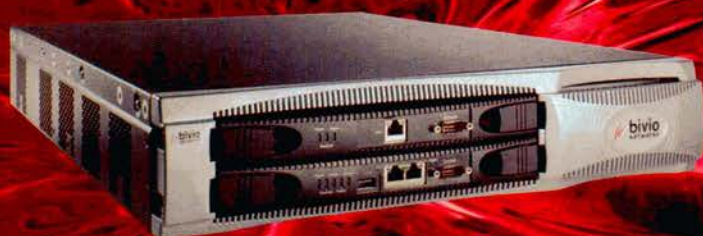


Bivio NCCS

Network Content Control System



A Cyber-Security Solution to Monitor, Control, and Block Unwanted Traffic

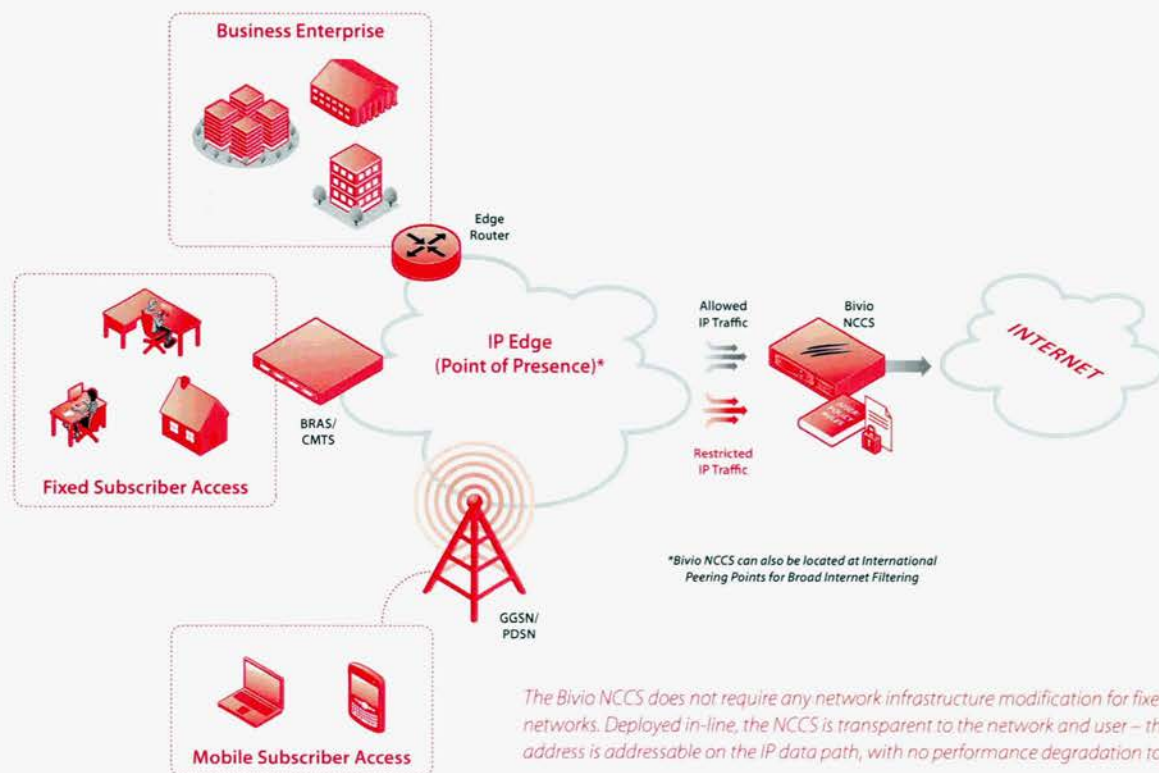
Bivio's Network Content Control System (NCCS) is the industry's leading integrated policy-based monitoring, content control and traffic enforcement solution. Until now, network and security administrators needed to deploy disparate single function devices to solve specific content enforcement problems such as URL filtering or traffic enforcement. Bivio NCCS has revolutionized the networking industry by delivering monitoring and control of all forms of IP traffic in one multi-function networking system.

The Bivio NCCS is a carrier-grade networking platform that utilizes advanced deep packet inspection (DPI) technology to deliver comprehensive network content control. Purpose-built for high-performance networks, the NCCS includes a rich set of functionality to identify, manage and control network traffic based on content, services, applications, protocols and users. Customers can easily deploy the Bivio NCCS to provide highly programmable traffic enforcement and web content control functionality to immediately protect and optimize their fixed and mobile network communications infrastructure.

Product Features

- Carrier-grade system combines web filtering and traffic enforcement for comprehensive network policy enforcement and cyber threat mitigation
- Innovative FlowInspect™ DPI Engine — Industry leading flow-state technology manages the 'state' of each IP flow and performs real-time correlation between the different flows for accurate traffic identification
- Auto-learns users' profiles by inspecting Radius packets for per-user policy enforcement, eliminating reliance on external provisioning servers
- High-performance web filtering delivers extensive coverage and accuracy
- Dynamic and uncategorized site analysis, including support of custom white list/black list
- VoIP signaling detection on a per call direction, per telephone number (E.164), and per ISP/IP-range basis for granular policy enforcement
- Ideal for both wireline and mobile deployments — Supports mobile IP communications and identification of network users with "Follow-Me" policy enforcement
- Dynamic libraries and plug-ins deliver up-to-date protocol and application fingerprints for current and future network traffic
- Reduces network complexity with in-line, standalone deployments, eliminating reliance on proxy servers

Bivio Network Content Control System



Network-Based Web Content Control and Traffic Enforcement

Managing today's complex network infrastructure presents many challenges to network and security administrators. First, they must effectively manage the continued growth in bandwidth-consuming IP communications (such as general Internet/Website traffic, Peer-to-Peer (P2P) file transfers, Skype, Instant Messaging (IM), VoIP, and YouTube) traversing their networks. Furthermore, they must ensure that IP traffic moving across the network complies with various regulatory or organization-approved network communication policies. Finally, since this same traffic often contains policy-prohibited content as well as malicious data (such as viruses, worms, phishing and other malware), network administrators must minimize the impact of cyber security threats.

If left unchecked, overall network performance is reduced, content management and control is diminished and there is increased vulnerability to cyber security attacks.

Responding to these challenges, the Bivio NCCS is the industry's leading integrated policy-based monitoring, content control and traffic enforcement solution. The NCCS is a standalone networking system that enables customers to provide granular web filtering and traffic enforcement on a per-protocol, per-flow, and per-user basis, all without requiring interaction with external devices.

FlowInspect™ DPI Engine – The Foundation for IP Traffic Monitoring & Control

At the core of the Bivio NCCS is a powerful and innovative deep packet inspection (DPI) engine, which leverages Bivio's long and successful history of combining complex processing at very high networking speeds with unlimited flexibility. These technologies enable full protocol and user awareness, along with fine-grained application and content differentiation. In addition, the DPI engine is used to provide auto-discovery of user-authentication protocols, eliminating the need to make external calls to provisioning servers, thereby greatly simplifying the deployment and management of the system. The result is a unique and powerful system that can be deployed inline to perform packet inspection, web content control and traffic enforcement on a completely standalone basis.

Web Content Control with True HTTP Filtering

The Bivio NCCS provides an advanced Internet filtering solution that not only includes traditional URL filtering but also protects the network communications infrastructure from malware and other emerging threats. NCCS includes mechanisms to control access to improper content, peer-to-peer (P2P) and chat usage, and other Web-centric applications.

A significant shortcoming of traditional proxy-based URL filtering systems is that only the traffic routed to the proxy servers can be filtered (ports 80, 8080, 443, etc.). The Bivio NCCS uses Bivio's advanced FlowInspect DPI Engine to filter HTTP traffic regardless of the port used by the service.

The Bivio NCCS web content control technology is based on a state-of-the-art URL categorization and content rating engine, supporting controlled access to any combination of over 80 website content categories, including many categories specific to sites optimized for viewing on wireless/mobile devices. With over 350 million URLs classified in over 20 languages, the Bivio NCCS provides coverage for the smallest regional to largest global deployments. Network administrators may also import custom whitelist and blacklist sites for specific enforcement concerns for comprehensive content control with fine-tuned precision.

Advanced features of NCCS include the ability to enforce policy based on the specific destination IP address, as well as supporting HTTP keyword matching and URI wildcards.

Transparent DNS Overriding

The Bivio NCCS incorporates a DNS overriding technology that can be used to block access to common tunneling/proxying techniques that may be employed by illicit hackers to circumvent network policy. In fact, the DNS overriding capability further permits transparent and accurate enforcement of site accessibility without modifying the general DNS server infrastructure configuration. This allows customers to easily conform with local government regulatory requirements while substituting an altered DNS response to the network user that does not identify the enforcement policy.

Traffic Enforcement for Today and the Future

With the rapid expansion of broadband applications, network providers are acutely aware that a significant amount of their network's bandwidth is consumed by traffic such as P2P, VoIP, YouTube, and more. Besides consuming a huge amount of bandwidth, this traffic may often contain malicious or restricted content, such as security threats or confidential data. In some cases, administrators may find that some services are overwhelming the network infrastructure at particular times of the day and causing dissatisfaction among network users.

The Bivio NCCS, powered by Bivio's advanced FlowInspect DPI Engine, provides full visibility and control of all users accessing the network, the types of traffic they can transmit and services they can access. Network administrators can use the NCCS to accurately identify and manage traffic flows based on specific applications, protocols and users.

As networking is very dynamic, one of the major challenges of network traffic enforcement is the ever-changing application and protocol signatures that are used to identify an application within a specific traffic flow. Bivio has overcome this challenge with a unique capability of the Bivio NCCS that addresses frequently changing protocol versions and enhancements. As new protocols and applications emerge, dynamic libraries on the NCCS are updated so that analysis and identification continues uninterrupted. Unclassified traffic flows are also managed to eliminate potential network threats.

VoIP Identification, Control and Blocking

Another characteristic of the Bivio NCCS traffic enforcement functionality is the ability to classify, identify and control VoIP traffic flows, enabling administrators to apply flexible and granular policies in full compliance with their network control, cyber security and regulatory goals. The NCCS combines different key technologies to enforce VoIP traffic policy:

- Flow marking based on the 5-tuple of IP addresses, protocol and port numbers, with flow-state information maintained in memory;
- Heuristic mapping to control/block identified traffic based on Super-Node (SN) knowledge.

Analysis, identification, reporting and control of users VoIP services provides valuable user statistics and information that enable compliance with internally developed or regulatory mandated policies. This unique approach makes the Bivio NCCS the ideal solution to detect, block and provide maximum accuracy in managing Skype and other P2P VoIP traffic.

Mobile-Ready Content Control for Carriers

Today's mobile user introduces new complexity for carriers who are enforcing web content policy. User IP addresses can change from device to device or location to location, making it difficult to identify and maintain user policy. The Bivio NCCS is mobile-ready, with built-in support for mobile broadband networks. Key highlights for NCCS mobile deployments include:

- Identification of actual user/IP source for WAP requests, coming from the WAP Gateway
- Filtering rules follow the user on different devices
- Supports mobile data description languages
- Built-in load balancing features ensure scalability even in distributed mobile networks

Bivio's Network Content Control System – The Best Solution for Wireline and Mobile Network Awareness and Control

The Bivio NCCS delivers web content control and traffic enforcement functionality for customers to protect and optimize their fixed and mobile network communications infrastructure. Completely self-contained and capable of operating transparently inline, the NCCS can be deployed at any location, such as the data center, Internet gateway, or point of presence (POP).



The Bivio NCCS is a carrier grade system designed to create, manage, control and enforce usage policies for a variety of Internet services, present and future, on a per-user basis. Operating transparently inline, the NCCS can be scaled to support 10 Gbps network throughput and higher.

Bivio Network Content Control System

Specifications

Bivio NCCS Models

- Network Edition (NCCS-NE) – Universal, network-wide policy enforcement
- Subscriber Edition (NCCS-SE) – Granular, per-user policy enforcement

System Performance

- NCC7512: Up to 2 Gbps
- NCC7562: Up to 6 Gbps
- Integrated system scaling support up to 10 Gbps

Advanced System Features

- Transparent inline mode
- Passive sniffing mode when used with TAP or SPAN port
- High-performance scaling technology for application & network processing scaling

High Availability

- Optional Active/Active and Active/Standby configurations
- Inline (LAN bypass) failopen
- Failure-adaptive load balancing
- Dual redundant hard drives with RAID-1 support
- Dual redundant hot swap power supplies

Operating System

- Linux 2.6
- BiviOS™ and APIs for system interface

Traffic Management and DPI

- Classification and load balancing on a per-flow basis
- 802.1q VLAN support
- Multi-level MPLS support
- Jumbo packets to 9KB
- FlowInspect™ DPI Engine

Web Content Control

- Over 350 million URLs classified in over 20 languages
- 80 database categories
- Database updates in 24 hour intervals
- Support for over 20 languages
- Performance: >100,000 HTTP reqs/sec
- Concurrent sessions: >8,000,000 unidirectional

Traffic Enforcement

- Support for standard Internet Applications/Protocols including HTTP, FTP, SMTP, POP3, Telnet
- Example P2P protocols include eDonkey/eMule, Gnutella, Kazaa, Bittorrent (encrypted/unencrypted)
- Example VoIP protocols include H.323, SIP, Skype, Google Talk, MSN, IAX/IAX2, MGCP, H.248/Megaco
- Tunneling and Obfuscation: TOR, Proxyfy, OpenVPN, PPTP, VTun, SSL/TLS, IPsec
- Ethernet Wrapping: Ethernet, MPLS, VLAN, QnQ, L2TP

Network Interface Modules (Up to 2 per chassis)

- 2-port and 4-port 10 Gigabit Ethernet (10GBASE-SR or 10GBASE-LR)
- 8-port Gigabit Ethernet (10/100/1000BASE-T)
- 6-port Gigabit Ethernet (1000BASE-SX or 1000BASE-LX)

Regulatory & Environmental

- FCC Part 15 Class A, TUV, CE, VCCI, BSMI, CISPR, ICES, CTick, MIC, GS
- RoHS Directive 2002/95/EC (EU)

Electrical

- Dual redundant AC power supply (100-240V, 50-60Hz)
- Dual redundant DC power supply (-36 to -72 VDC) [optional]

Physical

- Weight: 45 lbs
- Dimensions: 3.5" (9cm) H x 17" (43cm) W x 24" (61cm) D [2U rack height, standard 19" rack-mountable]

Operating Conditions

- Power: 600W nominal
- Operating Temperature: 0-40C (32-104F)
- Relative Humidity: 10%-90% non-condensing

About Bivio Networks

Bivio Networks is a leading provider of network systems for securing, monitoring and controlling critical network infrastructure. Bivio's global customer base includes worldwide government agencies and service providers. Its product suite enables its customers and partners, which include application developers and systems integrators, to develop and deploy leading solutions to secure monitor and control customer networks. Bivio is privately held and headquartered in the San Francisco Bay area with office locations worldwide. More information is available at www.bivio.net.

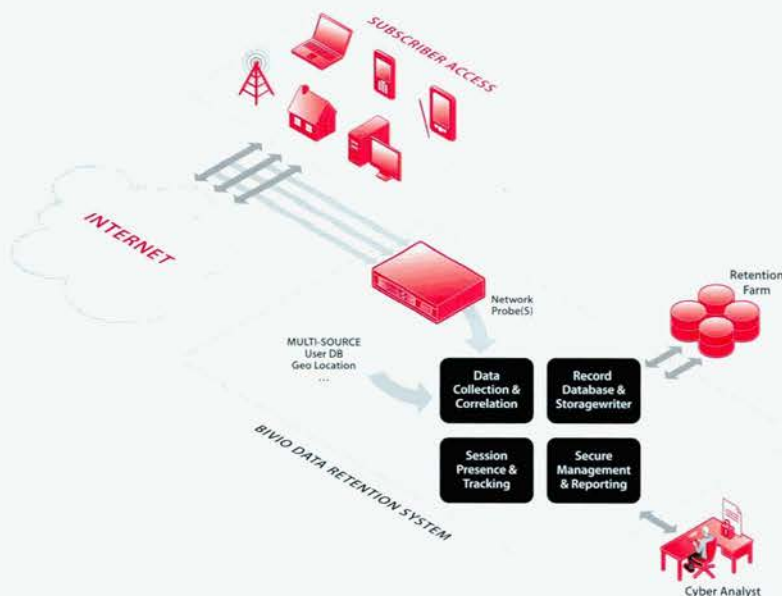


Bivio Data Retention System

Real time actionable intelligence

The Bivio Data Retention System (DRS) is a high-performance data collection and retention system that allows network operators and government agencies to strengthen cyber security operations across fixed and mobile network infrastructures. The system correlates network flow records with online and offline data sources to provide contextualized information intelligence which cyber analysts can use to detect and respond to complex security threats.

Bivio DRS provides a key piece of a comprehensive cyber investigative strategy, enabling investigators to rapidly detect, analyze and react to complex security threats originating from or traversing the cyber realm. Through the integration of extremely efficient multi-domain record correlation technology, Bivio DRS delivers actionable intelligence that far exceeds the capabilities of existing data recording and packet capture systems.



Scalable Architecture

Bivio DRS uses a distributed scalable architecture to manage high volume data collection. The system consists of five different functional elements:

- Multi-domain network probe with DPI-based data extraction engine
- Secure, high-performance Data Collection and Correlation (DCC) engine
- Performance-optimized Record Database and StorageWriter (RDSW) module
- Synchronized Session Presence and Tracking (SPT) engine
- Secure Management and Reporting (SMR) interface

Bivio DRS integrates directly with industry-leading network storage systems to maximize deployment options.

Bivio DRS Features

- Real-time multi-source record correlation
- 10 Gbps DPI-based network probing enabling application and user context extraction
- Mobile-specific protocol support (WiMax, 3G, 4G/LTE) for wireless network integration
- High-performance record database
- External interfaces for custom data mining and event triggering

Bivio Data Retention System

Bivio DRS Architecture

Existing cyber investigative data retention solutions focus primarily on collecting data from a specific source, for example call data records (CDRs), IP data records (IPDRs) or server activity logs. Through their inherently linear nature, these existing solutions limit the ability of network analysts to develop a complete view of activity and potential threats.

Data retention solutions that are designed to record or collect as much network data as possible result in storing enormous amounts of unrelated, sequential flow data. This leaves network analysts with the task of sorting through records to find relevant or related communication streams, a process which can consume weeks of intense investigative effort.

In contrast to the existing solutions, Bivio DRS is able to correlate and store structured data. Bivio's innovative technology links related pieces of data to form a single record that represents the full context of the collected information. This information enables rich data mining for powerful cyber investigative operations.

Multi-domain network probe

A core component of Bivio DRS is a 10 Gbps network probe that utilizes a high-performance layer 7 engine to extract key flow information including specific user, protocol and application information. Bivio network probes can be distributed across multiple domains, supporting both wired and mobile (WiMax, 3G, 4G/LTE) protocols, to broaden the scope of investigative activity.

Data Collection and Correlation (DCC)

The Data Collection and Correlation (DCC) engine performs several critical functions in the Bivio DRS including aggregating flow records from multiple data sources and creating context-based data relationships of the user activity streams. The formation of these datasets provides information-rich intelligence that optimizes the retention and analysis functions of the system.

Record Database and StorageWriter (RDSW)

The multi-dimensional datasets created by the DCC are collected and securely stored by the Record Database and StorageWriter (RDSW) module using high-capacity data storage algorithms that are optimized for fast search and retrieval. This module is personalized to integrate directly with industry-leading network storage systems to offer flexible deployment options.

Session Presence and Tracking (SPT)

The Bivio DRS Session Presence and Tracking (SPT) engine provides overall synchronization of the communication sessions and information datasets. The SPT engine allows administrators to implement retention archiving, protection and deletion policies for overall system and storage management.

Secure Management and Reporting (SMR)

Bivio DRS is managed through the Secure Management and Reporting (SMR) interface. This function provides access to Bivio DRS data and reports based on user and group level privileges, including system-level authorization and auditing capabilities.

Dynamic Triggering

In addition to providing historical analysis of retained usage data, Bivio DRS includes innovative dynamic triggering technology that can initiate real-time actions throughout the collection, storage and retrieval process. This powerful capability is easily customized using an open scripting mechanism, and can immediately alert analysts or enable instant threat mitigation action based upon the real-time front-end data collection process.

Bivio DRS Delivers Actionable Intelligence

The Bivio Data Retention System empowers cyber analysts to leverage contextualized information faster than ever before through real time data collection and correlation. This ability enables government authorities such as law enforcement (LEA) and public safety agencies to rapidly detect, analyze and react to cyber security threats.

About Bivio Networks

Bivio Networks is a leading provider of network systems for securing, monitoring and controlling critical network infrastructure. Bivio's global customer base includes worldwide government agencies and service providers. Its product suite enables its customers and partners, which include application developers and systems integrators, to develop and deploy leading solutions to secure monitor and control customer networks. Bivio is privately held and headquartered in the San Francisco Bay area with office locations worldwide. More information is available at www.bivio.net.

© 2010 Bivio Networks, Inc. All rights reserved. The Bivio logo, BivioOS, Bivio 7000, Bivio 7100, and Bivio 7500 are trademarks or registered trademarks of Bivio Networks, Inc. All other company and product names may be trademarks of their respective owners. Bivio Networks may make changes to specifications and product descriptions at any time, without notice. P/N: GA1010-62000-00026 Rev 1



Bivio Networks, Inc.
4457 Willow Road, Suite 200
Pleasanton, CA 94588
Tel: +1 925.924.8600
Fax: +1 925.924.8650
www.bivio.net

Applications Brief: Network Security Solution

Network Security Solution

Today's Network IT and Security Managers want to deploy world-class network security solutions that leverage SNORT® IDS and other open source network security applications.

This, however, is not always an easy task. Between having to implement multiple applications and dealing with the constraints of existing server platforms, implementing a comprehensive network security open source solution on high performance, 10 Gbps platforms have been a challenge for Network IT and Security Managers.

Bivio Networks has significantly reduced the time, effort and resources required to identify and leverage a complete open source network security solution. Through a rigorous certification program, Bivio has bundled a compelling package of open-source network security applications — Snort®, YAF, Barnyard, SiLK, and Arpwatch — to provide a superior network security solution without compromising performance or flexibility. By executing this package of applications, Network IT and Security Managers can use Snort® to identify intrusions and Barnyard to unify the Snort® alerts. In parallel, they can deploy YAF in conjunction with SiLK to provide a full-featured flow record generator. Finally, Arpwatch provides a powerful low level method of detecting Ethernet/IP addressing anomalies.

Bivio Networks is shattering the belief that 10 Gbps performance and open-source packet processing applications are incompatible. By certifying this security application suite on our Bivio 7000 Series DPI Application Platform, Bivio Networks bridges open source applications and 10 Gbps networking with no compromise in performance.

Bivio's open source solutions can be easily downloaded from Bivio's Application Library found at www.bivio.net — or can be factory installed onto our Bivio 7000 at time of shipment.

Features and Benefits

- **A Complete Solution**

A pre-packaged bundle of open source network security applications delivering IDS, alert processing, packet flow formatting, packet flow analysis, and monitoring: **SNORT®, YAF, Barnyard, SiLK, Arpwatch**

- **Bivio 7000 Series Certified**

Tested and certified on the Bivio Networks 10 Gbps DPI Application Platform.

- **Easy Access**

Applications are downloadable from Bivio's Application Library found at www.bivio.net or can be Bivio factory installed onto the Bivio 7000 at time of shipment. Contact sales@bivio.net.

- **Easy Installation & Start-Up**

Applications ship in a complete package that includes all the software files, documents and configuration files native to the open source software. In addition, Bivio includes initialization scripts to simplify and ease implementation.



Application Brief: Network Security Solution

Open Source Network Security Solution

The Network Security Solution consists of five complementary open-source applications: Snort®, YAF, Barnyard, SiLK, and Arpwatch. These applications may be used individually, or they may be used in conjunction with each other to create a compelling suite of security services.

Application	Purpose	Description
Snort®	Passive Intrusion Detection Active Inline Prevention	Snort® offers both inline and passive intrusion solutions. Snort® uses rule-based mechanisms to provide detection of anomalies through layer 7 protocol analysis techniques.
Barnyard	Alert Processor for Snort® IDS Engine	Barnyard is a companion application for Snort®, designed to offload the output processing task by parsing Snort®'s unified output format into textual or database alerts.
SiLK	Flow Analysis Engine	SiLK is a flow analysis toolset. SiLK allows administrators to analyze their network traffic, both in real time and with a historical view.
YAF	Flow Analysis Sensor IPFIX data generator	YAF processes packet flows into IPFIX format for later analysis.
Arpwatch	ARP monitoring tool	Arpwatch maintains a relationship database between hardware and software network addresses, alerting on modifications to the database.

The installation package that Bivio ships includes all of the software files, documents and configuration files native to the open source software. In addition, Bivio includes initialization scripts to simplify and ease implementation. The scripts allow the open source application to seamlessly integrate into the operating environment on the Bivio platform (named BiviOS). BiviOS provides additional control over the application, enabling users to optimize the runtime configurations on the system. Additionally, BiviOS provides mechanisms to ensure that the applications are always running even when a failure occurs.

The Hardware

The Bivio 7000 Series of DPI Application Platforms is a family of compact, extremely high-performance, and fully programmable network appliances that combine a unique packet processing hardware architecture with a software platform that includes a standard Linux-based execution environment and a comprehensive set of networking features. Bivio's DPI Application Platforms deliver uncompromising performance and unmatched flexibility.

Benefits

- **True Wire-Speed, 10 Gbps Performance**

A state-of-the-art high-performance architecture ensures that all deep packet handling services on all interfaces are processed and forwarded at line rate for all packet sizes.

- **Standard Linux Environment**

The network appliance platform is shipped with a pre-ported, standard Linux distribution with full Linux API compatibility to ensure rapid development.

- **High Availability**

Bivio 7000 Series Platforms support redundant system configurations to deliver non-stop mission-critical services.

- **Network Connectivity with Hardware Bypass**

A selection of industry-standard network interfaces provide programmable fail-open support for copper or fiber cabling.

- **Scalable Processing & Performance**

Multiple platforms may be stacked to deliver unprecedented application performance and throughput.

About Bivio Networks

Bivio Networks is a leading provider of network systems for securing, monitoring and controlling critical network infrastructure. Bivio's global customer base includes worldwide government agencies and service providers. Its product suite enables its customers and partners, which include application developers and systems integrators, to develop and deploy leading solutions to secure, monitor and control customer networks. Bivio is privately held and headquartered in the San Francisco Bay area with office locations worldwide. More information is available at www.bivio.net.



Bivio Application Library Overview

Today's Network IT and Security Managers want to implement world-class third-party and open source applications for network security, network flow analysis, and other mission critical monitoring and control solution. Applications such as SNORT, YAF, SiLK, Barnyard and Bro are excellent open source applications available for global network deployment. In addition to typically free distribution, the leading open source applications are readily supported by a community of experienced users.

Bivio Networks has significantly reduced the time, effort and resources required to identify and leverage a complete open source solution. Through a rigorous certification program, Bivio has certified a number of leading open source applications as well as pre-packaged a set of applications specifically to help IT and Security Managers deploy network security and network flow analysis solutions without compromising performance or flexibility.

Open source applications and bundled solutions can be easily downloaded from Bivio's Application Library found at www.bivio.net — or can be factory installed onto the Bivio 7000 at time of shipment.

The RPM packages that Bivio ships include all of the software files, documents and configuration files native to the open source software. In addition, Bivio includes application profiles and initialization scripts to simplify and ease implementation.

Bivio Networks is shattering the belief that 10 Gbps performance and open-source packet processing applications are incompatible. By certifying this application suite on our Bivio 7000 Series DPI Application Platform, Bivio Networks bridges open source applications and 10 Gbps networking with no compromise in performance.

Features and Benefits

- **The Leading Open Source Applications**
Open source network security and network flow analysis applications delivering IDS, alert processing, packet flow formatting, packet flow analysis, and monitoring: **SNORT, YAF, Barnyard, SiLK, Arpwatch, Bro, nProbe, nTop, SANCN, Squid, TCPdump, Argus**
- **Bivio 7000 Series Certified**
Tested and certified on the Bivio Networks 10 Gbps DPI Application Platform.
- **Easy Access, Implementation & Start-Up**
Applications are downloadable from Bivio's Application Library found at www.bivio.net or can be Bivio factory installed onto the Bivio 7000 at time of shipment. Contact sales@bivio.net



Bivio Application Library Overview

Open Source Applications

Application	Purpose	Description
Snort®	Passive Intrusion Detection Active Inline Prevention	IDS application using signature-based analysis
Bro	Passive Intrusion Detection Active Inline Prevention	IDS application using event-oriented analysis
SANCP	Connection Profiler	Create network connection and traffic logs for auditing, historical analysis, and network activity discovery
TCPdump	Packet Capture	Open source tool for capturing and analyzing packets
nProbe	NetFlow Collector	Netflow collector application for gigabit networks
nTop	GUI for network metrics	Hierarchical graphical display for network usage metrics
Squid	Web Proxy	Web caching proxy for HTTP, HTTPS, FTP, etc. Reduces bandwidth and improves response times
Barnyard	Alert Processor for Snort®	Offload the output processing task by parsing the Snort® unified output format into textual or database alerts.
SiLK	Flow Analysis Engine	Historic and real time analysis of network traffic
YAF	Flow Analysis Sensor	Processes packet flows into IPFIX format for later analysis
Arpwatch	ARP monitoring tool	Alerting on modifications to ARP tables
Argus	System & Network Monitoring	System and network monitoring application with flexible alerting and easy-to-use web interface

The Hardware

The Bivio 7000 Series of DPI Application Platforms is a family of compact, extremely high-performance, and fully programmable network appliances that combine a unique packet processing hardware architecture with a software platform that includes a standard Linux-based execution environment and a comprehensive set of networking features. Bivio's DPI Application Platforms deliver uncompromising performance and unmatched flexibility.

Benefits

- **True Wire-Speed, 10 Gbps Performance**
A state-of-the-art high-performance architecture ensures that all deep packet handling services on all interfaces are processed and forwarded at line rate for all packet sizes.
- **Standard Linux Environment**
The network appliance platform is shipped with a pre-ported, standard Linux distribution with full Linux API compatibility to ensure rapid development.
- **High Availability**
Bivio 7000 Series Platforms support redundant system configurations to deliver non-stop mission-critical services.
- **Network Connectivity with Hardware Bypass**
A selection of industry-standard network interfaces provide programmable fail-open support for copper or fiber cabling.
- **Scalable Processing & Performance**
Multiple platforms may be stacked to deliver unprecedented application performance and throughput.

About Bivio Networks

Bivio Networks is dedicated to providing leading networking systems for deep packet inspection (DPI) networking applications and services. The company's products support a wide range of customer solutions, including network security, monitoring and surveillance, traffic management, content-based processing, value-added Web 2.0 applications and services, and many other DPI-based networking applications. Bivio's global customer base includes worldwide government agencies, service providers, leading DPI-based application developers, and systems integrators. Bivio is privately-held and is headquartered in the San Francisco Bay Area with office locations worldwide. More information is available at www.bivio.net.



Bivio 7000 Series™

DPI Application Platform



Features and Benefits

- **True Wire-Speed, 10 Gbps Performance**

State-of-the-art high-performance architecture ensures all deep packet handling services on all interfaces are processed and forwarded at line rate for all packet sizes.

- **Standard Linux Environment**

Network appliance is shipped with a pre-ported, standard Linux distribution with full Linux API compatibility to ensure rapid development.

- **High Availability**

Bivio 7000 Series platforms support redundant system configurations to deliver non-stop mission-critical services.

- **Network Connectivity with Hardware Bypass**

A selection of industry-standard network interfaces provide programmable fail-open support for copper or fiber cabling.

- **Scalable Processing & Performance**

Multiple platforms may be stacked to deliver unprecedented application performance and throughput.

10 Gigabit Deep Packet Processing

Bivio's DPI Application Platforms, the Bivio 7000 Series, are a family of compact, extremely high-performance, and fully programmable network appliances that combine a unique packet processing hardware architecture with a software platform that includes a standard Linux-based execution environment and a comprehensive set of networking features. Designed specifically to provide wire speed deep packet processing, the Bivio 7000 Series architecture fuses Network Processing components with Application Processing CPUs to deliver uncompromising performance and unmatched flexibility. The platform family includes two main product groups that provide performance optimized features to deliver true line rate packet processing from 4 Gbps to more than 10 Gbps throughput using seamless scaling technology.

The Bivio 7000 Series platforms are fully programmable systems that allow any Linux-based networking application to run on the appliance with little or no porting effort. By basing the platforms on a standard, pre-ported Linux distribution with full API compatibility, software developers can quickly and easily run applications within hours of unpacking the device. A rich set of software infrastructure components further allow developers to quickly realize advanced capabilities of the platform including robust traffic management, load distribution across the multiple Application Processor CPUs, high availability and system management integration.

Deploying solutions on Bivio 7000 Series platforms allow customers to achieve disruptive improvements in deep packet inspection and processing performance, systems cost, reliability, and scalability for their open source, commercial and custom developed solutions. Bivio platforms are ideal for a wide range of applications such as cybersecurity, content management, policy enforcement, and network intelligence.

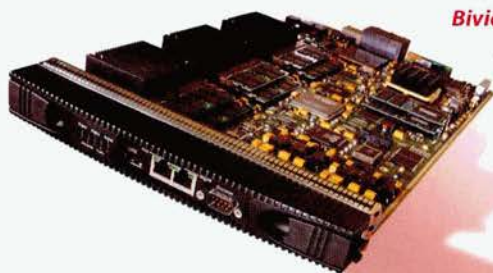
System Architecture

The Bivio 7000 Series platform family includes two main product groups, the Bivio 7100 and Bivio 7500. All platforms employ a common system architecture that is optimized by model for a range of performance tiers. The major hardware features include a multi-threaded network processor, multiple dual-core application processors, high-capacity Network Interface Modules (NIMs), and a high-performance communication fabric that accommodates full wire-speed data rates between processors.

The separation of application-level processing from network layer processing is fundamental to the Bivio system architecture. All platform models include a high-performance Network Processor Card (NPC) featuring a multi-core, XLR™ Processor that provides hardware packet manipulation at line rate for all packet sizes. A standard Linux execution environment allows applications to easily leverage performance-enhancing functions of the Network Processor such as fast path acceleration, or blocking of packets at the network layer. In addition, the NPC implements system management functionality through a dedicated processor that communicates to all processors on a private control network.

Application Processors (APs) in the platform architecture are fully parallelized CPU subsystems that host Linux networking application(s). Each AP subsystem employs dual-core processor technology designed so that each processor core includes independent memory and offload acceleration slots. Two dual-core APs are included on the NPC board, and Bivio 7500 models allow performance scaling by adding Application Processor Cards (APCs) to provide an additional four APs per APC to the platform through the high-performance fabric interconnect.

Bivio 7000 Series platforms support dual redundant hot-swap power supplies and dual hard drives that can be configured in RAID-1 redundancy. The system chassis is a carrier-grade 2U rack mount appliance with optimized airflow and thermal management.



**Bivio 7000 Network
Processor Card**

Network Connectivity with Programmable Bypass

Network Interface Modules (NIMs) simplify the connection of the Bivio 7000 Series Network Appliance Platforms to a variety of industry standard network interfaces. The platform includes two NIM slots that are populated with the appropriate type and number of interfaces required for each installation without impacting the appliance system architecture.

Many network topologies require failsafe protection from devices that are installed as "in-line" elements on the network. This requirement guarantees that an equipment failure will not cause a network outage or loss of connectivity. This requirement may be met by deploying systems in redundant failover configurations or by providing hardware bypass circuits on the network interface ports.

Bivio 7000 Series NIMs are designed with software-programmable bypass circuits so that in the event of a power failure or other system fault, the bypass ports will fail "open", allowing network traffic to pass uninterrupted through the NIM. The failopen occurs between paired ports on the same NIM. This feature allows the network appliance to be placed directly in-line in the network topology without adding additional switches or routers when used in a transparent mode deployment.

Scalable Processing & Performance

The Bivio 7500 architecture includes the capability to stack multiple platforms using unique scaling technology that delivers unprecedented application performance and throughput for multiple 10 Gbps links—all managed as a single logical system. Chassis may be stacked with additional APCs to provide additional application performance, NPCs for greater system throughput on multi 10G links, or a combination of both NPCs and APCs. NPC scaling also provides greater I/O capacity to the system if required.

High Availability (HA)

The Bivio 7000 Series Network Appliance Platforms provide numerous HA system features that eliminate any single points of failure to deliver non-stop mission-critical services. Standard system HA features include dual redundant hot-swap power supplies, dual redundant hard drives with RAID-1, internal redundancy of Application Processors with failure-adaptive load balancing, and software- and hardware-based failopen (bypass) network interfaces. Additional HA capabilities are also supported including external system redundancy configurations, and an independent management processor with an isolated control network and management port. The Bivio architecture ensures sufficient resources for each application even at full line rate processing.

BiviOS™ Software

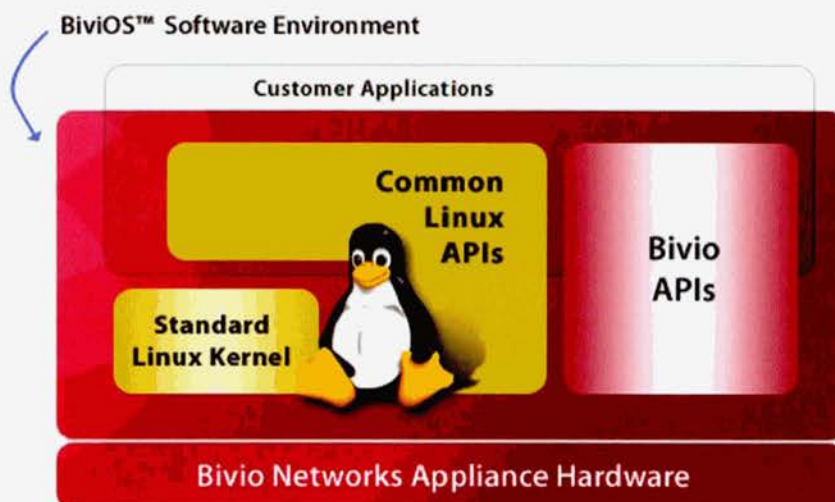
At the foundation of the Bivio platform is a standard Linux execution environment that allows any Linux-based networking application to run on the appliance with little porting effort. The Bivio software environment is called BiviOS™ and includes a comprehensive set of networking and management features in addition to the Linux kernel and common APIs.

By basing the Bivio network appliance on a standard, pre-ported Linux distribution with full API compatibility, software developers can quickly and easily run applications within hours of unpacking the device. BiviOS™ is transparent to the programmer but immediately allows applications to take full advantage of the performance, flexibility, and scalability inherent in the Bivio 7000 Series platforms.

BiviOS™ also supports a rich set of software infrastructure components that allow developers to quickly realize advanced capabilities of the Bivio network appliance. These components provide a variety of critical services including robust traffic management and load distribution across the multiple Application Processor CPUs. Bivio Application Programming Interfaces (APIs) enable further customization and optimization of the Bivio architecture to the specific application requirements.

Traffic Modes

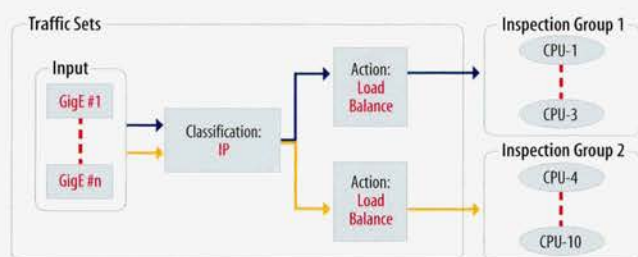
All Bivio 7000 Series platforms can be configured to support either of two traffic modes: transparent mode or mixed mode. Transparent mode supports traditional inline or "sniff" behavior, as all network interfaces are configured with no IP address and the platform appears invisible, or like a wire, to the network devices on either side. Mixed mode allows configurations to be used where some interfaces are in transparent mode, and some (or even all) interfaces are in gateway or "routed" mode. In gateway



mode packets must be routed through the platform as if it was a router, and each interface is on a different subnet, has a unique IP address, and is independently addressable from outside the appliance.

Policy-Based Load Distribution

Traffic distribution in the Bivio network appliance is based on innovative load balancing algorithms that are managed by Configurable Inspection Groups (CIG). CIG is the foundation for expanding the platform into multiple virtual systems and consolidating complimentary applications on a single network appliance. The basic function of CIG is to bind specific interfaces to classification policies and distribute incoming traffic to the assigned computational resources according to the classification. In the example diagram, IP traffic is classified into two groups which are then load balanced among a dedicated Inspection Group, or group of Application Processors. Different applications or configurations can be run on different Inspection Groups, allowing complete flexibility in applying the platform's resources to different tasks.



Advanced Modes

The default operation of the Bivio network appliance is to load balance all traffic from the network interfaces across all Application Processors. Although this configuration is sufficient for many inline and transparent network applications, the Bivio platform can be easily configured to support advanced network operations in multiple traffic modes.

- **Inline Tap Mode:** In this mode, the platform operates as a transparent inline device while packets are being copied from the "wire" to the application. Therefore, packets can be sniffed at wire speed and without the need for mirror-ports on a switch.

- **Parallel-Processing with Packet Copy:** Sometimes, different applications need to inspect the same packet, but would normally experience resource contention when running on the same processor or shared memory. The Bivio platform avoids these resource contentions by copying packets in hardware to parallel applications without sacrificing throughput or latency. The scalable processing architecture ensures sufficient resources for each application even at full line rate processing.
- **Network-Layer CPU-Offload:** In this mode the Application decides which flows to process at the Application Layer and which ones to off-load to the programmable Network Layer. This functionality significantly increases the effective capacity of the device. For latency sensitive traffic like VoIP and multimedia, applications can tap into control flows while data flows get forwarded on an accelerated inline path through the network layer, thereby keeping data path latencies at an absolute minimum.

Bivio APIs

Bivio APIs enable system developers to utilize several advanced capabilities of the Bivio architecture as well as offer unique value-added capabilities for custom product differentiation. Bivio APIs include advanced capabilities for traffic modes, system scaling, management and high availability functions on the Bivio network appliance.

Management

The Bivio platform supports a command line interface (CLI) as well as a web-based graphical user interface (GUI). The Bivio CLI provides auto-completion, tab completion, command history and context-sensitive help.

Managing the Bivio platform through a web GUI is accomplished by using the Bivio Systems Management Center (SMC). Bivio SMC is a comprehensive centralized management system that simplifies the deployment and maintenance of Bivio platforms and cyber security solutions. Fully-integrated as a hardened, rack mount appliance, the Bivio SMC provides complete Fault, Configuration, Accounting, Performance and Security (FCAPS) functionality for network administrators to easily manage and maintain any number of Bivio systems using a highly scalable client/server architecture.

Bivio 7000 Series DPI Application Platforms

Specifications

Platform Features	B7132	B7134	B7512	B7514	B7562	B7564
System Performance	4 Gbps		4 Gbps		10 Gbps	
Network Processor Type (# cores)	XLR732 (8)		XLR732 (8)			
NPU Memory (DDR2)	4 GB		4 GB			
# Application Processor Cores	4		4		12	
AP Memory (DDR2)	8 GB	16 GB	8 GB	16 GB	24 GB	48 GB
Scalable Processing Capability	No		Yes			
Mgmt Processor Memory (DDR2)	4 GB	8 GB	4 GB	8 GB	4 GB	8 GB
Storage Technology	SATA		SAS or SATA			
Redundant Power Supplies, Hot Swap, 100-240 VAC, 50-60 Hz	Dual 600W		Dual 600W (optional DC PSUs)			

Operating System and Networking Features

- Linux 2.6, hardened
- Bivio API system interfaces
- 802.1q VLAN support
- Multi-level MPLS support
- Jumbo packets to 9KB
- IPv6 support

Network Management Features

- In-band or Out-of-band CLI with telnet SSH or console support
- XML and EJB extensibility
- SNMPv2c, SNMPv3
- Alarm detection and reporting
- Real time statistics reporting and logging
- Software versioning and upgrade infrastructure
- Complete MIB support
- GUI-based centralized monitoring & management via Systems Management Center (Bivio SMC)

High Availability Features

- 1:N system redundancy
- Active/Active and Active/Standby with non-stop system operation
- Inline (LAN bypass) failopen
- Failure-adaptive load balancing
- Dual redundant hard drives with RAID-1 support
- Dual redundant hot swap power supplies

Network Interface Modules

- Up to 2 NIMs per chassis
- All NIMs include programmable hardware bypass
 - 2-port and 4-port 10 Gigabit Ethernet (10GBASE-SR or 10GBASE-LR)
 - 8-port Gigabit Ethernet (10/100/1000BASE-T)
 - 6-port Gigabit Ethernet (1000BASE-SX or 1000BASE-LX)
 - 8-port OC-3c/STM-1c, OC-12c/STM-4c Packet-over-SONET/SDH
 - 2-port OC-48c/STM-16c Packet-over-SONET/SDH
 - 1-port OC-192c/STM-64c Packet-over-SONET/SDH

Bivio Accelerator Modules (Optional)

- Cavium CN1615: SSL, IPsec, RSA, Diffie-Hellman, DES/3DES, AES, AES-GCM, Kasumi, ARC4, MD5, SHA-1, SHA-2, HMAC-MD5, HMAC-SHA-1

Regulatory & Environmental Compliance

- FCC Part 15 Class A, TUV, CE, VCCI, BSMI, CISPR, ICES, CTick, MIC, GS
- RoHS Directive 2002/95/EC (EU)
- China RoHS

Environmental (Operating)

- Temperature: 0 to 40C (32 to 104F)
- Relative Humidity: 10 to 90% non-condensing

Dimensions

- 3.5" (9cm) H x 17" (43cm) W x 24" (61cm) D (2U height)
- Standard 19" rack-mountable
- 45 lbs

About Bivio Networks

Bivio Networks is a leading provider of network systems for securing, monitoring and controlling critical network infrastructure. Bivio's global customer base includes worldwide government agencies and service providers. Its product suite enables its customers and partners, which include application developers and systems integrators, to develop and deploy leading solutions to secure, monitor and control customer networks. Bivio is privately held and headquartered in the San Francisco Bay area with office locations worldwide. More information is available at www.bivio.net.

