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Netsweeper Education Whitepaper

Content Filtering for the Education Market

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Version Control

Version	Author	Date	Section Modified
1.0	Andrew Graydon	June 1, 2010	Original draft
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Foreword

The education market has a number of challenges with content filtering at the various levels: department of education/superintendent, network operators, district IT managers, teachers, parents and students. The following outlines these levels and the key criteria being sought with respect to content filtering and web threat management systems.

- Department of Education/Superintendent
  - Directors of education are required to provide online protection for all students. 'In loco parentis' is the legal doctrine under which individual or body assumes parental rights. In an education environment, it is this executive authority's duty to protect children while under their supervision, if even temporarily.
  - Reduce liability risk associated with student Internet usage
  - Require data to backup infrastructure, equipment and eLearning programme investments. Examples include:
    - Netbooks and 1:1 computing – need information to validate cost of such programmes
    - Paid-for, online content – are subscriptions to such content being used?
  - Budget constraints/reductions for IT related tools and resource.
  - Advanced web security solutions that protect network, workstations and users from harmful and malicious web content while also protecting data and personal identities
  - Ensure a safe teaching and learning environment.
  - CIPA compliant → qualify for E-Rate funding in the US
  - In the UK, Ofsted will only grant Good and Excellent ratings for Student Internet Safety if per user filtering is in place.
- Network Operations Team (at Education network providers or large district operators)
  - Easy to install, simple to set-up and easy to use systems that require little hands-on maintenance
  - Advanced web security solutions that protect network, workstations and users from harmful and malicious web content while also protecting data and personal identities
  - Real-time categorization of new web content and identification of new anonymous proxy sites to ensure protection of network
  - Flexible to install
  - Flexible and intuitive administration tools that permit multiple levels of administration
  - Steadfast and knowledgeable support
- District Administrators
  - Complete admin control with ability to delegate specific tasks to named staff at the school level
  - Affordable application with low Total Cost of Ownership
  - Ensure safety of students and reduce legal liability risk
  - Effectively managing the circumvention and other common content filtering challenges found with other no-effective content filtering tools: enforcing safe

search engine use, managing use anonymous proxies, managing HTTPS proxies, limiting over and under blocking.
    - Advanced web security solutions that protect network, workstations and users from harmful and malicious web content while also protecting data and personal identities
    - Ability to control/manage network bandwidth
    - CIPA compliant – qualifies for E-Rate in the US
    - Need to control use of mobile laptops if they leave school premises
    - Flexible and powerful reporting to provide information to teachers and board executives
    - Supports local needs and requirements
- Teachers
    - Enable teachers to gain access to sites as needed for teaching curriculum without need for IT intervention – Deny page override feature
    - Ability to manage class Internet use on student by student basis if needed
    - Ensure kids are staying on task and not using sites of little educational value
    - Advanced web security solutions that protect network, workstations and users from harmful and malicious web content while also protecting data and personal identities
- Parents
    - Ensure online safety of children
    - System that enforces appropriate Internet use as dictated by community standards
- Students
    - Provide a clean, safe and productive learning environment
    - Make available all online tools to enhance the learning experiences of the students without limiting them to curriculum related materials online
    - Advanced web security solutions that protect network, workstations and users from harmful and malicious web content while also protecting data and personal identities

Introduction

The Internet is considered ***the*** research and communication tool used in virtually any education organization or institution around the world. By providing Internet access, end users are clicks away from such an abundant of information and direct communication with anyone in their 'networking circle' which will consist of personal, educational and even yet-to-be-known fellow Internet users. However, they are also now exposed to the threats the Internet brings to data, productivity, personal safety and moral sensibilities. By its global reach, the Internet regularly defies laws, policies, and regulations established by governments and lawmakers.

Web content filtering solutions and services available over Internet protocol (IP), offer educational institutions the ability provide educational materials and e-curricula, denying offensive and often intrusive websites while providing protection from viruses, spyware, adware, and malware that lurk outside every network Internet connection.

Best known for our real-time web content categorization technology, Netsweeper's web filtering solution incorporates the search activities and patterns of its entire user community. With millions of web pages being posted each day, this artificial intelligence engine has the capacity to keep pace with the massive growth of the Internet, its content and malicious threats. As a result of this industry leading technology, Netsweeper has accrued and strategically categorised over 3.8 billion URLs.

Netsweeper has also invested significantly into the development of a web -based administration tool-kit that enables the IT authorities to proactively manage the Internet access and activity of its immediate user community. This tool ultimately offers the greatest form of defence, mitigating all relevant issues related to Internet user today.

Content Filtering For Education

Introduction

Technology in education is exciting and challenging. Education curricula are incorporating technology to enhance student learning and development. With web-based eLearning tools and the increase of Internet availability, students are encouraged to spend more time online. However, educators must also manage the issues, risks and challenges when fulfilling the promise of Internet-based learning.

The critical issues include:

- Solutions must be compliant to CIPA (Children's Internet Protection Act) to qualify for E-Rate funding in the United States.
- Budget cuts becoming increasingly common, educators are searching for Internet content filtering tools that still meet local standards but are more economical and more efficient to manage with fewer IT resources available on payroll.
- As dollars are spent on IT solutions, Board authorities are increasingly interested in understanding what return on investment is being driven. Reporting on Internet usage is one way to justify spent on new eLearning initiatives.

The criteria that filtering solutions must address in order to be effective:

- Easy to install and simple to use solutions that enable IT Managers to effectively manage Internet access while preserving the performance and security of the network.
- Producing a rich educational experience by effectively protecting children from inappropriate content while ensuring Internet access is productive regardless of where or how students access the Internet on school owned equipment.
- Enable teachers to monitor and control student Internet activity while at the same time promoting the incorporation of technology to fulfil or assist in meeting curriculum requirements.
- Complying with local legislation that will drive the lowest Total Cost of Ownership (TCO) that may include the opportunity for qualified funding or discounts.

Education Authorities

In the educational setting, IT authorities and administrators are mandated to protect the students from the social dangers associated with the Internet while also preserving the school networking infrastructure. Content filtering solutions provided by Netsweeper help deliver on this two pronged task.

Regulating standard compliance

Government regulatory bodies have imposed legislation whereby school districts or boards are required to filter school networks for unwanted content. Netsweeper's solutions comply with the regulations and certification requirements of the Children's Internet Protection Act (CIPA) in the United States.

Delegated administration offers ease of management

Management of a district wide network requires considerable attention. Having one, short-staffed department manage filtering for potentially thousands of students is next to impossible. Using Netsweeper, IT authorities can delegate system administration to a level closer to ground floor through the use of a single and centralized web-based administration tool. Doing so will enable students at different age or maturity levels to be filtered appropriately.

Filter laptops off-network

With the growing acceptance of mobile browsing and a world-wide vision of 1:1 computing for all students, protecting children on the Internet expands well beyond the classroom. Netsweeper offers a full client-based content filter that allows administrators to continue the filtering of laptops off the network.

Internet usage and eLearning verification reporting

Providing education authorities with information pertaining to the usage of the Internet will enable educated decisions to be made regarding Internet access policies or privileges and the ongoing support/investment of eLearning and 1:1 computing programs.

Controlling the use of anonymous proxies

Bypassing filters by using Web-based anonymous proxies exposes the school network to potentially malicious content. Through Netsweeper's real-time categorization engine, the URLs of these new sites are quickly identified, categorized and distributed to minimise the burden and cost affects these sites can pose on a network.

Delegated Administration for Teachers

Ability to allow blocked pages

When a teacher is planning a lesson she can go to the web sites in advance from home or in school. If for some reason this is blocked Netsweeper can allow the teacher to unblock for a period of time with a password.

How is this accomplished? Teachers are given what is called "System Operator" Status. This is accomplished via password.

Ability to run a report

Teachers require information on the total class or on an individual student – with "Netsweeper Sys Op Access" teachers can log in and run a report on an individual user. This report can be pre set and accessible for the teacher or can be a custom process request by the teacher.

Ability to override policy

During the course of teaching a class it is sometimes necessary to 'open' content in a supervised setting for a period of time. Teachers can be given the ability to override the policy for a period of time. For example 30, 45, 60 minutes. When time line expires, all previous policies are returned. A log of changes can be reported for audit purposes back to Master Administrator.

This is accomplished with a password access to a short list or request for the teacher to check the boxes.

Ability to submit a request automatically

Teachers can have a site reviewed by submitting this site on the deny page. Netsweeper's policy is that all sites submitted are reviewed by a human within 24 hours. Teachers can check a box on the deny pages and or log in and request this function.

Netsweeper can limit functions and assign or "Delegate" these limited functions to the teachers or local IT staff. This alleviates the process of calling the Head IT staff for every change. An automated daily log of all teachers' activity can be sent via Email to monitor the changes made and for audit purposes. These changes are managed by the assigned Master Administrator of the Netsweeper system.

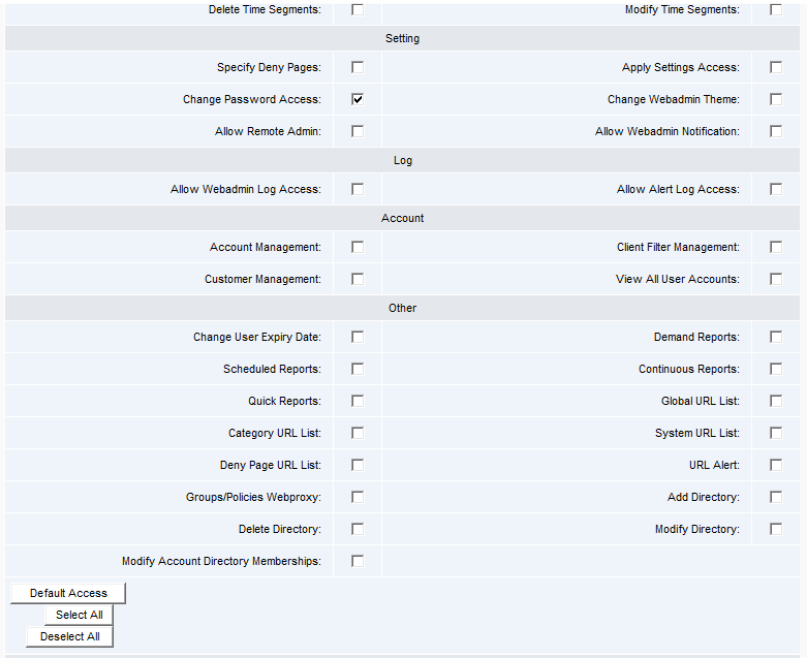


Figure 1 Setting Delegated Administration

The Benefits of Filtering Student Mobile Devices

Promotes a safe, productive and rich educational experience

Filtering student Internet access with Netsweeper will ensure inappropriate and harmful content is not accessible while promoting use compliance and a richer educational experience. Further, prohibiting access to websites that are deemed of little educational value, such as social networking or gambling, will ensure students remain on task.

Additionally, solicitation while using online sites is a major concern as it poses as a liability issue when providing students with mobile technology. Ensuring such an event does not happen is the first line of defence when mitigating the risk of liability.

Enabling teachers access control ensures appropriate use

Netsweeper enables IT managers to delegate the day-to-day administration of Internet access policies to named staff on the ground floor. This approach empowers teachers to ensure they, and the students themselves, have access to the sites needed to fulfill curriculum projects. With administration permissions, teachers can also determine when Internet access should be permitted such that students are not distracted during important instructional hours.

Protect mobile devices and preserve performance with filtering

As students scour the Internet uncontrolled, they run the risk of encountering sites that contain viruses or other malicious applications which will not only affect the performance of the devices, but could potentially harm school networks when they reconnect. Netsweeper will filter and block viruses, spyware, phishing and other forms of malware from compromising the usability of these remote devices and the core network.

Student eSafety Messaging

A required component to qualify for eRate funding starting in 2010, is to have a plan to educate students about online threats and to teach them how to be safe and responsible. Netsweeper's Student eSafety Messaging platform is designed to meet this newly approved criterion whereby online eSafety learning is actually driven by the surfing patterns of students.

How this works

Students make a request to view a specific website on the Internet. With other traditional Internet access management systems, based on the students' user policy, they will be either allowed or denied access to the particular site.

With Netsweeper's Student eSafety Messaging platform (patent pending), this process is much the same. However, based on the category or topic of the site requested and the profile of the student making the request, a page may be returned with a relative eSafety message embedded.

In some instances, the site requested is to be allowed, however, the student may first receive a message page that would show for a short interval of time before proceeding to the intended site. In other cases, the student may be required to click on a button to proceed. For example, social networking sites are highly used by students but pose as a threat each time they post information or communicate through the site. Displaying a message to instruct them on safe use techniques would be a proactive form of eSafety education.

In other cases where a student has requested a site that is not in compliance with their user policy, a deny page would appear. With the Netsweeper Student eSafety Messaging platform, this would be a custom deny page with the relative eSafety message pulled from the same repository. As well, a hot-link to an alternative site would appear for further information on the topic.

Student eLearning Verification Reporting

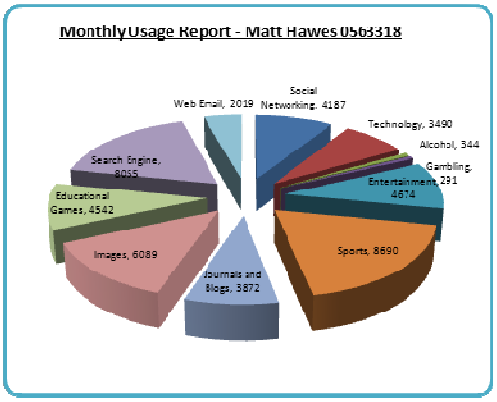
Education curricula are incorporating web-based eLearning tools and other forms of technology to enhance student learning and development. The power to stimulate learning and knowledge with the Internet is incredible but there are also risks and challenges prevalent that must be acknowledged by our educators. Especially in an era of 1:1 computing where students are provided mobile laptop devices to extend their learning beyond the classroom.

One of the biggest challenges is how to verify that students are actually spending their time on curriculum related activities, even when school owned laptops leave the school premise.

Netsweeper's eLearning Verification Reporting has been specifically designed to validate all student Internet access while on and off the school network. Reporting can be set-up to verify Internet activity for an entire school district, a single school, a grade level, a particular class or even an individual student. Understanding access trends and validating the use of the Internet will support the ongoing use and Return on Investment (ROI) of eLearning tools, and more importantly, student mobile devices.

Examples of eLearning Verification Reports may include:

- Summary Activity by Category – Allowed requests
- Summary Activity by Category – Denied requests
- Reports on Request Logs (customized as required)
- Daily Summary/ school - Protocols accessed
- Daily Summary/ group - Protocols accessed
- Weekly Summary - Education Sites accessed
- Weekly Summary /group - Education Sites accessed
- Top 10 websites allowed by group
- Top 10 websites denied by group
- # Anonymous Proxies denied
- Top 10 users / education site access
- Individual usage report
- Internet Request Activity - all Netbooks
- Network vs. Netbook requests allowed / denied
- Network vs. Netbook requests during /after hours
- Top 10 websites access during / after school hours



Conclusion

Netsweeper is an accredited web content filtering and web threat management solution that empowers educational authorities to create and manage a safe and productive teaching and learning environment. By controlling Internet access to inappropriate content, web applications and streaming media sites, school authorities can mitigate liability concerns while preserving network performance, data security and reliability.

Educational systems need to enable a safe learning and teaching environment;

- To allow school authorities to protect children and provide a safe and productive learning environment
- To empower teachers to control classrooms and fulfill curriculum requirements
- To gain trust and support of parents
- To see students engaged and achieving top marks

When integrating 1:1 eLearning initiatives, Netsweeper plays a key role by ensuring Internet activity on student mobile laptops remains within the boundaries of Acceptable Use regardless of where or how these devices connect to the Internet. Operating as a service solution, Netsweeper requires minimal overhead or resources to implement, configure and manage.

What Netsweeper can offer and 'so what'

- Enable student achievement by providing safe learning environment.
- Internet access management platform that has the ability to delegate Internet access controls to the teacher level, thus enabling teachers to generate a more productive, rich and safe teaching environment.
- Empower teachers with detailed reporting on student Internet activity to ensure usage is positively impacting student performance.
- A single, intuitive web-based administration tool that enables IT managers to manage and control Internet access privileges, user policies, reporting and administrative access rights.
- Technology to manage Internet access on mobile laptops whether they are on or off the network, thus protecting devices from infection and students from online threats regardless of where or how they connect to the Internet.
- Comprehensive data on all Internet user activity to be utilized in the creation of reports designed to justify investments in network operations, eLearning initiatives and paid-for content.
- Ability to better manage network bandwidth by controlling access to high bandwidth resources.
- A CIPA compliant Internet content filtering solution that will ensure qualification for E-Rate funding.

Appendices

Appendix A - Education Customers

CUSTOMER NAME OR LOGO	DESCRIPTION
"Together We Learn" SCHOOL DISTRICT No. 23 (CENTRAL OKANAGAN)	**British Columbia Education (Okanagan School District 23)** Located in central British Columbia, Okanagan School District 23 launched a 1:1 eLearning initiative in 2007 whereby 5,000 students receive laptops to enhance their learning experiences. To mitigate legal liability and to ensure proper use of district owned equipment, Netsweeper was deployed on each of the devices to filter and block inappropriate websites and content from being accessed. (Please note: due to the unforeseen costs in maintaining the hardware, this program was cancelled as of June 2008 – the first year of a three year program. Today, Netsweeper is not being used. **Segment:** Education **Number of users:** 5,000 laptops were fitted with Netsweeper **Region:** Kelowna, British Columbia
NEBRASKA esu NINE	**Educational Service Union #9** The ESU uses the Netsweeper filtering solution to service the Adams, Clay, Hamilton, Southern Hall, Nuckolls, and Webster Counties in the Nebraska region. ESU #9 filters over 1,500 workstations and has been a Netsweeper client since 2002. **Segment:** Education (Medium sized school district) **Number of users:** 1,500 workstations **Region:** Nebraska, United States

CUSTOMER NAME OR LOGO	DESCRIPTION
	**eiNetwork** The eiNetwork is the Regional Asset that furthers the mission of over 70 libraries in Allegheny County in Pennsylvania. It manages the catalogues and on-line reference materials to the various libraries in the county. eiNetwork uses the Netsweeper Content Filtering solution to provide filtering to over 2,000 workstations so as to ensure that public computing resources are being used appropriately. **Segment:** Education/Enterprise (Library focus) **Number of users:** 2,000 workstations **Region:** Pennsylvania, United States
	**embc** embc is a collaborative body established and owned by 8 Local Authorities and providing Internet and other related services to the education sector. Presently, Synetrix now manages embc. **Segment:** Education Service Provider **Number of Users:** They resell our solution. Exact numbers not known. **Region**: United Kingdom
	**Halifax Regional School Board** A Netsweeper customer since 2006, the Halifax Regional School Board is the largest Atlantic Canada school board with over 53,000 students in 137 schools. The Netsweeper solution is currently filtering 10,000+ workstations across the region. **Segment:** Education **Number of Users:** 10,000+ **Region:** Halifax, Nova Scotia, Canada

CUSTOMER NAME OR LOGO	DESCRIPTION
HAMILTON-WENTWORTH DISTRICT SCHOOL BOARD	**Hamilton-Wentworth District S.B.** With over 50,000 students in 114 schools across the Hamilton-Wentworth region, HWDSB has invested millions into the 'revitalization' of its board to ensure that students have the tools they need to succeed. In 2002, HWDSB implemented Netsweeper to filter Internet activity on over 8,000 workstations. **Segment:** Education (Medium – large sized school board) **Number of Users:** 8,000 workstations **Region:** Ontario, Canada
Kenora Catholic District School Board	**Kenora Catholic District School Board** A small, northern Ontario Roman Catholic school system consisting of 3 elementary schools and one high school found some inappropriate Internet use was occurring at the high school level back in 2003. Today, Netsweeper is deployed across the school board and filters over 1,000 students. **Segment:** Education (Small school district) **Number of Users**: 1,000 students (approximately 700 workstations) **Region:** Northern Ontario, Canada *** Case study is available.**

CUSTOMER NAME OR LOGO	DESCRIPTION
Prince George's County Public Schools	**Prince George's County Public Schools** Prince George's County is a large school district in Maryland that has approximately 160,000 students, 25,000 staff and over 160 buildings. Prince George's is in its seventh year using the Netsweeper Internet content filter. The school district has been a client since September of 2002. Prince George's County uses one policy engine and several squid servers to service its network. **Segment:** Education (Large school district) **Number of users**: 160,000 students using **Region:** Maryland, United States ***Case study is available.**
ramesys	**Ramesys (recently acquired by Capita)** Ramesys provides an array of professional IT services to businesses and educational institutions. Ramesys currently resells and in some cases, provides the hosting infrastructure to support Netsweeper's content filtering solutions, primarily in the education market. With approximately 20 clients now running Netsweeper, Ramesys is an expert in both deploying and supporting the Netsweeper platform **Segment**: Education (Reseller; Managed Service Provider0 **Number of Users**: 20 customers with approximately 30,000 end point devices **Region**: United Kingdom

CUSTOMER NAME OR LOGO	DESCRIPTION
SYNETRIX LONDON GRID FOR LEARNING	**Synetrix Solutions (London Grid for Learning)** Synetrix is the premier managed services provider of integrated applications, infrastructure and identity management solutions for the UK Public Sector and Education, and leading private sector companies. Through the vision of the London Grid for Learning Trust (LGFL), the Synetrix network is currently being deployed to provide broadband services and content filtering to schools and libraries within all of London's 33 Local Education Authorities (LEAs) and independent schools. Synetrix has been filtering 2,684 schools within the LGfL since 2002. Today, the Netsweeper application processes over 1 billion URL requests per week. **Segment**: Education/ISP (Manage very large school districts → LGfL) **Number of Users:** LGfL → 1.6 million student, plus staff (estimate 600,000 workstations, in 2,684 schools) – See contacts for LGfL below. **Region:** United Kingdom ***Case study is available.**
Walsall Children's Services serco	**Walsall Children's Services** WCS, a division of Serco Group plc, provides services that manage technology, people, process and assets on behalf of the entire Walsall education district. With over 49,000 students and approximately 15,000 endpoints, WCS made the decision in 2006 to manage all student Internet activity with Netsweeper. **Segment:** Education **Number of Users:** Approximately 15,000 end point devices **Region:** Walsall, United Kingdom

CUSTOMER NAME OR LOGO	DESCRIPTION
Logo not available	**Waterloo Public Library** The Waterloo Public Library has been protecting its patrons in 2 branches from inappropriate and offensive content since 2004 with Netsweeper. **Segment:** Government **Number of Users**: 20 workstations **Region:** Ontario, Canada ***Case study is available.**
Logo not available (new logo)	**West Virginia Department of Education** In 2005, the State of West Virginia Department of Education implemented Netsweeper in the core of their network. Using a single policy solution to manage over 114,000 terminals, the State of West Virginia has successfully filtered inappropriate content while securing its network from http viruses. **Segment:** Education (Large state-wide network) **Number of Users:** 114,000 workstations (increasing to 130,000 in 2010) **Region:** West Virginia, United State

Appendix B - About Netsweeper

Netsweeper at a glance

Netsweeper Inc. is a privately owned corporation that develops and licenses the Netsweeper **Internet Content Filtering** and **Web Access Management** product line. Netsweeper works closely with our client-partners to provide solutions and implementations that address each partner's unique requirements. Netsweeper sells its solutions direct but also has distributors located around the world reselling various forms of the premium solution.

The Netsweeper application is designed to manage the Internet access and activity of Internet users around the world. Originally created as an alternative to the limited performance of the early filtering products that simply used word-blocking techniques and URL-blocking lists, Netsweeper was designed with the first automated and on demand content filtering categorization system. Netsweeper Inc. is the first Internet content filtering company to develop and use a form of hybrid "AI" (Artificial Intelligence) technology to scan content, assign content to categories, and update its filter system without human intervention in real-time.

We fully understand that the only way to meet the exponential challenges of Internet growth is to develop, create, and adapt technology to suit our partners and clients. Netsweeper Inc. continues to constantly raise the bar, making it the filter of choice with the best all-round performance, at a reasonable cost.

Quick Facts

Founded	1999
Headquarters	Canada's Technology Triangle, Waterloo Region, Canada.
Products	Network-based real-time, dynamic web content filtering and client filtering software
Markets	• Telcos/Carriers • Network Service Providers / Managed Service Providers • Education • OEM Filtering Providers • Enterprise and Public Sector Organisations

Competitive Differentiators	• Centralised WebAdmin console that enables IT resources to manage Internet access policies, system administration rights and reporting
	• Embedded threat scanning capabilities, capable of identifying and blocking web-borne viruses, spyware, malware and other forms of malicious code
	• Packet-level, real-time categorization of websites with Artificial Intelligence Engine and URL database containing over 3 billion classified URLs
	• Database management:
	  ○ Real-time updates and are provided every millisecond
	  ○ 8 – 10 Million new URLs are found and added to the

Competitive Differentiators	master database EACH DAY ○ Ongoing maintenance of existing information posted on pages of existing URLs listed in database • Proven to process high levels of throughput, suitable for national Telcos (300,000 request per second, 10 Gbps at BSNL with a total of 44 Gb with in-line solution) • Combination of client-server deployments ○ A single server to support both network and client ○ Netsweeper does not backhaul traffic ○ Netsweeper is a protocol solution as opposed to a proxy solution and a VPN is not required ○ Each request is logged and made available for reporting • Flexible deployment options ○ Netsweeper hosted ○ ISP and Telco hosted ○ Enterprise hosted ○ Netsweeper NS PROx appliance ○ Virtualization of Policy Server • Menu of network installations and deployment configurations ○ In-line ○ Bridge ○ Spoof packet ○ Tee-traffic ○ Integrated into 3rd party devices – routers, switches, appliances ○ Proxy (optional) both transparent and browser • Delegated administration controls with multi-levels of system operator access • Premium reporting ○ Set of canned reports with solution ○ Report wizard with multiple data inputs provides ability to create detailed custom reports ○ Reporting module scales to manage data from billions of requests • Perfected ability to identify anonymous proxies • Small footprint with low hardware requirements and other capital costs (low total cost solution) • Advanced OEM integration options ○ Access to back-end categorization technology only – nsConnect product) ○ Complete, branded, end-to-end solution with Web API enables OEM to sell as their 'own' solution

Appendix C - The Netsweeper Product Breakdown

Netsweeper's Internet content filtering includes the following basic components.

1) Netsweeper – An Internet Content Filtering and Web Access Management Solution
    a. ***WebAdmin*** – A web-based administration module that is used to manage all aspects of the Netsweeper platform including: creating policies, managing users, generating reports, updating system access rights, monitoring system usage, etc.
    b. ***Policy Server*** – Houses and matches web requests with category assignments and determines the 'allow' or 'deny' ruling based on the user's policy. Policy server will also house a cache of recently viewed URLs as a means to speed up request ruling process.
    c. ***Logger*** – The Logger is a service that records and writes all policy decisions to disk for each user request.
    d. ***Reporter*** – The Reporter will use data captured by the Logger to then generate scheduled or on-demand reports showing either general network statistics or individual usage.
    e. ***URL request Interceptor*** – With each URL request, a device or program is required to intercept the request prior to retrieving the desired content from the Internet. Netsweeper provides 2 versions of such a device as noted immediately below. However, Netsweeper can also integrate with other 3rd party devices which can act as interceptors. These may include: firewalls, routers, MS ISA server, Squid Proxy, Blue Coat cache, etc.
        i. ***Enterprise Filter*** – Residing in a network and typically placed at the gateway, the Enterprise Filter will intercept the Internet request, route the request information to the Policy Server which will in turn send the appropriate ruling, whether to allow or deny the request, back to the interceptor for request processing.
        ii. ***Client Filter*** – Residing on a client device (PC or laptop), the client filter will similarly intercept the Internet request, route the required information to the Policy Server and then process the request based on the decision made at the Policy Server level. (Note: We have various versions of the client filter as well.)
            1. ***Residential Edition*** – This version is sold via ISPs and other resellers serving the residential community. Client filter is a standalone product with a built in administration interface called the Profile Manager, which enables parents to control each user profile. (This is available for workstations operating Windows, Mac and Linux OS.)
            2. ***Enterprise Edition*** – This version is commonly deployed in a corporate, government or education setting where per user filtering and/or filtering of laptops is required. This version is deployed 'silently' with no user interface and simply intercepts traffic. (This is available for workstations operating Windows, Mac and Linux OS.)

2) Netsweeper Real-time Categorization Engine

At the core of Netsweeper's technology is an 'Artificial Intelligence Engine' that has been developed to scan and categorise the content posted on new web pages when found by any member of the global Netsweeper user community. As new pages are scanned, this AI engine will determine which category the content falls under and will then link the URL with the appropriate categorization information back to Netsweeper's network of global Category Naming Servers (CNS). This process takes merely seconds to perform. As a result, appropriate allow-deny decisions can be made in 'near real-time' despite the web page having never been reviewed before.

With millions of web pages being posted each day, this artificial intelligence engine has the capacity to keep pace with the massive growth of the Internet and its content. As a result of this industry leading technology, Netsweeper has accrued and strategically categorised over 3 billion URLs.

Appendix D - The Categorization Process

Netsweeper's unique architecture provides effective, flexible services-over-IP filtering through a series of Internet-connected servers that access one of the largest URL databases of any IP filtering provider. Netsweeper houses most of the filtering technology in secure and redundant locations, so an organisation needs only to set up a Netsweeper Policy Server and an Enterprise Filter to handle its unique network use and traffic flow requirements at a minimum.

(Netsweeper clients can now also opt to use Netsweeper's hosted environment or a Netsweeper NS PROx Web Filter Appliance to accomplish the same.)

The Internet is a constantly changing matrix of websites and services. Netsweeper was designed to respond immediately to surfing patterns and new sites. By design, the most commonly requested sites are already categorised and available in a cache as near the user as possible.

User to Integration Level

When a user makes an outgoing request to the Internet, the Netsweeper Enterprise Filter intercepts the request and asks the Policy Server for a ruling - whether to allow or deny the connection. The Policy Server must first categorise the outgoing request: Is it a protocol request or an HTTP request? For non-HTTP requests (such as messaging or file sharing), the Policy Server is always able to make the categorization itself. If it is an HTTP request, the Policy Server checks its own cache for the URL. If the URL is there, the Policy Server categorises the request.

Once categorised, to process the outgoing request and to respond to the Enterprise Filter, the Policy Server looks up the group policy associated with the user who made the outgoing request. Policies can be defined as blanket policies covering all users, groups of users, or an individual. (It is also possible to define different policies for different times of the day.) If the specific policy allows the outgoing request, the Enterprise Filter is told to process the request. If the specific policy does not allow the category of the outgoing request, the Enterprise Filter is instructed to return a deny page to the user.

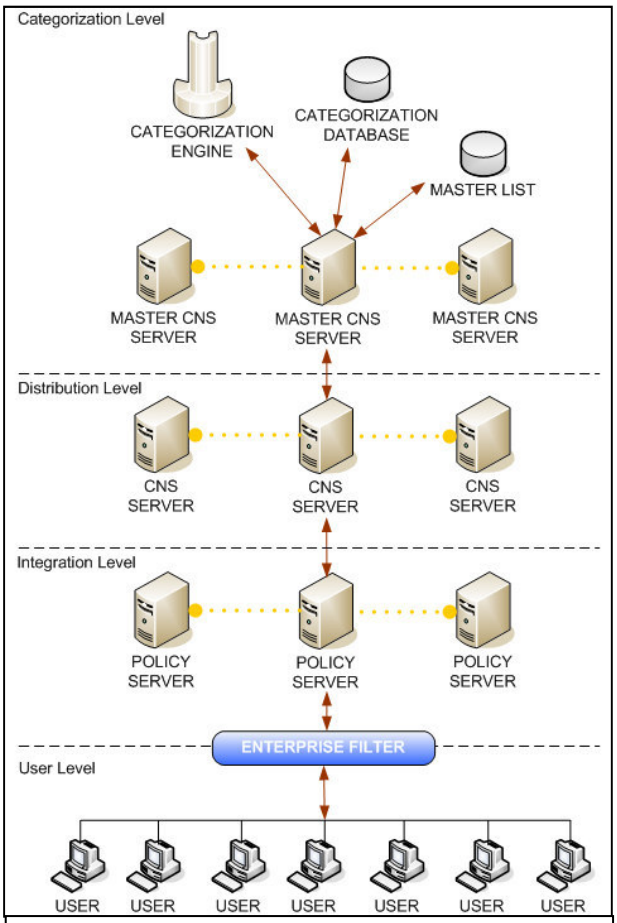


Figure 1: *URL Flow through Netsweeper Architecture* shows a simplified version of what happens when an outgoing URL request is made through a Netsweeper Enterprise Filter solution.

Integration to Distribution Level

If the Policy Server cannot locally categorise an HTTP request, it sends the URL to the Netsweeper Category Naming Server (CNS) asking for a category ruling. Like the Policy Server,

the Category Naming Server maintains a local cache of recently requested URLs and first looks here to assign a category to the URL. If the URL is in its cache, the CNS returns the category for the URL to the Policy Server. If the CNS does not have the requested URL's category in its cache, the CNS requests a category ruling for the URL from the Netsweeper Master Category Naming Server (Master CNS) and allows the request from the Policy Server to time out (default setting of time out is one second).

Normally, the Enterprise Filter and Policy Server are located within the client's network. The Category Naming Server is hosted on the Internet by Netsweeper. In certain circumstances, a CNS can be dedicated to a particular client or group of clients and may contain its own local URL list – for example, static allow/deny lists. On the request time out, the Policy Server proceeds to process the initial request from the Enterprise Filter using "New URL" as the category. Now having a category for the URL, the Policy Server looks up the ruling and responds to the Enterprise Filter to allow or deny. The Policy Server stores the URL in its cache with the category of No Category.

Distribution to Categorization Level

Continuing upstream, if the Master Category Naming Server does not have the URL in its own cache, it allows the CNS request to time out, which results in New URL being stored in the CNS cache. The Master CNS then requests a category ruling for the URL from the Categorization Database. If the URL is not in the Categorization Database, the Categorization Service sends the URL to the Categorization Engine for categorization and sets the category for the URL in its own cache to New URL.

The Categorization Engine is made up of a number of daemons/servers running over 800 processes; each processing URL categorization requests. Through this dedicated categorization process, the Categorization Engine reviews the Web page content from a request, and within milliseconds, assigns a category to it.

When the Categorization Engine receives a request, it retrieves the URL, parses the data, reports any found links to the Master Category Naming Server for their own category ruling, and proceeds to determine a category for the original URL request. Once it determines a category for the URL, it passes the data to the Master Category Name Server which updates the Categorization Database.

The Categorization Database is made up of several SQL database servers that balance the URL request load.

In Practice…

New URL is one of several special system categories. The administrator can set the filtering policy to allow or deny URLs with the New URL category (or other system categories) to tailor the overall response. For New URL categorizations, the servers (Policy, Categorization Name, Master Categorization Name) know to request a refresh the category for the URL (since the Categorization Engine will have properly categorised the URL at this point and updated the Categorization Database).

The entire Netsweeper categorization process—from initial outgoing Internet request for a URL never seen by the system before (worldwide) to Categorization Engine categorization and storage in the database—takes as little as one second and at most about five seconds,

depending on the global location of the network user and the speed of connection to the requested URL web server.

Users and administrators are able to request a human review of URLs—either to add a URL to a category, remove a URL from a category, or add a URL to multiple categories. All sites reviewed manually are immediately updated in the Categorization Database and are available to the Master Category Name Server. These sites/updates are also downloaded nightly to the Category Name Server and Policy Server caches.

Appendix E - Netsweeper – Proactive Web Security

Netsweeper's Web security provides a solution that detects zero-hour and known malware threats. By correlating a combination of current traffic and request trends, multiple detection technologies, automated machine-learning heuristics, and the industry's largest data set of web content, Netsweeper provides the most effective solution against new and known Web malicious content.

Netsweeper's signature-based scanning detects known Web malware residing on both reputable and uncategorized Web pages. As is expected in a signature based solution Netsweeper's solution utilises multiple anti-malware scan engines which cover all known spyware and viruses with regular updates hourly and immediate updates for outbreaks. Every new URL requested is automatically scanned utilising this engine and the current URLs in the database are regularly scanned to ensure their current legitimacy.

Netsweeper's heuristic engines utilise non-signature detection techniques and are based upon Artificial Intelligence engine technologies used to traverse the content and make decisions based upon thousands of inputs trained from years of collected information and trends.

However, utilising this signature-based scan engines, the heuristic detection engines and correlating this with the real-time trends of requests provides Netsweeper with an unparalleled advantage in providing zero-hour response.

Netsweeper systems filter approximately 3 million requests a second for information from around the world in multiple languages, multiple sectors and for multiple areas of information. Of this, nearly 10 million requests per day are for brand new URLs which have never been seen before. With over 10 years in operation, our database of current URLs is over 3 billion items giving Netsweeper an unrivalled view of demographically accurate web history and usage.

Netsweeper immediately sees outbreaks of malicious code through the trend of requests, independently of the initial vector of propagation. If a new SPAM message or IM chat traverses the Internet with an image, document or link sending users to a web based threat; the traditional approach of scanning at the endpoint has shown vulnerabilities with lagging signature updates, lack of worldwide visibility and little trend information. In this case, a correlation of the immediate rush of requests, the history and a real-time content analysis to this link will allow the Netsweeper heuristic engines to block the malicious content in real-time, before any of our customers get infected.