

The Evolution of SON to Augmented Network Automation

Proactive network management is essential
to 5G network optimization

Classic Self-Organizing Networks (SON) assist Mobile Network Operators (MNO) with routine Radio Access Network (RAN) management activities, by leveraging a subset of applications that automate the RANs. HCL Augmented Network Automation (ANA) Platform takes RAN automation a step further by employing an open architecture that allows MNOs to build custom applications aligned to each MNO network strategy, without having to depend on SON vendor product roadmaps.

The HCL ANA Platform incorporates additional essential elements for MNO success:

1. Analytic services leverage machine learning (ML) and artificial intelligence (AI) to support faster and more robust solutions
2. End to end network automation – Going beyond the RAN to incorporate the automation of transport, core and application layers
3. Subscriber centric Quality of Experience (QoE) management ensures MNOs support subscriber-level requirements such as increased bandwidth for streaming applications
4. 5G network slice optimization and automation improves subscriber QoE, with support for end to end network slicing
5. Near real-time automation platform, enabling O-RAN support for faster use cases, from seconds to sub seconds for closed loop applications

| Today's Network Environment

Traditional SON technology only provides RAN management capabilities, a subset of what is required to improve the quality of user experience. And it also requires constant monitoring, thereby reducing productivity and increasing costs.

Today's network environment is complex. Many MNOs have both 4G and 5G technologies deployed in their networks. Increased subscriber QoE demands such as video streaming applications require flexibility, scalability, and automation that meets the increased complexity and diversity of subscribers. And the need for additional functions such as geolocation, crowdsourcing, big data analytics, and the Internet of Things (IoT) further increases network complexity. The HCL Augmented Network Automation (ANA) Platform meets the demands of MNOs to solve network complexity and go beyond the RAN domain to cover transport, core, and application server layers, providing comprehensive end to end network automation that predicts, corrects, and updates to ensure enhanced subscriber QoE.

| Simplified Network Operation

New 5G use cases that require more data in better resolution contribute to rises in overall network complexity. This increased complexity requires additional capabilities. The multilayered architecture of HCL Augmented Network Automation (ANA) Platform meets the complex needs of network management requirements to simplify and automate network operation practices, helping to reduce both man hours and operational errors. A few examples include remote configuration of new base station equipment, new services enablement (such as connected cars), and parameter audits by automatically predicting, configuring, and optimizing networks. Self-healing

and reinforced learning detect network anomalies and automatically conduct root cause analysis to seamlessly fix and make changes to optimize network performance, slice optimization, and QoE Service Level Agreements (SLA).

Additionally, HCL ANA has a unified management console, providing visibility of data and the ability to control, change and configure applications across multiple domains and networks. This optimizes both setup and maintenance without the need for a different tool for each layer of the network. Together with the Platform's augmented automation and the unified management console, day to day operations are more automated and simplified, leading to productivity improvements.



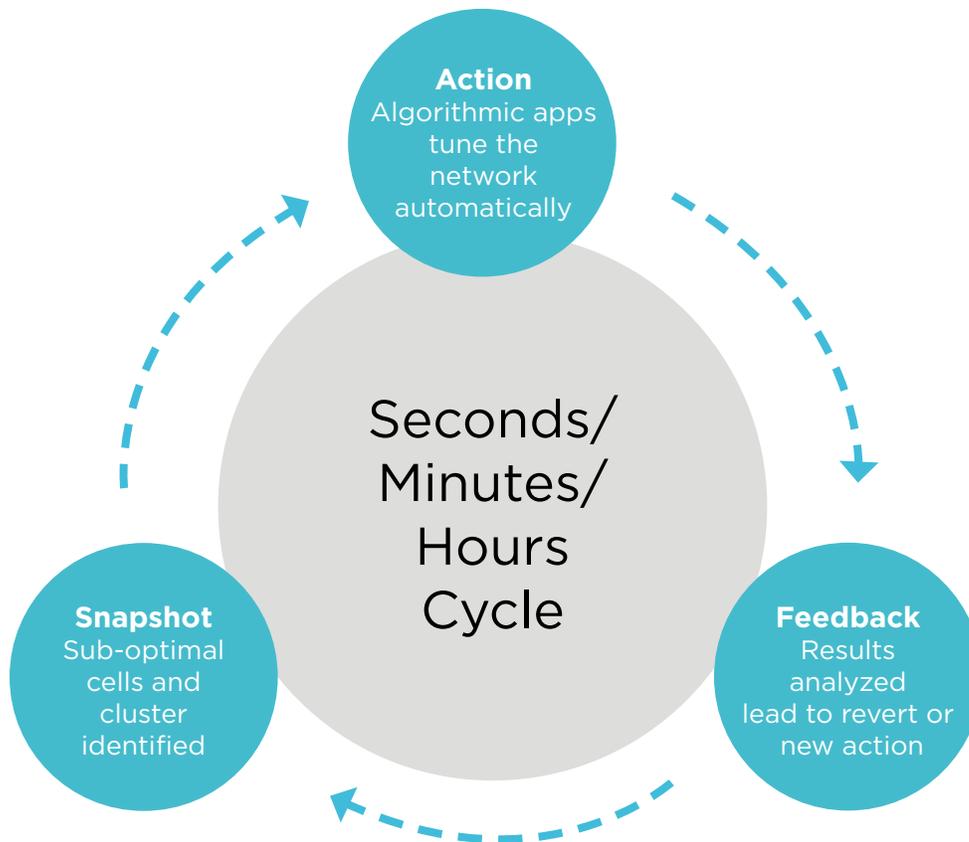
| Closed Loop, Dynamic Configuration

The HCL Augmented Network Automation (ANA) Platform operates in a closed loop that includes monitoring, analyzing, adjusting execution, and re-monitoring across the network. In addition, it brings the advantage of supporting multi-technology, multi-vendor cellular networks deployments. By taking advantage of these functions and the platform's flexibility, service quality and system capacity can be further improved across the network.

The HCL ANA Platform minimizes the impact of rapid changes in the network, which ensures there is no network performance degradation and the preferred user experience is maintained. This is accomplished by proactively identifying root causes that adversely affect the network and acting to prevent them before they occur. To detect the behavior patterns hidden in the mass of measurements at the network level, the platform uses the clusterization of similar network cells. This method identifies cells with suboptimal performance and analyzes the root causes on these

cells to optimize performance. The predictive capabilities select the optimal actions to maximize network performance. Employing these advanced predictive algorithms reduces the level of uncertainty about how the changes would affect the radio network and reduce the need for multiple steps of corrective action.

The HCL ANA Platform ensures performance improvements, reduces human intervention, minimizes errors, and maximizes network operational efficiency. With zero-touch provisioning, HCL ANA increases network savings, improves the user experience, and enables fast and simple deployment of new services.



The HCL Augmented Network Automation (ANA) Platform includes:



An open API framework for developers to create custom network applications such as radio applications for access, load management, coverage, capacity, mobility management, and Voice Over LTE (VoLTE) solutions



The ability for MNOs to create customized use case based applications that are user experience-aware and address key user quality indicators (KQIs). User-centric HCL ANA enables new applications for enterprise, private LTE, and high mobility

| Flexibility with Improved TCO

The HCL Augmented Network Automation (ANA) Platform is scalable and supports flexible deployments on-premises and in public, private, or hybrid clouds. Additionally, MNOs require a single management console to view and control both network services and subscribers across multiple network domains, HCL ANA Platform offers a unified console to manage the different layers, technologies, vendors and architecture, whether it's ORAN or classic Element Management System (EMS) networks. This results in efficient network scalability and improved productivity to reduce Total Cost of Ownership (TCO). This network flexibility reduces operational risk as MNOs no longer require vendor lock-in for network solutions.

| More Choice, Less Risk with Open Platform

HCL ANA reduces network management complexity by allowing the freedom to customize and configure networks according to individual network operator requirements and plans. Additionally, leveraging an open API framework allows for the easy creation and deployment of custom network applications.

| Learn more

HCL Augmented Network Automation (ANA) Platform harnesses closed-loop automation across network layers to deliver predictive optimization and 24/7 hands-free network configuration that automatically corrects any anomalies—driving faster time to market of new services across 5G networks.

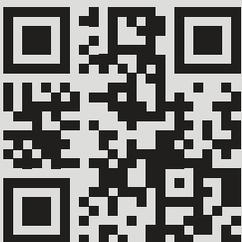
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