Nokia Home Analytics (HAL) monitors subscribers’ experience using telemetry from TR-069 managed home devices, proactively detects home issues, and provides automatic and interactive recommendations to resolve issues across the digital home ecosystem. Nokia HAL provides all the capabilities needed to optimize customer support, remediate problems, and fix home issues before they impact the customer experience.

Key features

- Deep visibility of the home network based on high frequency multi-vendor CPE TR-069 data collection
- Access Network, managed device and subscriber device historical quality scores for all digital home connectivity technologies
- Recommendations for different customer care channels: L1/L2/L3 assisted care, self-care, field tech care and autonomous care
- Historical subscriber centric drill down with KQI alignment
- Benchmarking reports per access technology/device model/firmware version/region
- Open and extendable analytics engine
- SDK for device onboarding, parameter normalization, KPI creation, data science and recommendation creation

Key benefits

- Lowers average call handle times by empowering call center agents and subscribers with clear recommendations on how they need to resolve issues.
- Improves First Time Right call center objectives by providing more accurate root cause analysis based on historical consumer connectivity and historical service experience such that the right solution to the problem is provided to avoid subscriber repeat calls
- Drives and monetizes service usage by making it easy for customers to resolve service issues and consume new services. Subscriber upsell opportunities can easily be derived from the insights
- Increases customer satisfaction and reduces churn through proactive identification of network level root causes and resolution of extensive set of field-proven customer issues at source
- Reduces help-desk calls and proactively eliminates need for on-site technician visits with powerful insights that invoke troubleshooting workflows designed to uncover many common home and access issues before subscribers are impacted
• Helps to prioritize the agile release cycle for engineering, IT, and vendors through continuous data-driven feedback such that better quality fixes and innovations to services, equipment, and devices can be brought to market with a faster pace
• Reduces OPEX related to non-defective device returns by supporting all permutations of devices and home networks
• Lowers churn and increases revenue with targeted offers—for example, service or device upgrades that make sense to customers.

Overview

Digital Service Providers make significant investment in network infrastructure to provide gigabit speeds but see these investments thwarted by an underperforming home network. In addition, the increasing diversity of both service provider managed devices (STBs, Wi-Fi mesh, 5G FMC gateways, ...) and consumer devices (mobile, IoT and entertainment devices) are creating higher volumes of technical support issues. Most service providers are struggling to cope with these challenges. Lacking visibility into the home ecosystem, they find it difficult to keep up with day-to-day problems and resolve them to meet the subscriber’s contractual speed expectations. These difficulties diminish customer satisfaction and drive up the cost of supporting devices, networks and services.

While broadband service offerings are becoming increasingly complex, consumers expect the service experience to be simple and seamless. Our research shows that

• 96 percent of customers expect their service providers to proactively notify them about actions being taken—or even better—the solution to an impending problem
• 50 percent of technical support calls are related to home network issues
• 70 percent of devices returned have nothing wrong with them
• 89 percent of churn is caused by poor customer experience.

Today’s broadband home networks and their connected devices require the analysis and combination of large network, device, and subscriber data to profile the customer’s service experience across offered devices, manufacturers, models and firmware in real time. And to improve the home experience requires further analysis to accurately determine clear, concrete and effective actionable recommendations for problems affecting customer experience, either reactively (with the help desk) or proactively (with self-care or automatically triggered actions).

Nokia HAL enables service providers to improve not only reactive customer service but also introduce a more proactive and predictive approach to the digital home experience management. It turns insights into actions with measurable impact on how they improve the customer experience and the business objectives of the Service Provider’s customer care organization and CPE team:
**Empower assisted care** - Nokia HAL delivers improved visibility into the past and present home/access network and device performance. With HAL’s recommendations, help desk agents resolve problems more efficiently and effectively. It takes the guesswork out of the diagnostics process that agents have to follow such that the right agent behavior is enforced. As a result, agents can quickly identify issues while resolving more customer problems in a single call.

**Reduce unnecessary device swap** – Nokia HAL assesses the health of Service Provider’s managed devices and helps customer care to determine if a device swap will really solve the problem or not. In this way, HAL reduces the cost of no-defect-found device returns.

**Avoid unnecessarily or wrong field technician truck roll** – Nokia HAL provides the necessary insights and recommendations to transform the field engineer processes during the pre-dispatch, on-site and post-dispatch stage.

**Avoid calls by drive proactive self-care engagement** – Nokia HAL makes self-care more efficient and enables subscribers to resolve issues for a broad range of devices and technologies. It supports self-care use cases that involve automated alerts and interactive resolution recommendations for end users.

**Avoid calls by empowering proactive autonomous care engines and bots** – Nokia HAL’s self-healing proactive actionable recommendations are the cornerstone to the next generation autonomous help desk center.

**Empower data scientists** – Nokia HAL’s SDKs and open analytics platform provides the necessary toolchain for the Service Provider’s data science teams to produce valuable insights out of the raw data and processed data such that new use cases and new business opportunities can be identified quickly.

Unlike generic big-data solutions, Nokia HAL is specifically designed for customer care organizations dealing with broadband home and access network management. It’s an open intelligent workbench for proactive and predictive user experience monitoring and optimization. Equipped with field proven use cases based on Nokia’s unique
domain expertise, HAL is effective at behavioural profiling of device and network in real time such that customer experience degradation can be predicted and proactively remediated. It has been optimized for providing the much desired subscriber end-to-end visibility for the Service Provider’s customer care organization by correlating home data with the access data for an effective and accurate demarcation of the problem and solution.

Combined with the Nokia’s flag ship products for device management (Nokia HDM), access network management (Nokia Network Analyzer Copper and Fiber) and intelligent action engine (Nokia SMP), Nokia delivers an unrivalled customer care solution for service providers that want to avoid the cost of calls to customer care, reduce drop ship, improve efficiency of truck rolls and improve customer satisfaction and loyalty.

### Detailed features

#### Standardized problem resolution use cases

Nokia HAL offers built-in use cases for a broad range of home networking diagnostics, enabling service providers to “see” subscriber experiences in today’s modern homes and delve into the factors driving these experiences.

This category of use cases proactively identifies impairments through pattern detection, like wiring problems, RF interference, bad connectors, configuration issues, software/firmware defects, as well as connected device issues on a diversity of network technologies (domains) including Ethernet, MoCA, powerline, Wi-Fi, Fiber access, xDSL access, DOCSIS access and fixed wireless access.

These impairments may be manifested on gateways, extenders, Wi-Fi mesh, and connected devices, such as STB, PC, Smart TV and home DVR, and can affect the service quality required for internet, video and VoIP delivered at home.
The detected impairments contribute to a rich set of per technology domain KQIs and quality scores, like stability scores, throughput scores, coverage scores, band/client steering scores, health checks, channel zapping time scores etc.

The KQIs are used for consumer device and Service Provider managed device behavioral profiling over time by the HAL recommendation engine. This engine produces intra-domain or cross-domain recommendations to fix persistent and service quality disruptive issues in the home or the access network. These recommendations can be targeted at one or more care channels (self-care, L1/L2/L3 assisted care, field tech care, autonomous care, etc.). The recommendation engine manages the lifecycle of these recommendations, automatically detects when actions are taken and monitors the effectiveness of the recommended actions.

Example recommendations include
- Run autonomous SELT test on the xDSL access line to determine the location of the detected bridge tap
- Upsell for a Wi-Fi extender or reposition a Wi-Fi extender to improve the in-home Wi-Fi coverage and device roaming behavior
- Force a channel change because there is too much neighboring Wi-Fi interference
- No need to swap the gateway because the health check is green
- Cancel the field technician visit because the problem has already been resolved
- Schedule an autonomous reboot during low traffic hours to fix speed and memory issues
- Etc.

**Business and benchmarking reports**
HAL offers various benchmarking reports:

For CPE team
- Detailed KQI trend analysis per device model and firmware version such that different device manufacturers can be compared against each other in terms of quality of experience
- Geographical KQI trend analysis to assess country wide and regional performance differences.

For business analysts
- Network wide dashboards that show trend analysis of the key technology KQIs that impact customer experience
- Ranked reports of the worst performing subscribers and their service degradation severities.

**Subscriber drill down**
HAL offers a detailed drill down of the home and access performance for the different technology domains used within the home of an individual subscriber. This offers the L2 or L3 customer care agent a historical KQI view for every hour of the current day and the past days. The KQIs of the different technology domains are aligned such that the agents get a clear view of the quality of each individual home network and access network segment that is used by each device in the home to connect to the internet.

The agent can also drill down in each individual KQI and HAL provides a view of each constituent KPI up to the level of the raw parameter values contributing to those KPIs.

HAL also provides a historical log of the recommendations that were generated for that subscriber. The log reveals the state of each recommendation: when it became active, when it was cleared, how long it has been active, etc.

**Highly scalable and customizable platform**
Built on the industry leading big data stack of Cloudera, the Nokia HAL platform consists of a meta data driven streaming analytics pipeline, optimized for high volume multi-vendor TR-069 CPE data collection and processing. It’s an open analytics platform that gives Service Providers full control over the data ingestion, enrichment, normalization and insights and recommendation calculation through a rich software development kit.
With this SDK, Nokia HAL helps to quickly address the continuously evolving use cases caused by new service introduction, device firmware revisions and settings, network upgrades etc. It ensures that help desk agents and subscribers always have a consistent troubleshooting experience by combining fully automated multi-technology domain data correlations and recommendations that trigger standardized troubleshooting workflows.

Bare metal or cloud deployment are supported, as well as the ability to integrate with the Service Provider’s data lake and customer care OSS systems using industry proven robust APIs (e.g. Kafka, Impala, REST, CSV, ...)

**Data scientist enablement package**

Nokia HAL enables Service Provider’s data scientist teams for use case prototyping and hypothesis checking through control group validation. This package contains platform features for Jupyter notebook integration to visualize and analyze all data flows in the HAL analytics pipeline, from raw data up to recommendations. It comes with sample notebooks powered by Nokia’s patents to help speed up the data scientist daily activities:

- Anomaly detection and causality analysis
- Multi domain (Wi-Fi, DSL, Fiber, STB, ...) insights, analysis and tuning
- Recommendation tuning, recommendation effectiveness assessment
- Device profiling, behavioral profiling
- Ticket data correlation and cleansing
- Complaint prediction and predictive diagnosis

**Nokia related products**

- Nokia Access Network Analytics
- Nokia Customer Service Console
- Nokia Field Technician Console
- Nokia Home Device Manager
- Nokia Service Management Platform
- Nokia Autonomous Customer Care

**Learn more**

Nokia customer care solutions deliver the best in customer experience with award-winning solutions that have delivered over €3B cost savings to our top ten customers. We are the global leader in home, mobile and IoT device and service management solutions that simplify provisioning and care processes.

Our Customer Care solutions support:

- More than 1.5 billion devices for 300 customers
- Approximately 1 million customer care agents
- More than 2.5 billion workflow executions per month
- More than 10 million self-service sessions per month.