Nokia Deepfield Cloud Intelligence

IP network and service insights for the cloud era

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

Deepfield Cloud Intelligence provides insights without network probes or deep packet inspection (DPI). Instead, Cloud Intelligence takes a big data-driven approach: it collects, correlates and analyzes data from the internet and the network, delivering multi-dimensional, actionable insights in real time. These insights can be leveraged by many use cases across diverse organizational teams – from network engineering and planning to marketing and customer care.

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

Features

- Wide range of multi-dimensional analytical breakdowns
- Detailed insights into over-the-top (OTT) services and internet applications
- A holistic view of 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
- Drives increased 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, requiring a new approach to be cost-effective. In addition, end-to-end encryption used for most internet services makes it difficult for DPI-based solutions to ensure holistic visibility for IP-based services.

Deepfield Cloud Intelligence addresses these challenges using a big data-driven approach to network intelligence and analytics. To improve visibility and accuracy, Cloud Intelligence employs Nokia's unique and proprietary technology, Deepfield Cloud Genome, as up-to-date data feed about the state of the internet's "supply chain" to provide unprecedented visibility into internet content, applications and services.

Correlating information from the network with the current information about the internet contained in the Cloud Genome data feed results in a detailed, accurate and up-to-date internet services "supply chain map" that network owners and operators can use to understand better what is happening in their networks.

Cloud Intelligence provides actionable insights 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 the actual 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 additional points of presence (PoPs).

How Deepfield Cloud Intelligence works

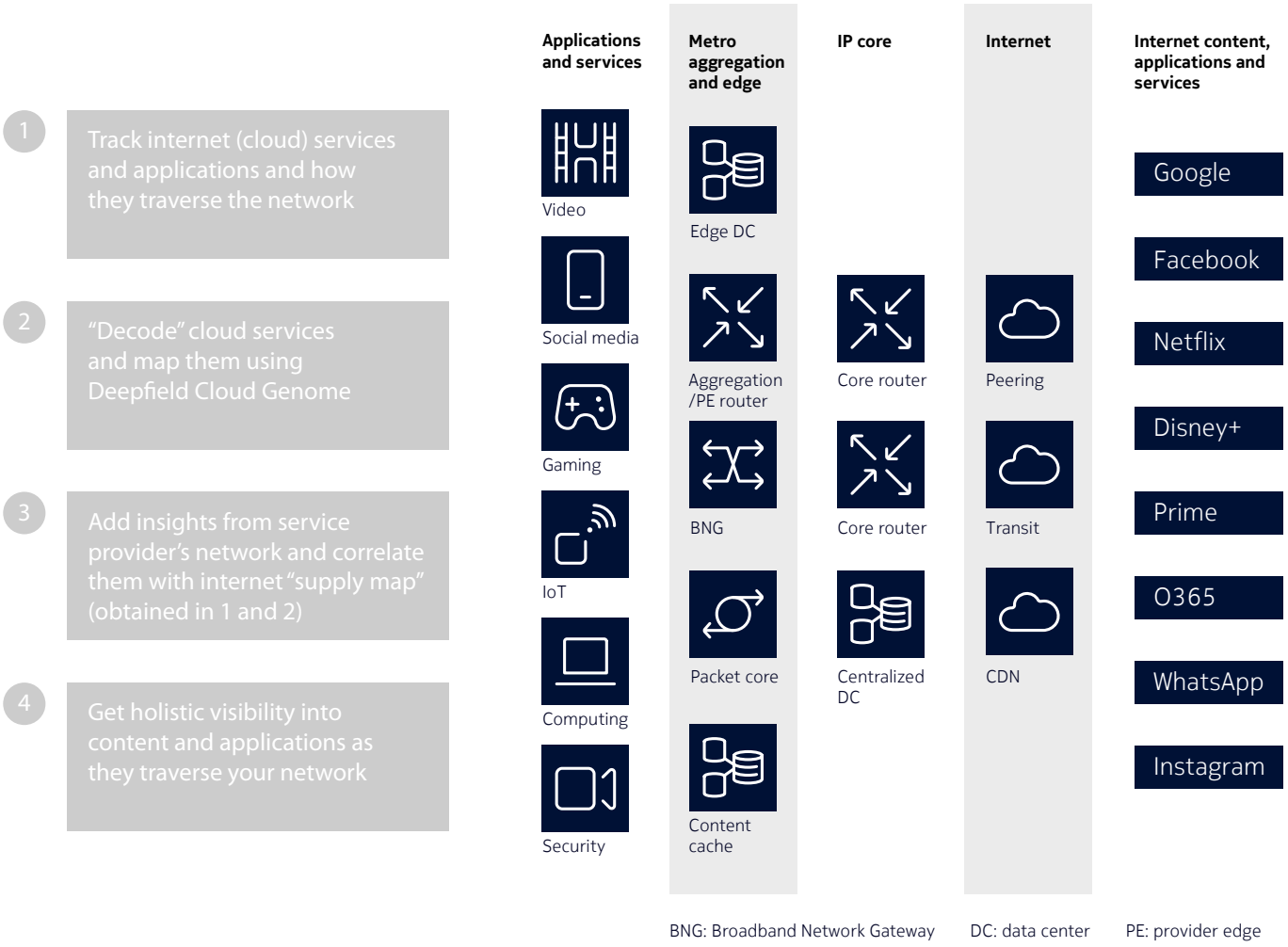
Deepfield Cloud Intelligence uses the Deepfield common platform for data processing. It ingests data from many sources within your network, starting with essential IP flow-based protocol information (such as sFlow, CFlow, J-Flow, and IPFIX) (see Figure 1). This information can be further enhanced with BGP and SNMP information and other router-, network- and telemetry-related data such as RADIUS/AAA.

Cloud Intelligence 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 this information is processed and correlated to provide a multi-dimensional, un-siloed view of the network, services and IP flows (see Figure 1).

Figure 1. The Deepfield approach



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 feed, which, together with Deepfield Secure Genome, constitutes the Deepfield Genome data feed.

The Deepfield Cloud Genome data feed 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 correlating the information from the network with the Cloud Genome data feed, Cloud Intelligence allows you to obtain unique and deep insights into IP flows across your network across many data sets and data dimensions—from originating content domains, across peering and transit, all the way to your network core, metro and edge layers.

Deploying Deepfield Cloud Intelligence

Deepfield Cloud Intelligence is a software application that network owners and operators can deploy in their network on-premise (on-prem), on dedicated servers, or it can be deployed in the cloud using the software-as-a-service model. Seamless scalability is ensured in both deployment modes using sophisticated software architecture.

Using Deepfield Cloud Intelligence

Bringing unique multi-dimensional insights and correlations across diverse data sets, Deepfield Cloud Intelligence can answer 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 multi-dimensional 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 optimize my peering, transit and CDN bandwidth?
- How do I know when/where to insert a cache?
- How do I know if my CDN cache works 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 many ways.

Data Explorer

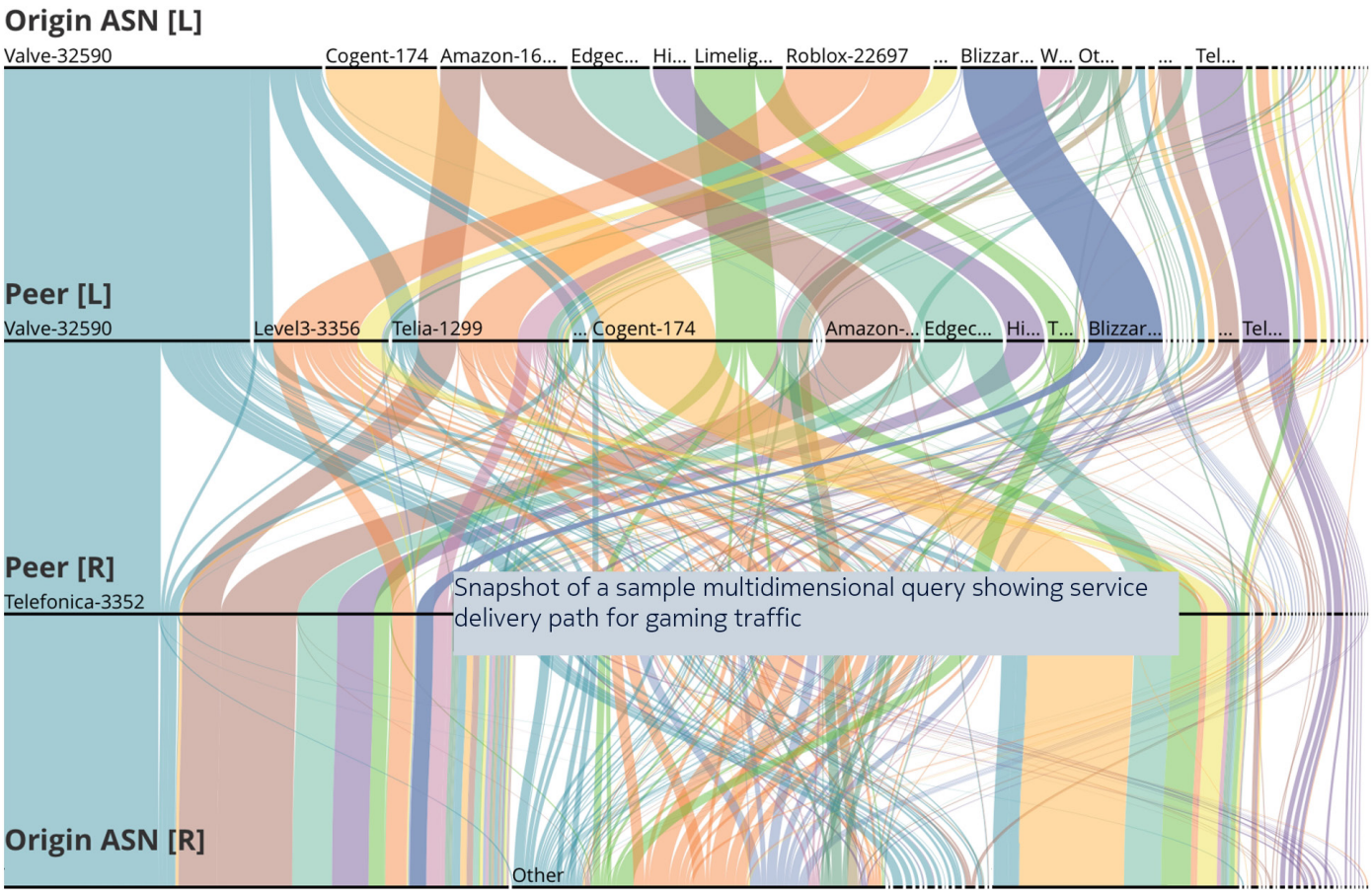
Data Explorer is the most common way of making multi-dimensional queries. Through easy-to-navigate menu options, customized queries are constructed, fine-tuned and executed, and the output is produced. Queries can be modified, saved and shared with other users.

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.

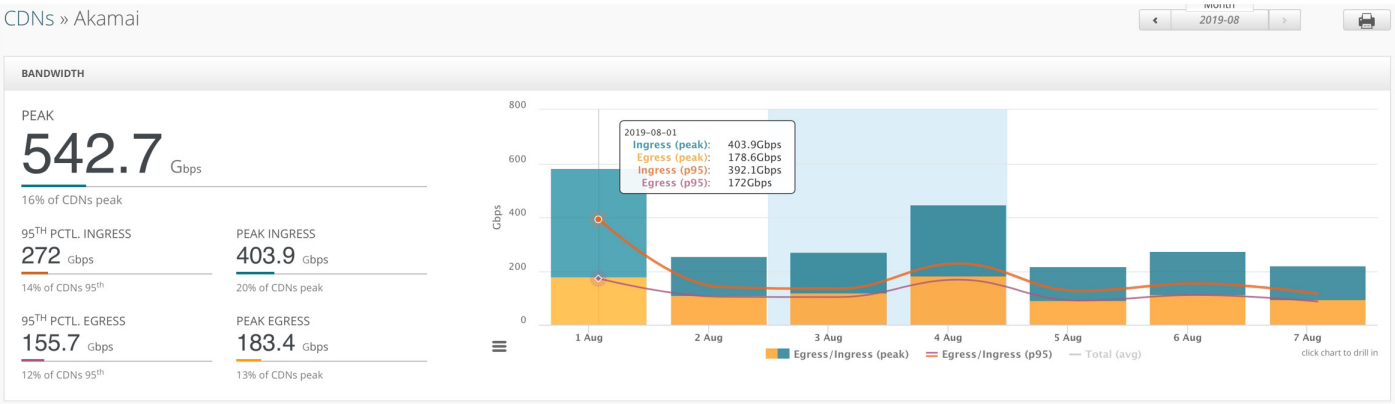
Figure 2. Sample output of data explorer query



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

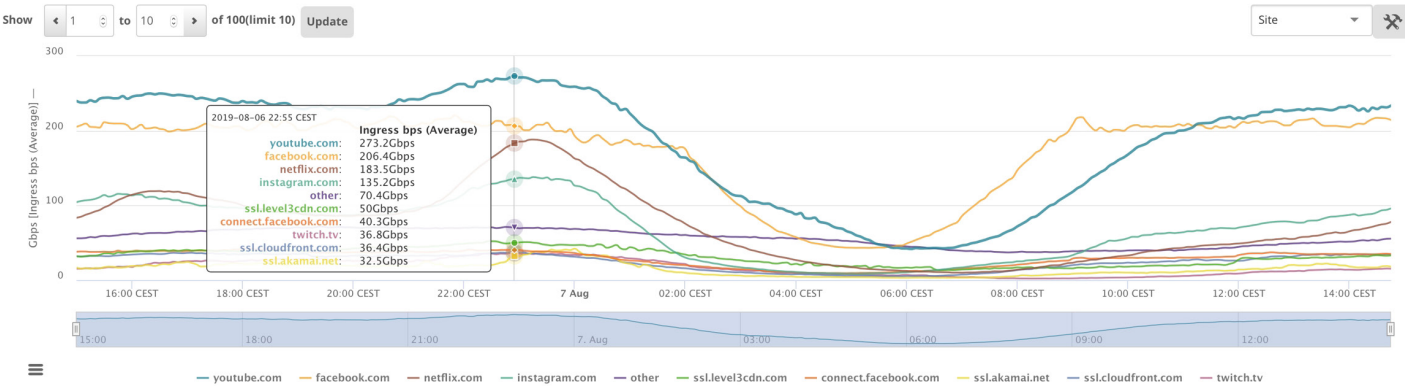


Dashboard

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, multi-dimensional queries

Cloud Intelligence can perform automated, multi-dimensional queries across all application areas, from network planning and optimization, across marketing and service planning, to customer care, marketing and operations.

The queries can be programmatically set, and their output can be passed to external, third-party systems, organizations and processes via REST APIs for further integration into data science systems or data lakes and additional 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 the entire IP network 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 the 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 multi-dimensional 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 Cloud Intelligence web page.

The Nokia Deepfield advantage

Nokia Deepfield is a software suite of network analytics and DDoS security applications for large-scale IP networks. These applications optimize networks and services, enhance customer experience, improve network security and increase operational agility.

Deepfield applications are deployed globally in many networks, including fixed and mobile service providers, cable companies, cloud companies, and digital enterprises.

Deepfield's approach uses big data IP analytics, combining network data (telemetry, DNS, BGP etc.) with Nokia's patented Deepfield Genome technology (live feed that tracks internet content, applications and services and provides DDoS security context). As a result, the Deepfield applications offer multi-dimensional, real-time insights about IP-based services and applications running across the entire IP network - from content-originating domains and CDNs, across the peering and backbone to the customer edge.

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

The Nokia Deepfield portfolio 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 to 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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Document code: CID201107 (August)