

## Streaming Telemetry in Enea Edge: Detailed Monitoring of System and Network Data on uCPE

Streaming telemetry data from a uCPE can provide a near real-time view of the system and the network interfaces across all functions running on the device at a very granular level, allowing fast issue detection and recovery as well as valuable optimization insights. Enea Edge combined with Grafana provides streaming telemetry that allows simultaneous monitoring of data passing through multiple network functions and interfaces. The solution can be deployed on any white box uCPE to optimize costs while raising performance.

Data generated at the customer premises edge is increasingly shared over the wider enterprise network while access to cloud environments has become a prerequisite for doing business. This means that any network issue can quickly become a serious threat to business continuity. Failing hardware, bad configurations, or unexpected usage and traffic patterns all need to be handled rapidly, or even proactively, to ensure that networks, applications, and in the end, business all continue to run smoothly at all times.

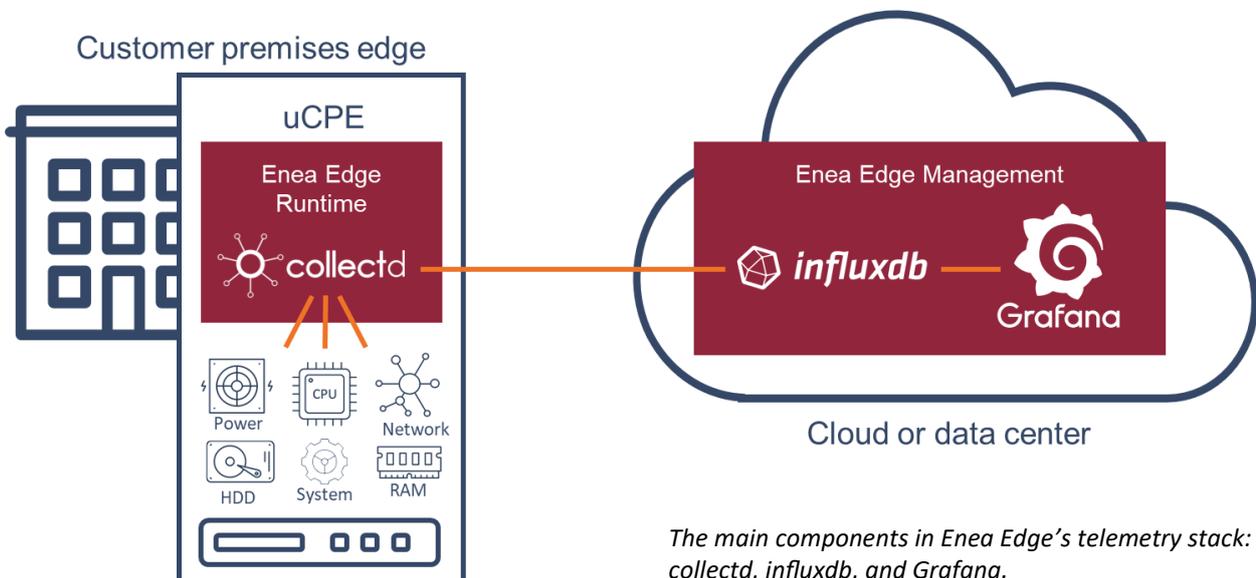
It is therefore essential for network managers and operators to be able to monitor both the use and performance of networks and devices across branches and to take immediate action should an issue arise. Telemetry makes this possible. It provides detailed, real-time information on all network-related branch activities to a centralized location for monitoring, allowing operations to be streamlined and action to be taken based on insights or events even before an issue affects the users of the network. For managed service providers, this granular, proactive approach is strategic to securing

business and building strong, long-term relationships with clients.

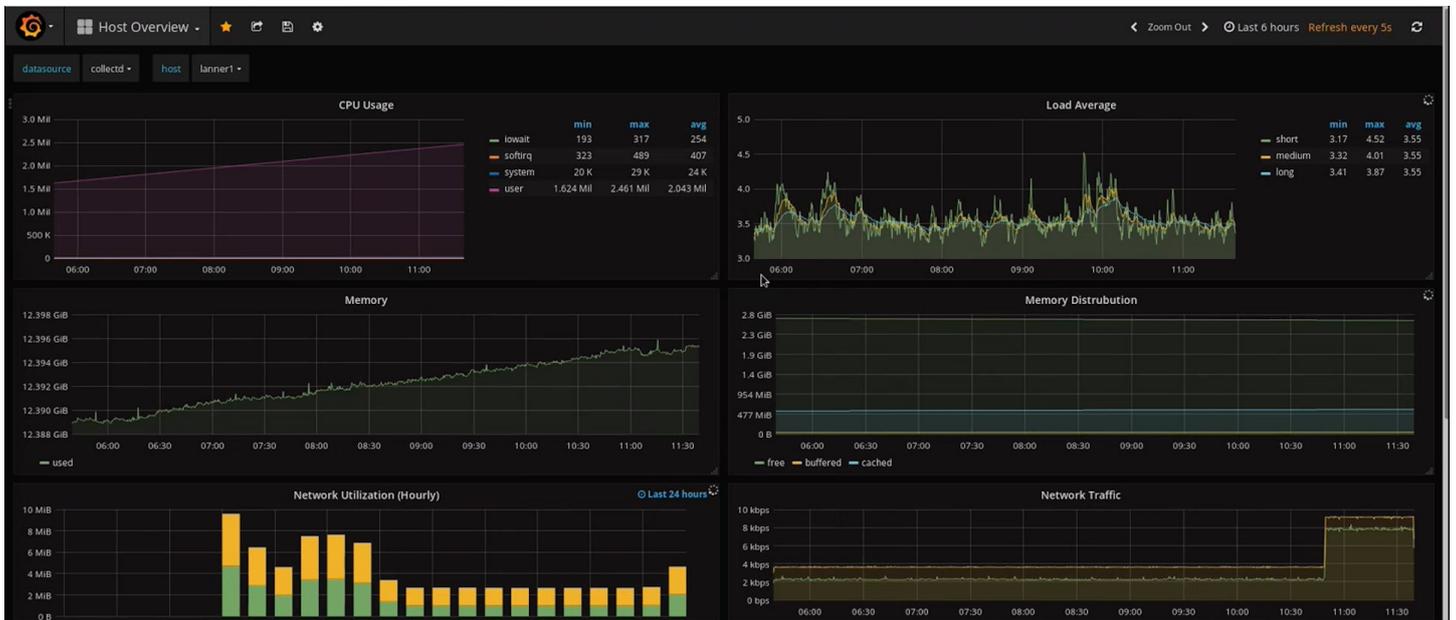
### Overcoming monitoring silos by streaming telemetry data from uCPE devices

Enterprises typically have multiple network appliances or functions deployed at each branch location, and while many of these can monitor their own health and provide their own analytics data, they do not provide a holistic view of the network or the functions running at the branch.

Implemented in a uCPE virtualization platform hosting multiple applications, telemetry provides an over-arching approach with fine-grained visibility into hardware, system, and networking states and performance. Networking functions such as firewalls, routers and SD-WAN are monitored together with enterprise edge applications that are also hosted on the uCPE (IoT applications or private LTE/5G stacks, for example), eliminating the monitoring silos created by applications that are only aware of themselves.



The main components in Enea Edge's telemetry stack: collectd, influxdb, and Grafana.



Grafana showing the Host Overview dashboard in Enea Edge

A state-of-the-art streaming telemetry solution that continuously transfers data to the monitoring system provides significant benefits over traditional pull methods:

- ▶ Data is provided in near real-time allowing immediate detection of anomalies and firing alerts.
- ▶ It eliminates any pull gaps resulting from periodical pulling, providing instead highly granular insights.
- ▶ It scales better for large networks where polling of numerous distributed agents is otherwise required and much more resource intense.
- ▶ Streaming telemetry data requires fewer resources on the uCPE, contributing to overall lower resource consumption that allows cost-effective on-premises hardware.

### Enea Edge Telemetry

Enea Edge deployed on uCPE implements streaming telemetry optimized for networks with on-premises deployments and cloud-based management. The solution is based on three components:

- ▶ A daemon (collectd) integrated in the runtime platform that collects data from a wide array of sources in the system and pushes it to a centralized database.
- ▶ A time series database (influxDB) deployed in a central datacenter or in a cloud environment.
- ▶ An analytics and visualization application (Grafana).

Grafana and influxDB are provided as containerized installations for easy cloud-native deployments.

The daemon itself requires very few system resources on the uCPE, as it only filters and relays the data. Only a minuscule amount of data is cached on the uCPE device.

Collecting telemetry data can be switched on and off in Enea Edge Management. When it is enabled, Enea Edge Management instructs the telemetry daemon to start

collecting data, which is then streamed to the database from where it is accessed by the analytics and visualization application. Data collection and configuration of telemetry properties can be automated through Enea Edge Automation, which is especially important for larger networks.

Grafana is the leading visualization and analytics software for networking applications. It is the analytics engine used in Enea Edge for querying, visualizing, monitoring, and exploring data from the uCPE. Configurable dashboards with extensive visualization and query capabilities for exploring performance and resource utilization are available through a web GUI.

Available data can also be accessed by third party analytics engines, e.g. for integration with existing monitoring or orchestration solutions.

### Use Cases for uCPE Telemetry

The telemetry function in Enea Edge can be used for different requirements including alerts, troubleshooting, and long-term monitoring.

#### 1. Alerts

Alerts are vital to managing large networks. Telemetry alerts from uCPEs ensure that network operators are immediately aware of any on-site issues, allowing them to take immediate action based on real-time insights as to what the situation is and where it is located. Without alerts an issue can only be discovered when it has already started to cause problems. By allowing faster reaction and response, alerts help network operators to correct issues proactively before they lead to serious damage. An additional advantage of uCPE-based telemetry is that network managers can monitor large numbers of devices from a central location, significantly streamlining operations.

## 2. Troubleshooting

Many branch offices have few or no IT staff with the skills to troubleshoot and resolve network issues. The telemetry function in Enea Edge can be an essential source of insight for remote troubleshooting when a node fails. It provides data that allows network operators to visualize the events leading up to a problem, to carry out a root cause analysis and rapidly resolve issues. The visual correlation of data is especially effective in showing the causality between different entities, significantly shortening the critical time until a diagnosis has been established.

## 3. Monitoring over time

Time-series data collected through a uCPE-based telemetry service running on Enea Edge can play a vital role in optimizing networks and equipment, and in managing capacity planning. The data can be used to monitor usage and throughput for both physical and virtual network interfaces over time. This enables network operators to see the peaks and long-term trends that require capacity changes before traffic or resource utilization hits the roof.

## Conclusion

The telemetry functionality in Enea Edge can make a significant difference to network operations through both its reach and the granularity of information that it provides. The centralization of network monitoring using

data from on-site uCPE devices allows issues to be detected in near real-time with insights that enable them to be resolved rapidly and efficiently. Management of the data is both flexible and easy, adapting to specific requirements and objectives. Operators can set up network monitors and alerts, establish performance baselines, plan capacity requirements, and troubleshoot issues, meeting the needs of both the service provider and the enterprise.

### Enea Edge

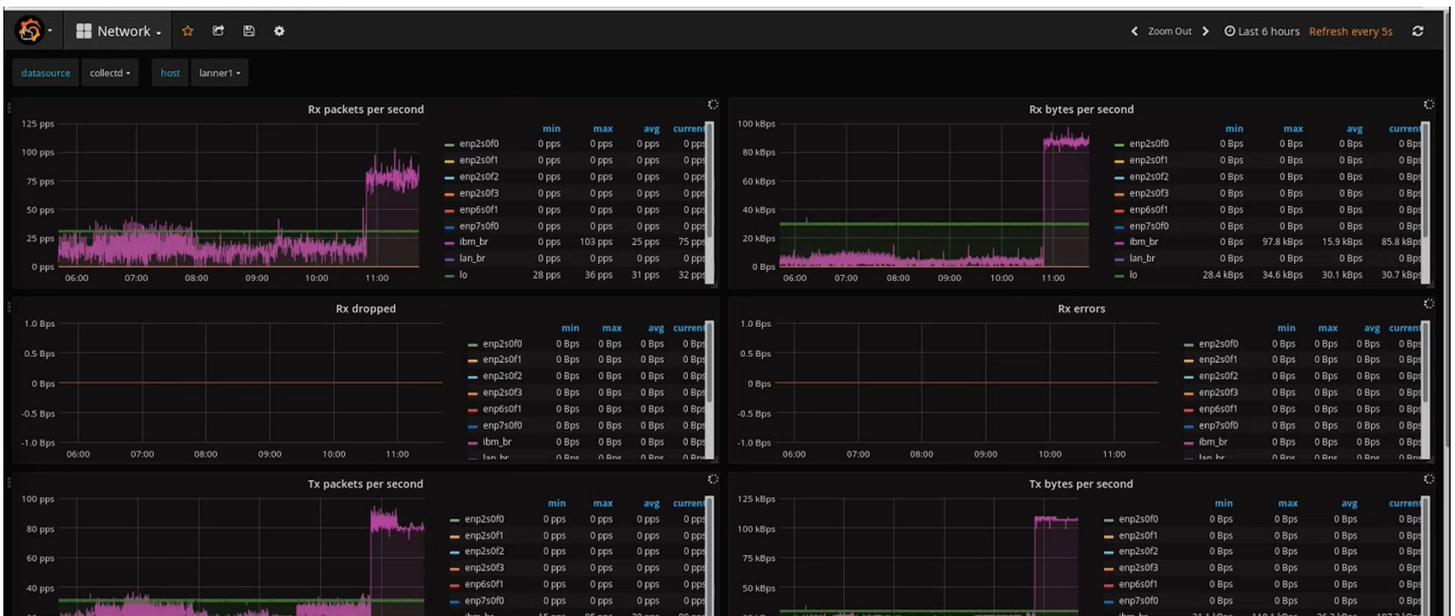
Enea Edge is a virtualization and management platform for universal Customer Premise Equipment (uCPE). It has been developed from the bottom up with the goal of providing a software infrastructure platform that is truly independent of hardware, applications, and orchestration, with optimal characteristics for the customer premise.

Enea Edge consists of:

- Enea Edge Runtime: white-box operating system providing virtual machines and containers
- Enea Edge Management: Platform and application/VNF lifecycle management
- Enea Edge Automation: Framework for automating deployment and operation of large-scale networks

For more information on Enea Edge:

[www.enea.com/enea-edge](http://www.enea.com/enea-edge)



Grafana showing the Network dashboard in Enea Edge



Enea develops the software foundation for the connected society with a special emphasis on reducing cost and complexity at the network edge. We supply open-source based NFVI software platforms, embedded DPI software, Linux and Real-Time Operating Systems, and professional services. Solution vendors, Systems Integrators, and Service Providers use Enea to create new networking products and services faster, better and at a lower cost. More than 3 billion people around the globe already rely on Enea technologies in their daily lives. For more information: [www.enea.com](http://www.enea.com)