTs. This is an ideal starting point for operators looking to modernize their O&M processes at a competitive entry price point .

- NCE-FAN STANDARD: The full-featured, carrier-grade platform designed for large-scale, high-density deployments. This version supports advanced AI-driven analytics, extensive scalability, and comprehensive high-availability features (including disaster recovery) to manage millions of subscribers .

- NCE-FAN MODULAR EXPANSION: For existing NCE deployments, Huawei offers modular expansion SKUs to enable specific capabilities. This includes the ability to add the PON network management feature to other iMaster NCE platforms (like NCE-Campus), thereby centralizing the management of both enterprise and access networks within a unified system .

