

Solution overview

# Gain real-time intelligence



Today, people and applications are always connected. Information is produced in large volumes and high velocities—continuously. This huge stream of data contains extremely valuable information for business. To manage it well, business leaders need real-time analytics solutions to produce actionable insight.

## Know why real-time analysis is important

Gain insight into customers:

- Continuous analysis of incoming data
- Complex analysis flying data
- Scalability without compromise

Information is emerging as a new currency for and between businesses, forming the ground of a true competitive differentiation. Communications service providers (CSPs) have a major asset: subscribers—and they know how, when, and where users are connected.

To remain competitive, service providers are looking at ways to leverage this information at the time users are more connected. It means that they do not only have to capture and analyse massive amounts of data. They also have to do it a timely fashion, react when users have difficulties, handle complaint calls, and propose tailored experiences and services.

## Perform real-time analysis

The HP Complex Event Processor (CEP), a module of HP Smart Profile Server (SPS), is a streaming analytics software designed to provide CSPs the ability to perform real-time analysis of their services, such as online monitoring abnormal pattern detection over large volumes of data.

Our event processor is able to perform standing queries (online processing) on data streams, correlate multiple event sources, and detect complex patterns across those sources. It is also able to enrich data marts and data warehouses, as well as be enriched with historical data.

This is key to establish baselines and then compare the traffic against those baselines in real time. A typical example is quality of experience (QoE) and quality of service (QoS) management, where average QoS measures are compared with current ones to detect anomalies in real time. This information enables service providers to react fast—and in some cases, anticipate those conditions.

This streaming analytics software platform provides the ability to:

- Capture data generated in and out of an operator's network across multiple sources and applications
- Identify complex events and patterns by correlating multiple sources of data, including streaming and non-streaming ones (historical data)
- Perform real-time, online calculations, such as statistical functions over a few seconds of sliding windows of incoming data
- Notify external applications when specific complex events or conditions occur

Based on a combination of the latest streaming and pattern detection technologies, HP CEP is designed to offer high-density processing and be massively scalable. As such, it:

- Enables processing of millions of events per seconds over a few nodes.
- Ensures events are processed with low latencies. This is critical in a CSP environment, where events are useful only for a limited time window—such as when customers are using services and applications. A customer who failed to access his or her preferred application over the last 15 seconds, but also failed to access it over the last hour, is good information to know if he or she calls right afterward to complain. This gives you right-time intelligence within the stipulated time period—and the capability to respond fast to a variety of sources.
- Provides massive, parallel-processing capability up to hundreds of nodes. In addition, HP CEP is designed to ease the creation of complex event processing logic (event-processing graph) for business users. HP CEP designers enable seamless combinations of various connectors, prebuilt processing agents in minutes.

To offer rapid CEP logic development and seamless integration, the HP CEP has a wide range of connectors, loaders, and writers:

- **Loaders:** Capture data from incoming sources whether streaming social networks, high-throughput and deep-packet inspections boxes, or static databases
- **Event-processing agents:** Perform pattern detection, filtering correlating data from multiple sources along with conditions
- **Writers and notifiers:** Inform client applications and update business processes in real time

HP CEP designers feature several event-processing components to build complex, processing logic in minutes.

**Table 1. HP CEP components overview**

<b>Loaders and Readers</b>	<ul style="list-style-type: none"> <li>• <b>CSV loader</b>—Can be adapted to any CSV format.</li> <li>• <b>DB reader analysis</b>—Enrich your data streams processing with historical data.</li> <li>• <b>Event queue writer</b>—Integrate your applications with a robust and scalable API.</li> <li>• <b>JMS reader</b>—Read data from JMS distributed applications.</li> <li>• <b>HDFS reader</b>—Read data and files from Hadoop’s file system.</li> <li>• <b>TCP listener</b>—REST-based servers and sources, SIMPLE ASCII over TCP.</li> </ul>
<b>Event Processing Agents and Rules</b>	<ul style="list-style-type: none"> <li>• <b>Filters</b>—Filters in stream data to capture only relevant value and save processing.</li> <li>• <b>Correlators/multiplexers</b>—Combine data and conditions from multiple sources.</li> <li>• <b>Aggregations</b>—Time windows-based and event-batch aggregators enable continuous streaming data processing sliding windows of time and events.</li> <li>• <b>EPL</b>—Provides an access to sophisticated event processing language (for advanced users only).</li> <li>• <b>Historical analysis</b>—Combines streaming data with historical data (residing in the CEP In memory DB and the EDW). It is useful to compare actual systems and business processes with baselines and past trends.</li> </ul>
<b>Writers and Notifiers</b>	<ul style="list-style-type: none"> <li>• <b>Event queue writer</b>—Store intermediate data processing results to recombine and offer a bus-like integration point.</li> <li>• <b>CSV writer</b>—Store CEP processing results in popular files format and export them.</li> <li>• <b>HDFS writer</b>—Store CEP processing results in the Telco Data Lake.</li> <li>• <b>JDBC writer</b>—Store data processing outcomes into data marts, EDW.</li> <li>• <b>JMS writer</b>—Write results through JMS APIs.</li> <li>• <b>SMTP notifier</b>—Send a mail to a business user when a pattern is detected.</li> <li>• <b>REST notifier</b>—Inform business applications in real time.</li> </ul>

When the right combination (event processing network) has been built with HP CEP designers, it can be deployed and executed in real time. An example is where results are expected in seconds or milliseconds in parallel for massive scalability.

## Analyse your Big Data on the fly

HP CEP provides a full and rich environment to build and run analytics packages in minutes:

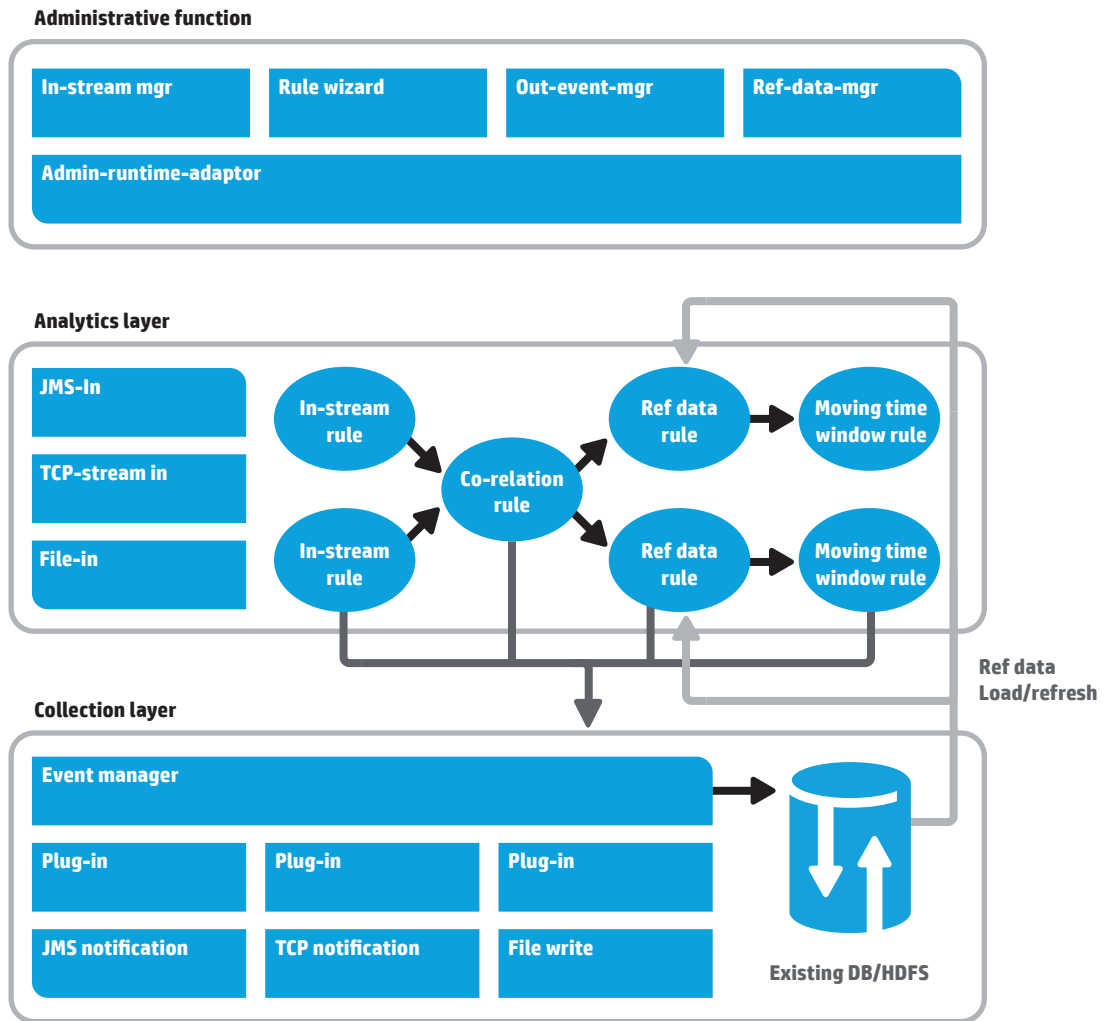
- **Designer Component**—A set of graphical designers, enabling users to define complex event-processing networks as combinations of connectors, event-processing agents (filters, correlators, and aggregators), and writers and notifiers. Those have been specifically designed to process streaming data with high throughput and to be used by people without advanced skills in event-processing languages.
- **Deployment component**—Once defined, those event processing networks can be deployed into large CEP clusters through a single click.
- **Runtime component**—This component executes and monitors the various complex events networks. They can be executed in parallel to provide a massive scalability.

HP CEP enables wiring together data sources and the analyses to create a chain of analyses that is able to efficiently process data.

Example of the analyses that can be created are:

- CSV loader analysis (in-stream rule)
- Multiplexing analysis (correlation rule)
- DB writer analysis (historical rule)
- Aggregation analysis (time-window rule)
- RHadoop analysis (RHadoop rule)
- Configured plug-in
- Others

**Figure 1.** HP Complex Event Processor architecture



## Gain business value

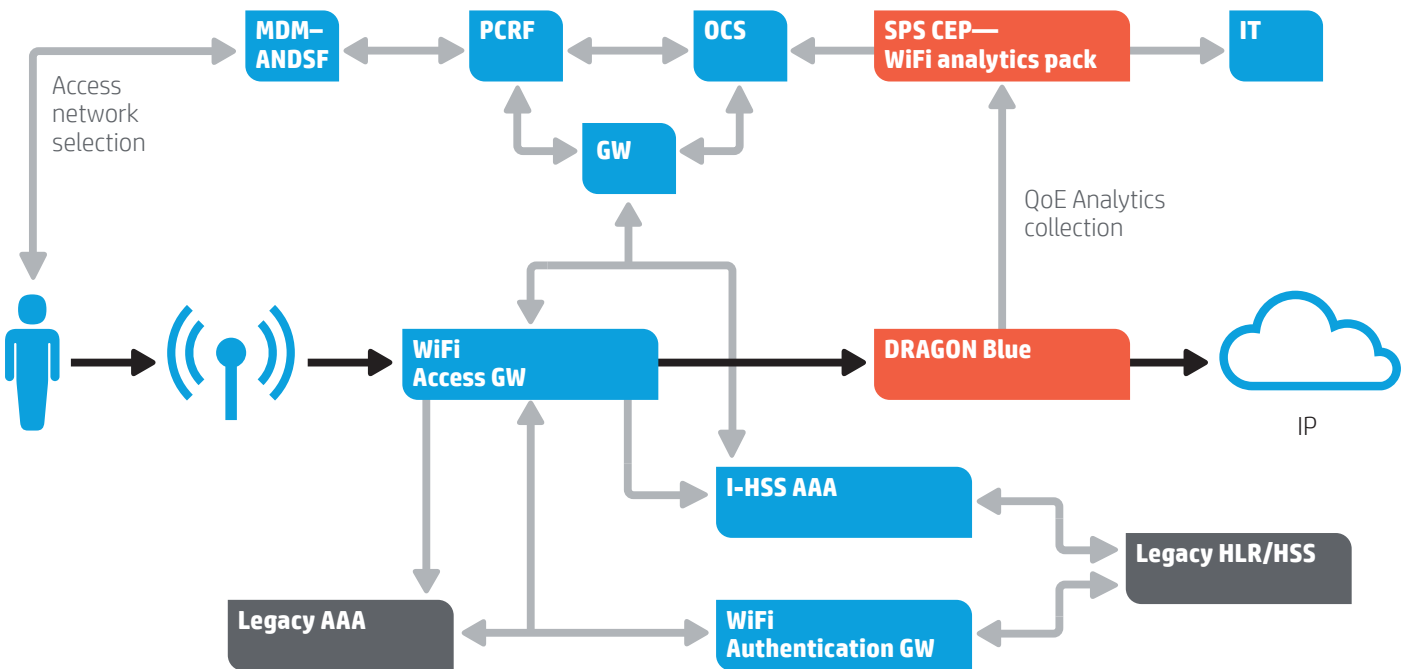
Communications service providers use HP CEP platform to:

Build your competitive advantage:

- Transform your insights from batch to real time
- Make them actionable to automate your business process

- **Perform a new kind of customer experience management**—Businesses can analyse in real time consumption of CSP Internet applications and detect abnormal situations impacting the perceived quality of experience. HP CEP helps to calculate network and users’ key performance indicators (KPIs) at the time they are connected and react in real time. This is key to maintain end-user satisfaction.
- **Identify frauds when they happen**—Service providers also can take inputs from a wide range of sources, including SIM/IMSI data, activations, history of fraudulent customers, and bad debt data. With all this data being correlated whilst the customer is in interaction with the customer care, the HP CEP helps to identify subscription frauds in real time and deny the service before subscription, saving substantial amounts of money.
- **Wire subscriber preferences to location for real-time marketing**—HP CEP collects and analyses data in real time from various customer information sources, including voice and data networks and application portals. Data is statistically analysed to produce in-depth insights. They include preferences, interests, web-browsing behaviour, and location presence patterns, combined with historical data analysis. This provides satisfaction index, propensity services, and ads, which can be effectively delivered and personalised, enhancing the overall customer experience.
- **Enable new business models**—In many cases, information derived from Big Data has value outside the enterprise that collected it. Service providers can use it to enrich an ecosystem of partners with real-time, in-session data. The CEP helps to provide insights at the time users are connected, which is a tremendous value to online advertisers, payment, and promotion platforms.

Figure 2. HP CEP enables intelligent offload between radio and Wi-Fi networks



Across the globe, enterprise clients rely on HP services to design, deploy, operate, and support the IT and network systems that run their businesses. HP services capabilities cover consulting and integration, outsourcing, and support services. HP Services can point to an extensive track record of helping customers improve their ability to support changing business needs with:

- More than 3,000 services professionals operating in 170 countries
- Acknowledged technology leadership
- A heritage of innovation in services

## Monetise data

HP CEP is the perfect solution to help service providers build and monetise their amazing amounts of data to create a competitive advantage. It provides a cost-effective and unique platform to leverage streaming data and combine it with other traditional data sources.

HP Complex Event process enables service providers to transform their analytic infrastructures from a batch, often outdated platform to a real-time and instantly actionable one.

## HP services


HP services offers a broader portfolio of solution services that can help you to navigate your transformation journey:

- Drive your business transformation: HP Solution Consulting Services helps define your business transformation and translate strategies into actionable solutions.
- Shorten time to revenue and mitigate risk: HP Packaged Solution Delivery services maps your business needs and accompanies you through the entire solution lifecycle.
- Improve availability and operational efficiency: HP Solution Management Services provides reactive and proactive solution support and ongoing operational services. HP services is packaged for HP SPS, and in general terms, for all telco analytics solutions, enabling you to quickly monetise Big Data.

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