Cisco Network Assurance Engine and Turbonomic

Automated self-healing for continuous network intent assurance

Highlights

- Self-managing intent assurance
- Self-healing networks

Introduction/challenges

Today's data center transformations are increasing complexity in the network

Organizations across the globe are transforming themselves with digital customer experiences. By 2021, at least 50 percent of global gross domestic product will be digitized, with growth in every industry driven by digitally enhanced offerings, operations, and relationships (IDC, 2017).[1] These trends are rapidly transforming the data center, increasing the scale, complexity, and rate of change. Today, organizations must support tens of thousands of virtual machines and hundreds of thousands of globally distributed applications. With that scale come millions of policies that must be managed in multitenant, hybrid, and heterogeneous environments. This is beyond human scale.

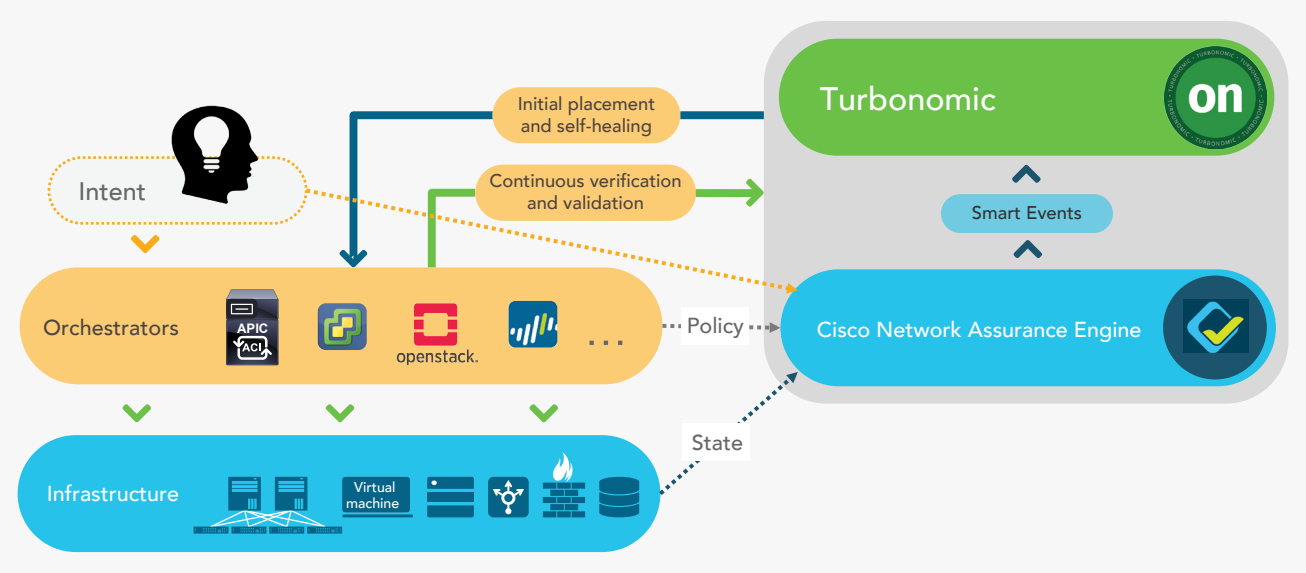
How to address the challenges

Cisco Network Assurance Engine and Turbonomic Solution

Cisco and Turbonomic together deliver continuous intent assurance and self-healing from the logical layer through the hardware. This solution gives operators the confidence that, as the network dynamically changes, it is always operating consistently with their intent throughout the workload lifecycle. And when things go wrong that are outside of their control, their systems will self-heal before applications' quality of service degrades (Figure 1).

[1] https://www.forbes.com/sites/gilpress/2016/11/01/top-10-tech-predictions-for-2017-from-idc/

Figure 1. Architectural overview: The core building blocks for self-managing networks



Solution use cases

What	How
Intelligent initial placement of workloads ensures availability of network services defined in the intent.	Turbonomic understands from Cisco Network Assurance Engine where policies can be assured by the network and will only place new workloads there.
Intelligent continuous placement enables existing workloads to self-heal.	Turbonomic understands from Network Assurance Engine where network intent can be assured and migrates workloads to the appropriate leaf, switch, or host.

Use cases in action

Turbonomic continuously assures performance while minimizing cost and maintaining compliance. It does so with specific real-time placement, scaling, and capacity actions. Now, it also dynamically assures intent with continuous and initial placement actions that are informed by Network Assurance Engine. Cisco Network Assu¬rance Engine delivers "smart events" that indicate when a policy cannot be applied in the network (Figure 2). Leveraging the smart events, Turbonomic provides specific actions to move the workload to a different host where the policy can be assured (Figure 3). Smart events from Cisco Network Assurance Engine also inform initial workload placement in Turbonomic. Operators simply choose to have the analytics abide by placement policies, as informed by Network Assurance Engine (Figure 4).

Figure 2 shows, the interface allocated by the fabric access policy administratively up with the link down. In Figure 3, . virtual machine mysql12-ubuntu is moved from host 192.168.136.22 to host 192.168.136.21 to assure policy intent. The smart events in Figure 2 indicated that for intent to be assured, the virtual machine must be moved to a different leaf or host. Turbonomic determines exactly where the workload should be moved. With Turbonomic, all decisions account for the multiple resource needs of the virtual machine, as well as compliance with the smart events from Network Assurance Engine. Finally, in Figure 4, the operators chooses to limit placement with placement policies as dictated by Network Assurance Engine (Candid_Turbonomic in the figure). By doing so, Turbonomic can consider this additional dimension—policy intent—alongside performance, cost, and compliance in its analysis and provide the correct real-time actions.

Figure 2. Smart events identify a misconfiguration in the leaf switch

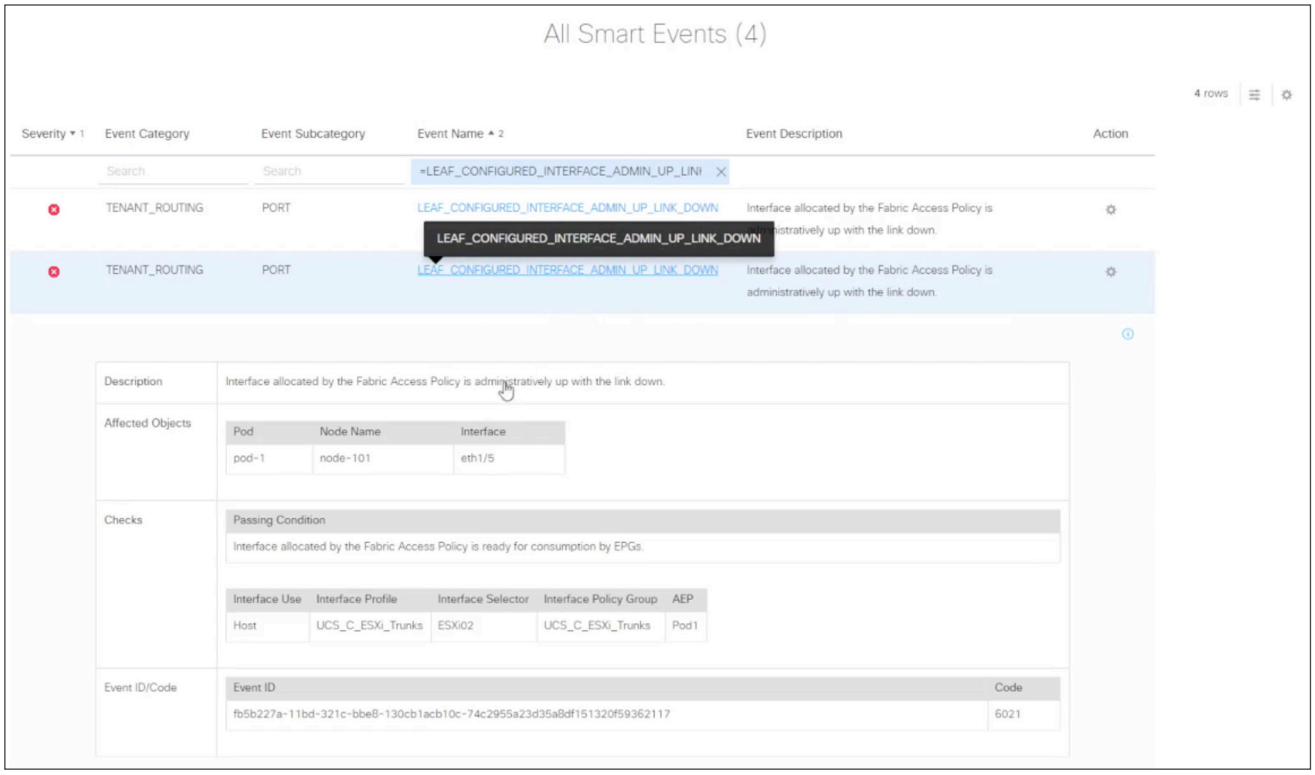


Figure 3. Turbonomic provides specific actions

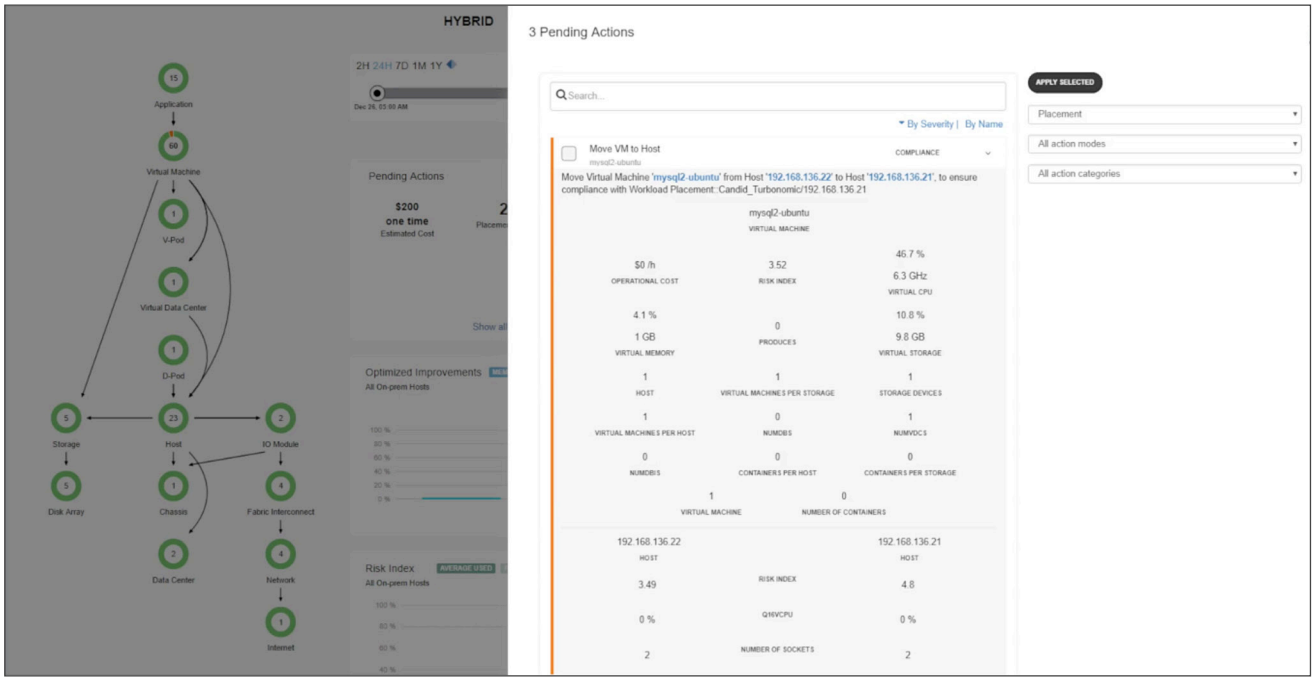
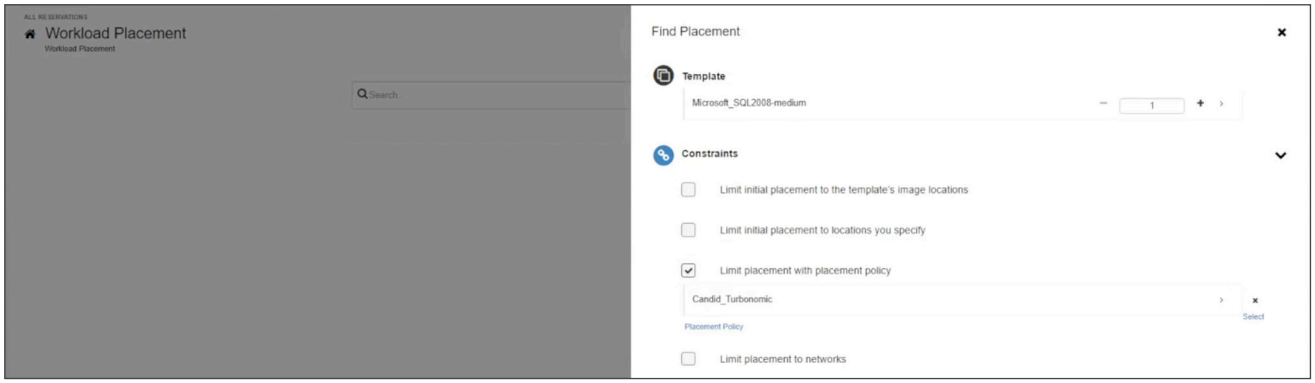


Figure 4. Operators select to limit placement with placement policies as dictated by Network Assurance Engine, here named Candid_Turbonomic

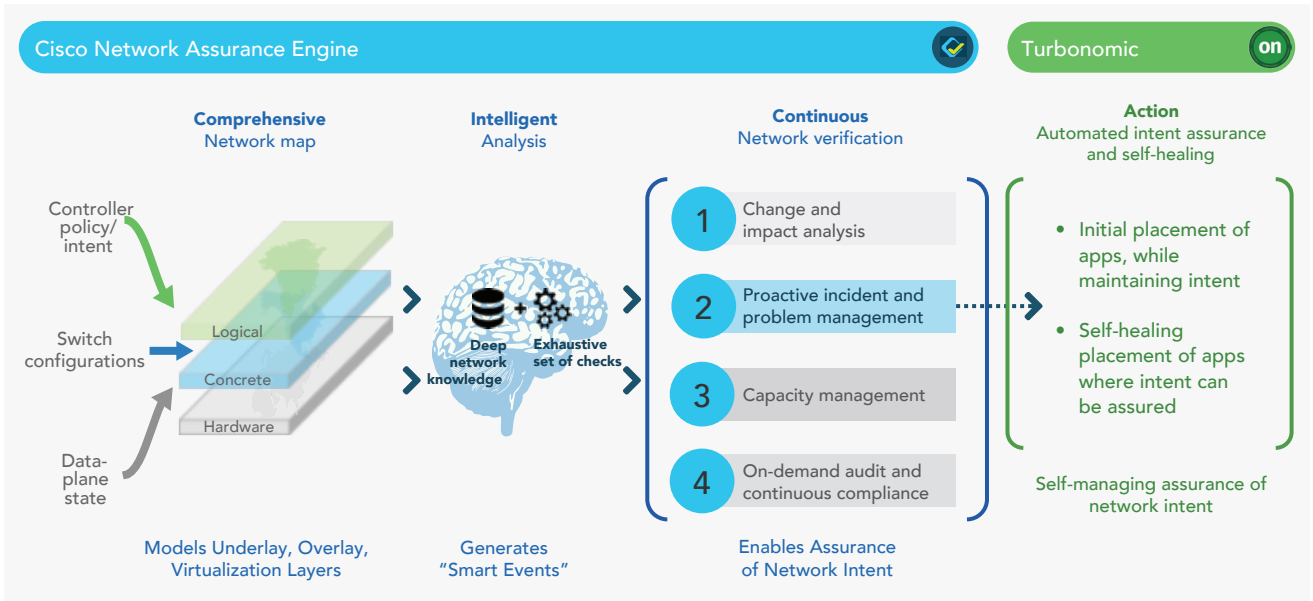


How it works

Cisco Network Assurance Engine understands the complete state of the network from the logical intent model to the concrete switch model and the hardware. It creates smart events by collecting various forwarding states from controllers, switches, and routers, and passes them to Turbonomic.

Turbonomic is a decision engine that drives continuous health in the environment. Workloads self-optimize, ensuring performance, while maximizing efficiency. Leveraging the smart events from Network Assurance Engine, Turbonomic also ensures that workloads are initially placed where policies can be assured and triggers self-healing move actions for existing workloads if failure occurs in the network.

Figure 5. Cisco Network Assurance Engine smart events inform Turbonomic initial- and continuous-placement actions



Solution components

Cisco Network Assurance Engine uses formal techniques to build a complete model of the network—without ingesting any packet data and managing the process entirely in software. The software offers the most comprehensive model of the network, spanning not just switch configurations but also the policy intent at the controller, as well as the data-plane state at the hardware level. But it is not enough just to collect data. We want assurance through actions, which is why Network Assurance Engine also has deep knowledge of expected network behavior built into the model, along with common failure patterns and best practices. Essentially, the intelligence of the smartest network operator and architect is built into the product. The software continuously keeps track of your network and provides alerts to ensure that it is always compliant with your intent. Because the software operates without ingesting any packet data, it requires only three virtual machines.

Turbonomic deploys as a single virtual machine in your environment. Working through the APIs of Network Assurance Engine and what is already in your environment (hypervisors, network, public cloud, cloud management, orchestration, storage, hyperconverged, etc.), it takes an agentless approach to pull the data that is already being collected. It then analyzes that information to determine the correct workload placement, sizing, and provisioning that assures workloads get the resources they need, when they need them.

Key capabilities

- **Automated intent assurance:** Newly deployed workloads are only placed where the network can support its intended policies.
- **Automated self-healing:** Existing workloads are automatically moved to a different leaf, switch, or host, if the current network components cannot assure the implementation of policies.

Benefits of solution

When software intelligently manages the network and assures your intent, you benefit:

- Continuous network intent assurance that scales with today's complex environments
- Time back for operators, to focus on what matters to the business

Conclusion

Digitization across organizations is ushering in a new level of dynamic complexity in networks. It requires self-managing, self-healing systems to continuously assure network intent. Together Turbonomic and Cisco Network Assurance Engine deliver an intent-assured, self-healing network.

For more information

https://www.cisco.com/c/en/us/products/data-center-analytics/network-assurance-engine/index.html

www.turbonomic.com

https://www.cisco.com/c/en/us/solutions/data-center/data-center-partners/index.html

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