Nokia Deepfield Cloud Intelligence

IP network and service insights for the cloud era  Nokia Deepfield Cloud Intelligence provides deep network and service insights to service providers, webscale companies and large digital enterprises.

Deepfield Cloud Intelligence is a software application that brings detailed visibility into internet content, services and applications that traverse IP-based networks. Cloud Intelligence delivers deep insights into network- and service-level details for service providers (cable providers, multiple system operators [MSOs], and telecommunications and cloud service providers), webscale companies and large digital enterprises.

Cloud Intelligence provides insights without the use of network probes or deep packet inspection (DPI). Instead, Cloud Intelligence takes a big data-driven approach: it collects, correlates and analyzes data sets from the internet and the network, delivering multidimensional, actionable insights in real time. These insights can be leveraged in many use cases across many organizational teams.

Deepfield Cloud Intelligence is a component of the Nokia Deepfield portfolio of IP network intelligence, analytics and security applications.

Features
• Wide range of multidimensional analytical breakdowns
• Detailed insights into over-the-top (OTT) services
• Holistic view of your IP network infrastructure, cloud applications and services

Benefits
• Enables better business and service insights
• Improves network engineering and capacity planning
• Improves management of peering, transit and content delivery network (CDN) partnerships
• Facilitates operational agility for improved network performance and enhanced customer experience
• Achieves infrastructure cost savings through more efficient network utilization and optimized network buildouts
Why Deepfield Cloud Intelligence?

Traditional traffic engineering solutions for service providers, CDNs, webscale companies and large digital enterprises were designed in the era of legacy data networks. The era of the cloud, the Internet of Things (IoT) and 5G poses significant scalability challenges, effectively requiring a new approach to be cost-effective. In addition, end-to-end encryption of internet services makes it difficult for DPI-based solutions to ensure holistic visibility for IP-based services.

Deepfield Cloud Intelligence addresses these challenges by using a “no appliances, no hardware probes” big data-driven approach to network intelligence and analytics. In addition, Cloud Intelligence employs Nokia’s unique and proprietary technology, Deepfield Genome, which continuously maps the global internet to provide unprecedented visibility into internet content, applications and services.

Overlapping these data sets—one from your network and the other one from the internet—results in a detailed, accurate and up-to-date internet service supply chain map that you can use to better understand what is happening in your network.

Cloud Intelligence provides actionable information to optimize cloud-era networks and manage complex relationships with content, peering, and OTT/cloud applications and services.

Examples include:
- Deciding how to manage content delivered by CDNs
- Identifying optimal peering points based on content delivery chain
- Monitoring bandwidth at peering/transit interfaces for more accurate billing control (e.g., 95th-percentile bandwidth metering)
- Determining where to focus infrastructure buildouts: Where and when to place content caches, add bandwidth and add points of presence (PoPs).

How Deepfield Cloud Intelligence works

Deepfield Cloud Intelligence uses the Deepfield common platform for data processing. Cloud Intelligence ingests data from many different sources into your network, starting with essential IP flow-related data sets (any x-flow type of data), Border Gateway Protocol (BGP) data sets and Simple Network Management Protocol (SNMP) data sets. This data can be further enhanced with Domain Name Server (DNS) information (from DNSflow) as well as other router-, network- and telemetry-related data sets, such as RADIUS/AAA (authentication, authorization and accounting).

The Deepfield platform can also ingest customized data sets from other network systems and operational domains, including:
- Network management
- Customer care
- Support and billing
- Software-defined networking (SDN) control
- Operations support systems/business support systems (OSSs/BSSs).

All these data sets are processed and correlated to provide a multidimensional, un-siloed view of your network, services and IP flows (see Figure 1).

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1 Deepfield platform ingestion of customized data sets may require customized development. Please discuss your requirements with your Nokia sales representative.
Cloud Intelligence complements the information about your network infrastructure and services with the intelligence collected continuously from the internet. This intelligence is maintained in the Deepfield Cloud Genome® data set, which together with Deepfield Secure Genome, constitutes the Deepfield Genome data feed. The Deepfield Cloud Genome data set contains up-to-date information about billions of internet (IPv4 and IPv6) endpoints and IP flows, categorized by application type, to create a dynamic supply map of the internet.

By consolidating the information from your network with the Cloud Genome data set, Cloud Intelligence allows you to create correlations among many data sets and data dimensions. These correlations provide unique and deep insight into IP flows across your network—from originating content domains, across peering and transit, all the way to your network core, metro and edge layers.

Figure 1. The Deepfield approach

1. Track internet (cloud) services and applications and how they traverse the network
2. “Decode” cloud services and map them using Deepfield Cloud Genome
3. Add insights from service provider’s network and correlate them with internet “supply map” (obtained in 1 and 2)
4. Get holistic visibility into content and applications as they traverse your network

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Deploying Deepfield Cloud Intelligence

Deepfield Cloud Intelligence is a software application that you can run in your network, on dedicated servers or in the virtualized environment, or you can deploy it in the cloud using the software-as-a-service model. Seamless scalability is ensured in all of these modes of deployment using sophisticated software architecture.

Using Deepfield Cloud Intelligence

Bringing unique multidimensional insights and correlation across many diverse data sets, Deepfield Cloud Intelligence can provide answers to questions that otherwise are not easily or quickly answered.

Typically, human-friendly questions such as “Where is internet traffic coming from?”, “How is the traffic getting into my network?”, and “Where is the traffic going?” need to be translated into machine-friendly formats to be answered by big-data analytical platforms. Cloud Intelligence makes it easy and intuitive to make complex queries and obtain multidimensional insights and cross-correlation across diverse data dimensions, including:

• Origin autonomous system number (ASN)
• BGP prefix
• CDN
• Traffic category (type)
• Application
• BGP peer
• PoP
• Router
• Interface
• Regions, metro areas and cities.

Queries can relate to specific areas of interest, such as peering/cache placement and optimization:
• How do I ensure I am making optimal use of peering, transit and CDN bandwidth?
• How do I know when/where to insert a cache?
• How do I know if my CDN cache is working optimally at peak demand?

The unique insights obtained by Cloud Intelligence can be viewed, reported, visualized, exported to other systems, and incorporated into workflows in a large variety of ways.
Data explorer

Data explorer is the most common way of making multidimensional queries. Through easy-to-navigate menu options, customized queries are constructed, fine-tuned and executed, and the output is produced. Queries can be modified, saved and shared with other users.

The output of a query can be viewed on the screen. Rich visualization options enable the output to be viewed as many different, easy-to-read and highly impactful diagram types (e.g., as Sankey diagrams).

The query output can be exported in various formats, including JSON and CSV. The URLs of customized queries can also be passed to other systems and used as REST APIs.

Figure 2 shows the output of a five-dimensional query related to gaming traffic.

Figure 2. Sample output of data explorer query

Origin ASN [L]

Peer [L]

Peer [R]

Origin ASN [R]
Reports
Data explorer’s queries with analytical-data output can be used to create customized reports, as shown in Figure 3.

Figure 3. Sample report

Dashboard
Important and commonly executed queries can be saved for repeated and quick access in the form of a dashboard. Dashboards can be customized for different users or user groups.

Figure 4 shows a sample dashboard.

Figure 4. Sample dashboard
Automated, multidimensional queries
Cloud Intelligence can perform automated, multidimensional queries across all application areas, from network planning and optimization, across marketing and service planning, to customer care and operations.

The queries can be programmatically set and their output can be passed to external, third-party systems and processes via REST APIs for further integration, workflow optimization and automation.

Leveraging Cloud Genome for better Cloud Intelligence context
Deepfield Cloud Genome identifies the endpoints for all network traffic traversing the internet, providing visibility down to the CDN, application and service. This level of detail equips Deepfield Cloud Intelligence with the ability to identify and accurately classify all traffic across your entire infrastructure, arming network operators with knowledge on how to make the best decisions about, for example, where to add bandwidth or caches to ensure a healthy network or premium user experience. Cloud Genome empowers Cloud Intelligence with holistic visibility into internet content, applications and services as they traverse the network—from originating content domains, over peering and transit, to backbone and network edge—and all of this with unprecedented accuracy and granularity.

Use cases
Deepfield Cloud Intelligence can empower many different teams in your organization and enable them to reap technical and business benefits from a wide variety of use cases:

• Holistic visibility into internet (OTT) and on-net services
  – See traffic breakdowns by applications, categories, CDNs
  – View detailed statistics with additional metrics: ASNs, prefixes or routers
  – Use multidimensional queries with filtering and visualization

• Network capacity monitoring and planning
  – Monitor network traffic at the caching, router interface, regional and CDN levels
  – Plan for peering/transit and access capacity
  – Detect which services and CDNs are driving growth
  – Provide data to assist with network optimization tasks

• Peering, transit and backbone engineering
  – Optimize peering relations and costs (peer analysis and peer prospecting)
  – Create any-to-any traffic matrixes, e.g., peers, routers, PoPs, etc.
  – Detect backbone routing inefficiencies

• CDN and OTT analytics
  – Optimize on-net/off-net content delivery
  – Analyze on-net traffic delivery and cache agreement violations
  – Evaluate usage and performance of CDN and OTT on-net caches
  – Provide planning details for cache locations

For details on use cases, visit the Deepfield web page.
The Nokia
Deepfield advantage

The real-time cloud and network context provided by the Nokia Deepfield solution enables service providers to extract the actionable intelligence needed to better design their networks, react to performance anomalies and changing traffic patterns, manage security threats, and better package their product offerings to attract and retain subscribers.

Nokia Deepfield enables service providers to understand, in real time, the service delivery path from the internet/cloud through the peering edge and at the customer edge—a path that can span multiple clouds, data centers, CDNs and networks.

This visibility is the critical first step to intelligent network automation, which will enable networks to respond immediately to changing conditions with minimal manual or physical intervention, lowering costs and improving performance.

To learn more about the Deepfield solution, visit the Deepfield web page.

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