



Enterprise Network Optimization



ENTERPRISE NETWORK OPTIMIZATION DELIVERS:

Application Awareness

Sandvine's industry's best application identification and classification delivers the greatest accuracy by far – 95+% - versus other solutions and has the most precise library of application signatures, allowing you to optimize network traffic on an application basis accurately.

Speed and Scale

Architected for and proven on the world's largest and fastest networks, Sandvine's network optimization recognizes adverse network conditions and executes policies with extremely low latency and with no impact on traffic speed.

Flexibility and Control

Enabling real-time policy control on a per-user basis across multiple context and service dimensions. Flexible policy and traffic management allows for powerful and agile policy management with multiple inputs from different sources.

Advanced Techniques

Sandvine provides the most advanced array of policy parameters and queuing mechanisms to give you fine-grained control on who, what, when, where and how you control traffic and optimize your network bandwidth.

Continuous Process

Network Optimization combines with Sandvine's Network Observability to provide a closed-loop and continuous process to observe how your network is behaving and identify new ways to optimize as your network grows and changes over time. With other tools, you are flying blind.

INTRODUCTION

Congestion and network performance are ongoing network issues for every enterprise, regardless of the size or access technology. Concerns about how to manage these show no signs of abating for the foreseeable future. Network congestion occurs when demands for resources exceed resource capacity and that capacity is bounded by two overriding factors: the investment required to expand capacity and the quality of experience (QoE) delivered to customers.

Theoretically speaking, networks are designed to be responsive to application and user traffic requirements, handle peak loads and provide reasonable returns on investments. However, the reality is that networks cannot be economically built to deliver against all potential future requirements because users and applications can present rapidly changing needs; peak loads can vary wildly, return on investment (ROI) and budget projections can falter in the face of rapidly growing needs, and other business-related issues.

To add another layer of complexity, enterprises typically only want to apply traffic management policies during congestion periods and ensure that all users have equal access to bandwidth or are allocated bandwidth according to their service-level agreements with transparency.

Enterprises need a solution that delivers more with less, stretching capital and operational resources without impacting QoE, while also complying with user and application needs.

The Problem

Congestion management may take many forms. Enterprises can analyze historical trends for planning purposes, but this approach is not helpful as a method for responding to real-time network congestion issues, which require dynamic and automated actions rather than static rules and manual actions.

Sandvine takes a more dynamic approach to managing congestion, combining traffic management with policies that are triggered when and where needed. This approach provides far more precise and effective network optimization based on a much broader set of conditions, which can include:

- Priority by application or application type, content type, by source or destination, and by network type
- Personalized user-related attributes such as recent usage, SLAs and type of device
- Real-time monitoring of QoE metrics at locations throughout the network, which can then inform actions to maintain specified quality levels

Ultimately, Sandvine's solution for managing congestion is centered on the notion of managing specific SLAs for applications, network resources, user groups, and users. Even for policies that may favor a higher power-user, there are still managed SLAs.

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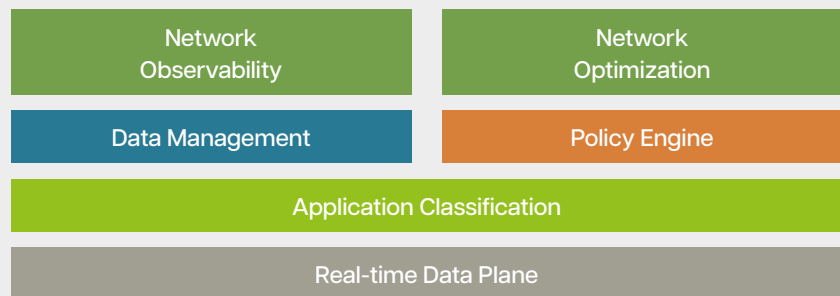


Sandvine's Enterprise Solution

Sandvine's Enterprise Solution is the only network optimization solution on the market that provides both pillars, integrated into a continuous optimization process to ensure your network operates smoothly and efficiently – network observability and network optimization. Both pillars are supported by Sandvine's industry-leading application classification, network data plane and real-time policy management technologies that have helped optimize some of the largest networks in the world.

Figure 1

Sandvine's Enterprise Solution Components



Speed and Scale

The ever-growing demand for new applications, cloud and digital transformation and global expansion has pushed enterprise networks to their extremes. Conducting business in today's global markets requires the utmost speed and lowest latency. Growing an enterprise globally can introduce extreme scale and the need to optimize networks in different ways across different locations.

Sandvine's network optimization solution is architected for and proven on the world's largest and fastest networks, Sandvine's network optimization recognizes adverse network conditions and executes policies with extremely low latency and with no impact on traffic speed.

Flexibility and Control

Today's enterprise networks are multi-faceted and highly complex. This diversity and complexity can be seen in our W's and H model:

- Who – there are growing numbers of users as enterprises grow, each working in different departments and roles and groups having different priorities and characteristics.
- What – there are an ever-increasing number of applications and network services including cloud and SaaS and growing complex content types that tax the network in varying ways.
- When – network conditions can change at any time with spikes and anomalies creating congestion and hurting Quality of Experience.
- Where – an increasing number of remote workers, access points, office locations, campuses and cloud data centers each have distinct network characteristics and links that need to be optimized.
- How – the way in which you want to control traffic flow needs to be as sophisticated as your network, using a variety of different techniques.

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As seen in the table below, Sandvine's network optimization supports all four W's and the H in this model giving you the greatest flexibility and control over how you manage your traffic.

	Meaning	Sandvine	Other Solutions	Sandvine Benefit
Who	Users, Groups, Departments, Units	All	Some user groups	Shape traffic to meet SLAs with business teams
What	Apps, App Categories, Content, URLs, Web Categories, IPs, Sources/ Destinations, Devices	All	Some; Not content, destinations and devices	Prioritize apps, content and traffic for critical business needs; Filter content to meet corporate policies.
When	Time, Network Conditions, Performance Situations, Outages, Usage, Metrics	Time, Congestion, Degradation, Heavy Usage, Network conditions based on metrics, Custom	Time	Adapt network priorities to network situations to ensure priorities and continuity.
Where	Internet links, Locations, Paths, APs, IPs, IP ranges, Subnets	Anywhere on your network	Internet links, IPs	Apply policies to locations based on unique network characteristics.
How	Queuing, Prioritization, Fair Use, Fair Factor, Sharing	Advanced queuing, Fair Split, Fair Factor, Weighting, Heavy Users, Prioritizations, Queue Sharing	Basic queuing and prioritization	Use policies to meet specific network goals (latency, speed, bandwidth, prioritization, etc.)

Table 1: How Sandvine Network Optimization Supports the Four W's and H Model

Analytics Answers the "Why"

Once you've determined you need to optimize your network traffic, the next step is seeing who, what when, where and how. This is the why! With many traffic management and network optimization tools, you are flying blind – you have limited to no analytics to guide you as to why you should optimize and answer the 4 W's and H for your various policy dimensions. Sandvine's Enterprise Solution combines both Network Optimization and Network Observability into a single solution that helps you gain greater visibility into your network operations and determine the best ways to optimize it.

Sandvine's enterprise network observability provides the breadth and depth of analytics and actionable insights to provide the comprehensive visibility needed to effectively operate and optimize enterprise networks. It goes beyond traditional pure network-level metrics provided by other solutions by providing actionable insights at an application, content, location, device and user level to measure the business impact, identify the root cause of issues, and recommend ways to optimize traffic.

The contextualization and information architecture of Enterprise Insights provides insights into optimizations for the network. When problems or unwanted conditions are identified via troubleshooting or alarms, these can often lead to tips on when, where, what and how to optimize the network. This information can be used to define traffic management policies in the Network Optimization of Sandvine's Enterprise Solution. Specifically:

- The network conditions seen – specific metrics (e.g. total latency) or overall conditions (e.g. congestion) – can tell you when you want to apply a traffic management policy,
- The dimension values – application, application category, users, locations – can tell you what and where to apply the traffic management policy, and
- The conditions within the specific dimensional values can tell me how I want to apply the traffic management policy – how I want to allocate bandwidth or prioritize/de-prioritize traffic.

Without the insights from Sandvine's network observability, you are essentially flying blind when applying optimization policies and guessing as to the when, where, what and how of your policies. Without network observability, you could easily apply policies that hurt and hinder your network rather than optimize it.

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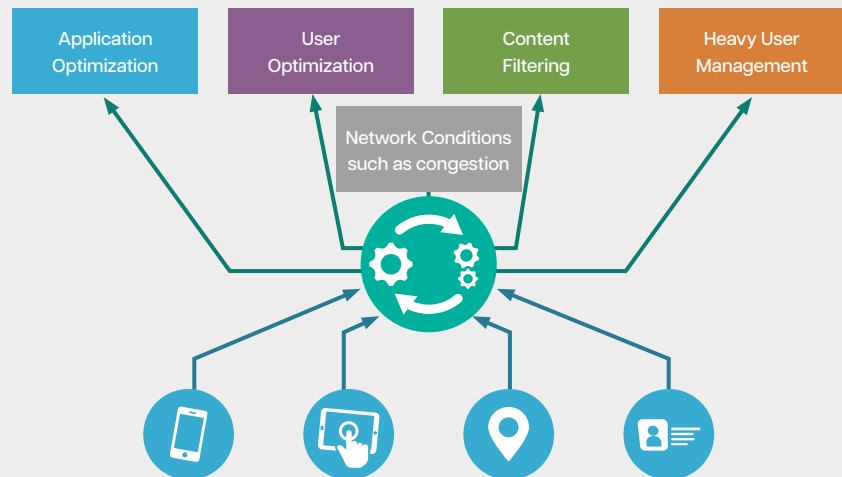


Optimizing Your Network

Sandvine's Network Optimization provides multiple solutions to controlling and managing your network traffic flows. It also provides a variety of contextual and situational parameters as described earlier in the four W's and H model.

Figure 2

Applying Contextual and Situational Parameters to Network Optimization



Who

CIOs, VPs of IT and VPs of Network Operations are increasingly being asked to commit to, measure, and maintain Service-Level Agreements with the business constituents they service. Optimizing your network for specific sets of business users is critical to managing and meeting your SLAs with those groups.

Sandvine Network Optimization can identify traffic from specific users and user groups and provide optimization policies that ensure they see the right level of service for their applications and network services. The Sandvine solution integrates with various user identification technologies (Active Directory, LDAP, RADIUS, custom) to understand who the users are, identify their traffic, and apply policies in real-time to manage their traffic.

What

AppLogic, Sandvine's industry-leading application identification and classification technology, powers highly accurate real-time application traffic identification - > 95% accuracy. It also classifies traffic into application categories and content categories (unique only to Sandvine). Using AppLogic information, teams can put in place policies that manage traffic from various applications, application categories and content categories to maintain high QoE for critical business applications and, as needed, control less important applications or content types to let high-priority business apps get needed bandwidth.

Using two robust, integrated internet service databases, teams can also apply policies on various websites and services – for example, to filter specific sites or services that break corporate policies. Policies can also be applied to specific sources or destinations, or even unknown sources and destinations.

When

Your network activity and performance can change at any moment. There can be regular bursts at known times (e.g. data pipelines running as nightly batch jobs) or anomalies due to bursts of business activities. You can also have performance anomalies due to network outages or degradation.

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ActiveLogic, the active data and control plane in Sandvine's Enterprise Solution, provides 18 real-time metrics and can detect specific conditions such as congestion, heavy user usage, network degradation, and more, in low-latency, 250-millisecond intervals. These real-time metrics can be used to trigger specific policies to best react to these network conditions and ensure bandwidth is properly allocated to key applications.

When conditions are normal, one set of regular policies can apply. During other, out-of-bounds network conditions, other policies can be applied to regulate traffic. When the conditions go away, regular policies are reapplied.

Where

Various places in your network will have different characteristics in terms of speed, performance, throughput, volume and more. Locations can be specific offices, data centers, clouds, access points within buildings, and more. Different locations may need optimization based on who is in that location, the services used and the characteristics of that network location.

Sandvine identifies various locations from the network devices, tracks traffic flows in those locations and can apply policies that are specific to those locations. This allows you to optimize those locations and ensure key applications and users get the QoE needed to keep the business humming.

How

There are several advanced techniques Sandvine supports to help you manage traffic queues and best regulate your traffic. This includes:

- Various queuing techniques including parallel queuing, active queue management, priority de-queuing, weighted fair queuing and virtual queueing,
- Different fair usage and shaping techniques including fair split, weighted fair split, fair factor groups/tiers, fair split with application-awareness, and
- Shaping techniques such as strict priority shaping, multi-layered shaping and shaping with asymmetry.

Industry Leading AppLogic

Sandvine's Network Optimization leverages the company's industry-leading application identification and classification technology and unique machine learning-powered QoE scoring capabilities. It provides the underpinnings for identifying applications, application categories, content and content categories that need to be optimized.

AppLogic, the application identification and classification technology, provides greater than 95% accuracy for app identification and classification – far greater than the 50 to 60 percent of similar technology – even on encrypted traffic which often doubles or triples the CPU consumption (and cost) of other solutions. This accuracy ensures confident visibility into application traffic and provides a unique content classification no other vendor provides that allows you to see and manage traffic by content type.

Continuous

Your enterprise network is a living, breathing entity. New users are added all the time. New applications and network services are rolled out – some on-premises and some in the cloud. Usage patterns change or anomalies occur. The ways in which you optimize your network today may need to change tomorrow. How will you know and how will you know how?

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Sandvine Enterprise Observability provides a continuous flow of analytics and insights about your network. It shows you when conditions change and what, where and how it has changed. It can show you the impact of changes you have made to your network and application portfolio.

Network Observability combined with Network Optimization (both in Sandvine's Enterprise Solution) work together to let you continuously analyze and optimize your network. This lets you gain the utmost performance, and make the best use of bandwidth and resources to deliver the best QoE constantly.

The Results

With Sandvine's Enterprise Network Optimization, you'll see clear results, including:

- Reduced network costs through deferred equipment CAPEX and lower OPEX,
- Increased application and user QoE by alleviating congestion and prioritizing key applications,
- Ensuring SLAs are maintained via dynamic policies that execute when network conditions occur that impact QoE and SLAs,
- Data-driven Optimization – identify optimizations using insights on where, when and how to optimize network traffic to maximize application and user Quality of Experience.
- Have a Continuous Process – use analytics to continuously understand how your network is operating to make evolutionary decisions on how to optimize it.
- Reduced trouble tickets and high NetOps productivity through proactive problem identification and resolution

Key Capabilities

- High-speed data plane with real-time metrics that scales to the largest networks
- AppLogic app ID, app classification and content classification with weekly updates
- Two (2) internet service databases for URL filtering with weekly updates
- Built-in, deep suite of contextualized analytics with Sandvine Enterprise Network Observability
- Maestro real-time policy engine for real-time policy execution with full contextualization
- LiveView real-time performance metrics and monitoring
- Multiple enterprise integration points (Active Directory, LDAP, RADIUS, SOAP/REST)
- Real-time, low-latency policy execution
- Real-time metric monitoring
- Conditional policy controls
- Situational policy controls
- Time-based policy controls
- Scales to 100,000+ policies
- Detailed policy execution metrics
- Advanced queuing algorithms
- Custom policy triggers
- Contextual control
 - Application, category & content policies

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- User and group policies
- Location-based policies
- Address-based policies
- Time-based
- Analytics-based policy controls
 - Real-time metrics
 - Network conditions
 - Congestion
 - User levels
 - Performance
 - Quality

ABOUT SANDVINE

Sandvine's cloud-based App QoE portfolio helps customers deliver high quality, optimized experiences to consumers and enterprises. Customers use our solutions to analyze, optimize, and monetize application experiences using contextual machine learning-based insights and real-time actions. Market-leading classification of more than 95% of traffic across mobile and fixed networks by user, application, device, and location creates uniquely rich, real-time data that significantly enhances interactions between users and applications and drives revenues. For more information visit <http://www.sandvine.com> or follow Sandvine on Twitter @Sandvine.



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