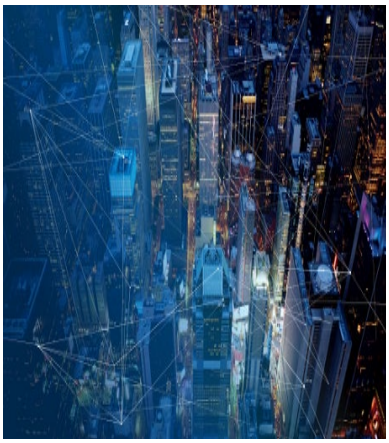
Solution Brief

Telemetry Reporting for Network Infrastructure

Telemetry reports software available from Intel® translates platform metrics into networking and operational metrics and provides insights on platform reliability, utilization, congestion, and configuration issues. These insights can be used to notify NetOps and provide key inputs for remediation actions by automated control systems as part of an observability solution in closed loop systems.



Executive Summary

One of the challenges for comms service providers is ensuring a robust, reliable network with the ability to recover quickly and efficiently from downtime scenarios. Comms service providers are accelerating their network transformation by using automation to efficiently manage their network operations. Automation helps to manage growing and changing networks, fix problems faster, and help adhere to customer SLAs. To perform automation effectively, it requires end-to-end monitoring of software, services, and the hardware on which these services are running within the network.

Intel server telemetry is available across the range of Intel processors* from Intel Atom® to Intel® Xeon® SP and spans a vast number of domains including utilization, power consumption, fault detection, and performance. To offer meaningful insights from this information, Intel has created a portfolio of telemetry reports that provides actionable data about the current status of the server.

Combining these insights with performance data about how the software and services are operating allows for a more holistic view of the network function. This document introduces telemetry reports and shows how they can be used effectively in an automated environment to influence network behavior.

This document is part of the Network Transformation Experience Kit, which is available at https://networkbuilders.intel.com/network-technologies/network-transformation-exp-kits.

Introduction

The telemetry reports provide insights that distill IA metrics into networking and operational metrics and allow the integration of insights into automated control systems. The distilled networking and operational metrics can be grouped into four categories:

- Platform health insights
- Utilization insights
- Congestion/overload insights
- Platform configuration checks

The distilled metrics/insights can be consumed by multiple management, orchestration, and control systems, including software-defined networking (SDN) controllers, VIMs including Kubernetes and OpenStack, root cause analysis (RCA) systems, virtual network functions manager (VNFM), network functions virtualization orchestration (NFVO), capacity planning, online and offline analytics systems and many others.

* The telemetry available is dependent on the features exposed on the platform.

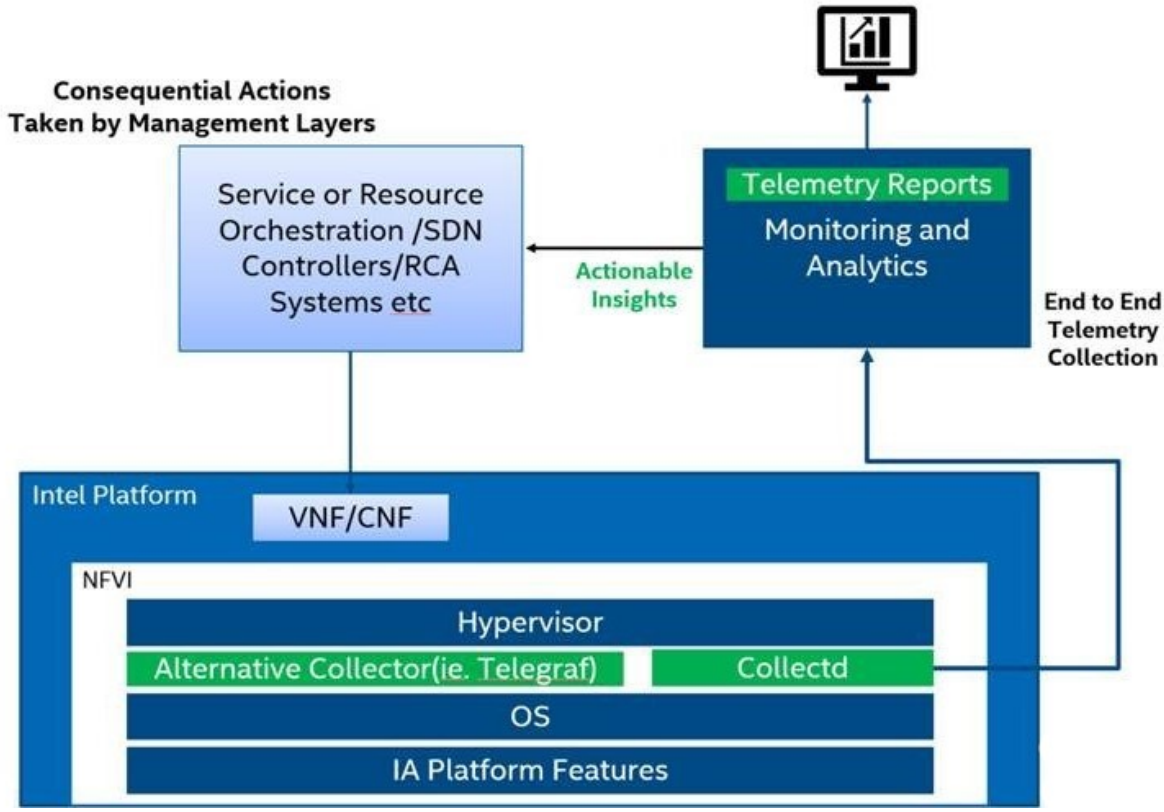


Figure 1. High level architecture of reports environment

Solution Description

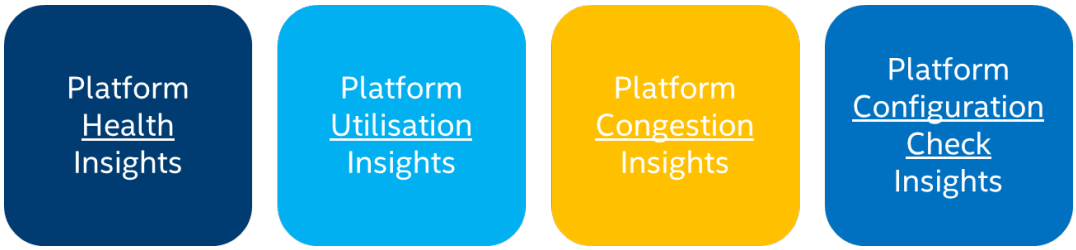


Figure 2. Categories of telemetry reports

Initial reports have been divided into four categories:

Platform Health:

- Key to several systems including high availability, resiliency, root cause analysis, and software-defined networking systems.
- Provides clarity into the overall health of the platform and the individual subsystems of compute, memory, storage, and network interfaces.
- Key in correlating network conditions with platform processing conditions.
- Can be used to create predictive models and develop preventative maintenance solutions.

Platform Utilization:

- Can be used to detect platforms trending to resource exhaustion before a workload experiences issues that could have a negative impact on customer experience.

- Helps the network operator to make decisions about meeting workload service level agreements (SLAs).
- Enables to detect platforms that are underutilized/idle and make decisions to rebalance traffic or minimize stranded resources.

Platform Overload:

- Overload/congestion reports detect exhaustion of platform resource capacity across compute, interfaces, and virtual switching.
- Notifies when specific points of congestion are detected on the platform, which could potentially result in service impacts such as packet loss.

Platform Configuration Checks:

- Allows configuration errors to be detected early in the platform configuration cycle.
- Can be included in lifecycle and preventative maintenance workflows resulting in fewer faults and increased uptime.
- Can be run as periodic checks or as part of a targeted root cause analysis workflow.

Technologies Implemented

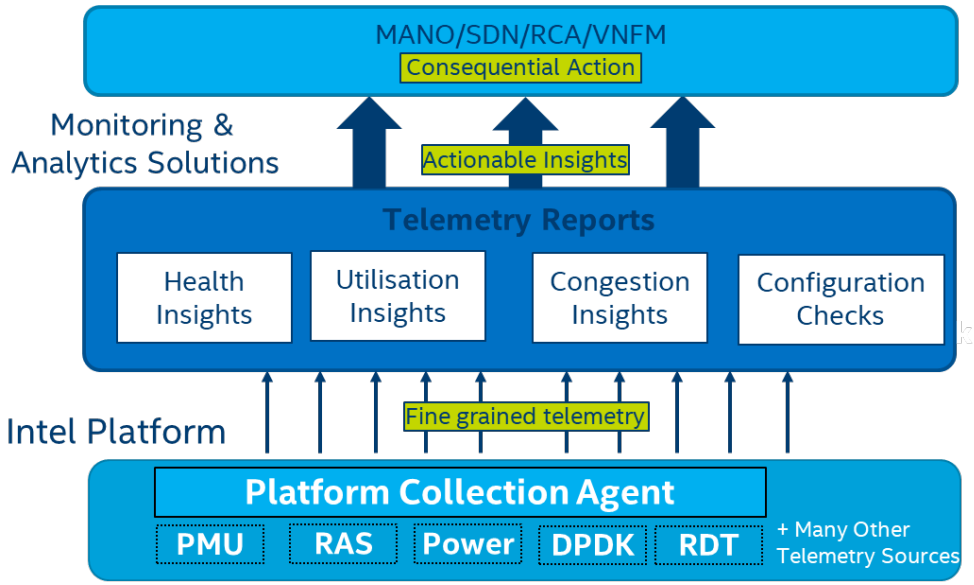


Figure 3. Telemetry and insights data flow

Figure 3 shows how the reports use Intel server telemetry provided by Collectd[1] and Telegraf[2] via Intel plugins[3] to a monitoring solution that forms the input for the reports. The telemetry reports select specific metrics for each type of report and apply appropriate formulae to generate operational and networking insights as output. They can also be run on the data collected at defined intervals of network operations choosing from seconds to days.

The output of the reports can be read by an operator or consumed by other management systems. Customers can feed the insights generated by the reports into their monitoring systems, which are then processed by online or offline automated systems. The telemetry reports have initially been developed to run on Prometheus[4] and InfluxDB[5]. However, they can be easily adapted to run on other open-source or commercial monitoring and analytics solutions.

Network operators can also use the output from the reports for visualization purposes. Figure 4 illustrates a simple Grafana[6] dashboard visualizing two of the memory health reports, availability and errored seconds. Errors can be documented in this instance and clear indications of these errors can be visualized.

[1] https://collectd.org/

[2] https://www.influxdata.com/time-series-platform/telegraf/

[3] https://wiki.opnfv.org/pages/viewpage.action?pageId=16220285

[4] https://prometheus.io/

[5] https://www.influxdata.com/

[6] https://grafana.com/

Figure 4. Grafana dashboard visualizing two memory reports

Benefits of Solution

- ✓ Portfolio of telemetry reports available for use in monitored network infrastructure – health, utilization, congestion, and platform configuration insights.
- ✓ Turning fine-grained server telemetry into meaningful actions within the network.
- ✓ Actionable insights provided to an array of consumers to take consequential action, management and orchestration (MANO), SDN controllers, RCA systems, etc.

As part of a closed loop automation solution, these insights can help to monitor and assess network functions virtualization infrastructure (NFVI) events, triggering actions that can close the loop for various automation use cases like, platform power optimization, platform reliability and ensuring application QoS. For more information/demo on some of these use cases, see our network transformation page at: https://networkbuilders.intel.com/network-technologies/network-transformation-exp-kits.

Summary

The growing number of subscribers along with the increased packet throughput have increased the complexity of networks and emphasized the need for additional services. Thus, being able to monitor the network infrastructure and ensure quality of service (QoS) is key to a holistic service assurance solution. Intel can offer telemetry and insights from its servers to provide health, utilization, overload, and configuration status that can feed not only service assurance solutions but various decision-making components of the stack, be it root cause analysis systems, resource orchestrators, etc.

This document showcases new telemetry reports available from Intel and how they can provide actionable insights for the rich telemetry set that is already available from the Intel servers. Covering insights for platform health, congestion, utilization, and configuration checks, this data can be used to notify NetOps and provide key inputs for remediation actions by automated control systems as part of closed loop systems.

REFERENCES

TITLE	LINK
Barometer OPNFV	https://wiki.opnfv.org/pages/viewpage.action?pageId=16220285
Collectd	https://collectd.org/
Telegraf	https://www.influxdata.com/time-series-platform/telegraf/
Prometheus	https://prometheus.io/
InfluxDB	https://www.influxdata.com/
Grafana	https://grafana.com/

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