

D-Link® Web Smart™ Switch Solutions for Small and Medium Businesses

Solution Brief
February, 2008

Abstract

As bandwidth-intensive applications continue to crowd into local and wide-area networks, switch technology has been changing to accommodate growth and allow administrators more control over service delivery and security. Networks that handle IP video (surveillance, teleconferencing and streamed programming), Voice over IP (VoIP), multi-user gaming, and sophisticated Web-based applications require switches that are not only high performance, but also manageable. Small to medium companies in particular need switches that are easy to manage without full-time IT support.

D-Link's Web Smart switches offer a solution with key "managed switch" features – yet without the hefty price tag of managed switches. This solution brief demonstrates the various advantages of Web Smart switches, which include advanced security, ease-of-use, simple installation, and low price. The switches are perfect for budget-constrained companies looking for advanced features like Quality of Service (QoS), Port Mirroring, Virtual LAN (VLAN) and Power over Ethernet (PoE), and SNMP.

Web Smart Switch Solutions for Small and Medium Businesses

IT environments with complex, high-traffic networks need high speed switches that include network management capabilities that can be handled by non-expert, non-IT staff (or part-time IT support) typical in small to medium sized organizations. Fully managed switches are overkill for many organizations. Yet common “dumb” switches do not provide the features and functionality required for managing the sophisticated database, video, voice and application traffic that many organizations – regardless of size – deal with.

The challenge is to boost bandwidth and uptime while keeping within tight budget constraints. However, cost and downtime considerations often discourage companies from attempting upgrades to the network infrastructure. But doing nothing can cause problems as well. Failure to meet bandwidth and performance requirements causes downtime, poor productivity, revenue loss, and frustration among both users and IT staff.

For example, IP surveillance applications require multiple high quality video streams that need dedicated bandwidth on the network. The network needs to have some sort of Quality of Service (QoS) or Class of Service (CoS) capability to achieve this. Organizations also need smarter switching technology to control bad users, lock down security, and aggregate links (port trunking) for increased network speeds.

Web Smart Switches Offer Advanced Management at Low Cost
 Fortunately, there is a third category of switch that resides between the “unmanaged” and “managed” switch categories – Web Smart switches. These switches satisfy the demands mentioned above, enabling a much more intelligently managed network and delivering high performance networking at a reasonable cost.

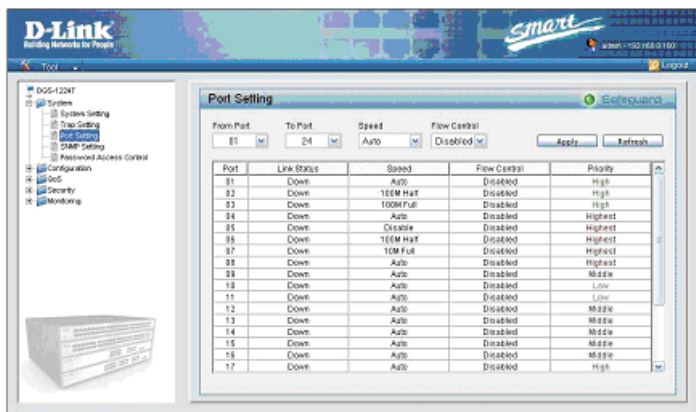


Figure 1. Intuitive, user-friendly Web-based (HTML) Graphic interface

A Web Smart switch or Web-based switch is managed through a Web browser. See Figure 1. The technology offers many of the benefits of managed switches, without excessive cost and complexity. Unlike fully managed switches, Web Smart switches do not typically include features such as IP Multicasting, Access Control Lists, RMON, SSH, SSL, TACACS+, and rate limiting, as shown in Figure 2.

| Feature** | Unmanaged Switches | WebSmart Switches | Managed Switches |
|----------------------------------|--------------------|-------------------|------------------|
| Priority Queues | ✓ | ✓ | ✓ |
| 802.1Q VLANs | ○ | ✓ | ✓ |
| Spanning Tree | ○ | ✓ | ✓ |
| IGMP Snooping | ○ | ✓ | ✓ |
| Port Mirroring | ○ | ✓ | ✓ |
| Storm Suppression | ○ | ✓ | ✓ |
| 802.1X Port-based Authentication | ○ | ✓ | ✓ |
| Safeguard Engine | ○ | ✓ | ✓ |
| SNMP | ○ | ✓ | ✓ |
| Web GUI | ○ | ✓ | ✓ |
| Access Control List | ○ | ○ | ✓ |
| Bandwidth Control | ○ | ○ | ✓ |
| RMON | ○ | ○ | ✓ |
| TFTP | ○ | ○ | ✓ |
| SYSLOG | ○ | ○ | ✓ |
| CLI, Telnet | ○ | ○ | ✓ |
| RS-232 Console Port | ○ | ○ | ✓ |

Figure 2. D-Link Web Smart switches have many of the same key features as managed switches.

With a Web Smart switch, organizations can prioritize traffic, segment networks, enable redundant network links, monitor security closely, and remotely manage the network. The switches can also be used as a central switching device for small office connectivity or at the edge of a network. Management and monitoring capabilities are easily accessible from a standard browser, anywhere, anytime.

QoS – Prioritize Traffic and Eliminate Latency

Some services, like IP video and VoIP, do not tolerate latency, so they need to cut to the head of the packet-pushing line. With a Web Smart switch, you can control priority with ease. Web Smart switches use the IEEE 802.1p standard, which is the LAN Layer 2 QoS/CoS protocol for traffic prioritization.

QoS is a switch feature that enables administrators to set different priority to different applications, users, or data flows, or to guarantee a certain level of performance for a particular data stream. Without QoS in place, real-time applications, like video, will fight over available bandwidth and slow network traffic to a crawl.

CoS manages network traffic by grouping similar types of traffic (e-mail, streaming video, voice, large document file transfer) together. It assigns each type its own service level priority (usually on a scale of 0-7, with 7 the highest priority). Unlike QoS, CoS does not guarantee service levels in terms of bandwidth and delivery time. It offers a “best-effort.” The technology tends to be simpler to manage than QoS.

The following list describes different priority examples used by QoS/CoS:

- 7 - Network Critical
- 6 - Interactive Voice
- 5 - Interactive Multimedia
- 4 - Streaming Multimedia
- 3 - Business Critical
- 2 - Standard
- 1 - Background
- 0 - Best Effort

The 802.1p standard used in Web Smart reads tags placed in each packet frame to indicate the priority of the frame. Tags represent priority 0-7 (above). VoIP traffic or IP video traffic, for example, maintains higher priority so voice traffic is always clear and jitter free, or videos are always clear and smooth. See Figure 3.

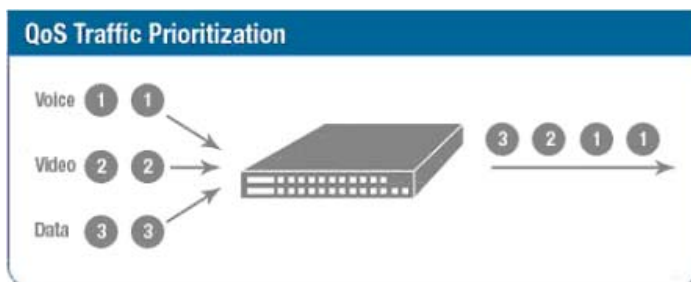


Figure 3. Prioritization of delay sensitive traffic using 802.1p

Ideal Solution for IP Camera Installations

QoS, PoE, remote management and troubleshooting features make Web Smart switches ideal for IP cameras that are deployed in small to medium sized business environments. QoS maintains bandwidth strength for high-priority video data transfer. With the right configuration, the switches eliminate latency and image losses that would otherwise occur on unmanaged networks. PoE, a feature available on some Web Smart models, enables camera placement where no power outlets are available. In addition, Web Smart interfaces typically allow users to easily hard reboot the attached device by a simple click of a button, facilitating network troubleshooting without physically having to go to hard-to-reach places. These features provide similar benefits for video streaming and VoIP applications, as well.

IGMP Snooping

IGMP Snooping enables the forwarding of multicast packets such as streaming audio and video without increasing network broadcast congestion. Web Smart switches “listen in” on IGMP communications between hosts and routers. By snooping IGMP registration information within a frame, a list of workstations that have joined the multicast group is created. This list then allows the switch

to intelligently forward packets to only the appropriate member workstations. The feature significantly reduces multicast traffic from streaming and other bandwidth intensive IP applications. Reduced multicast traffic minimizes packet processing at the switch, and reduces the workload at the end hosts. End host network cards do not have to receive and filter all the multicast traffic generated in the network.

Block Users and Secure the Network

Sometimes you need to kick users off the network immediately. Some desktops become corrupted by malware and viruses. Employees might be spending too much time playing online games. Visiting guests may be using the network for a specified time frame. Whatever the case, you need a way to cut them off at will with minimal effort. Web Smart switches allow you to pull the plug right at the switch from within the Web browser interface. You simply turn off the port in the Web control panel. Web Smart switches also protect systems from malicious denial of service attacks.

802.1x Authentication

802.1x Authentication allows users to securely log onto your network. When used in conjunction with a RADIUS server, 802.1x requires each user workstation attached to the switch to provide a username and password before gaining access to the local area network.

Port Trunking/Link Aggregation – Pain-Free Network and Bandwidth Expansion

Port trunking enables multi-link load sharing or link aggregation on a server or a network backbone. This helps you easily expand networks and eliminate bottlenecks between cascaded switches or uplinks to servers.

VLAN – Increase Security and Manage Bandwidth

VLANs improve security and bandwidth utilization by segmenting

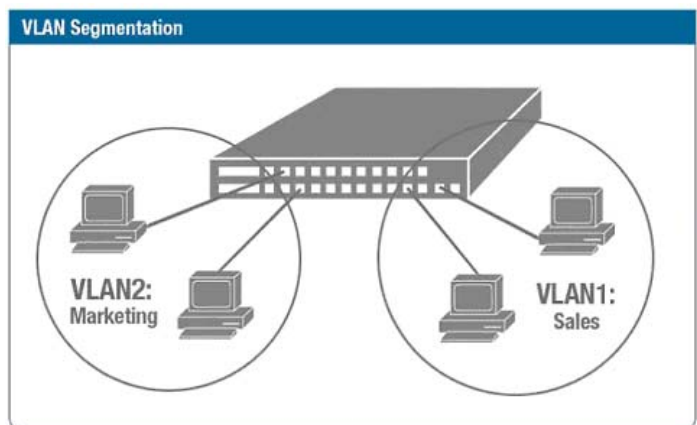


Figure 4. Security is enhanced because no traffic can be passed or accessed between ports not belonging to the same VLAN group.

broadcast domains. This reduces network congestion due to constant network broadcasting. VLANs also secure each broadcast domain from all others, as shown in Figure 4. This prevents users on one VLAN from gaining access to resources on other network segments.

SNMP – Automated Monitoring and Troubleshooting

Simple Network Management Protocol (SNMP) helps you manage and control Web Smart switches by polling the device to evaluate status and troubleshoot abnormal events. The feature saves time, money and IT resources.

802.1D Spanning Tree

The 802.1D Spanning Tree Protocol provides protection from unintentional cabling loops forming within a network infrastructure. These loops create dangerous, unending circles where broadcast and multicast traffic propagate across the network in an endless loop. This creates a storm of traffic that overwhelms the network and brings traffic to a crawl. 802.1D Spanning Tree detects and breaks these loops ensuring network uptime.

PoE – Easy Installation without Power Outlets

Some Web Smart switches integrate Power over Ethernet (PoE), delivering both data and power over existing network cabling. With PoE, wireless Access Points, VoIP Phones or IP Cameras can be easily added without worrying about the availability or proximity of power outlets.

PoE typically supplies up to 15.4 Watts to PoE ports. This allows users to attach IEEE 802.3af compliant devices to PoE switches without requiring additional power. Devices that are not 802.3af compliant can use a PoE adapter, such as D-Link’s DWL-P50, to receive power through a PoE switch.

D-Link Solutions

The D-Link Web Smart Switch family offers growing businesses simple, easy to use switches with many of the advanced management features found in much more expensive managed switches (network monitoring and troubleshooting, port configuration, VLANs, port trunking for increased bandwidth, QoS/CoS, and password protected access). Management features can be enabled or disabled as needed.

The switches come in 16, 24, and 48 port flavors, as shown in Figure 5. Fast Ethernet and Gigabit speeds are supported (depending on model). Most models offer 2 combo SFP slots (4 SFP ports in the

DGS-1248T), with the vendor listing 100Base-FX, Gigabit, LX and SX SFP modules as available options.

The D-Link Web Smart Switch line features auto-discovery software that makes installation and configuration easy, as shown in Figure 6. You can automatically discover up to 254 Web Smart Switches within a network for configuration. This helps you quickly upgrade networks with a minimum of hassles.

D-Link Web Smart switches also offer security features normally found only in fully managed switching solutions. For example, the D-Link Safeguard Engine™ protects the CPU from malicious attack. When frames enter the switch, the D-Link Safeguard Engine detects and blocks broadcast, multicast, and unicast flooding which can overload a CPU and bring network traffic to a halt. D-Link Web Smart switches also provide support for secure encrypted 802.1x port based user authentication, broadcast storm control, and up to 256 static MAC address entries.

| | Web Smart Switches | | | | | |
|--------------------------------------|--------------------|------------|------------|-------------|-------------------|-------------|
| Model | DES-1228 | DES-1228P | DES-1252 | DGS-1216T | DGS-1224T | DGS-1248T |
| 10/100Mbps | 24 | 24 | 48 | | | |
| 10/100/1000Mbps | 4 | 4 | 4 | 16 | 24 | 48 |
| SFP slots | 2 | 2 | 2 | 2 combo SFP | 2 combo SFP | 4 combo SFP |
| 100BASE-FX | | | | | | |
| CX-4 | | | | | | |
| XFP | | | | | | |
| PoE 802.3af support | 24 combo 10/100 | | | | | |
| RS-232 Console Port | | | | | | |
| Stacking Topology | | | | | | |
| RPS | | | | | | |
| Switching Capacity | 12.8Gbps | 12.8Gbps | 12.8Gbps | 32Gbps | 48Gbps | 96Gbps |
| MAC address | 8K | 8K | 8K | 8K | 8K | 16K |
| Jumbo Frame Support | | | | Bytes | Up to 10240 Bytes | Bytes |
| IGMP snooping | Yes | Yes | Yes | Yes | Yes | Yes |
| 802.1D Spanning Tree | Yes | Yes | Yes | Yes | Yes | Yes |
| 802.1w Rapid Spanning Tree | | | | | | |
| 802.1s Multiple STP | | | | | | |
| 802.3ad link aggregation/LACP | | | | | | |
| Port Trunking | Yes | Yes | Yes | Yes | Yes | Yes |
| Power Control/Monitor | | Yes | | | | |
| Port Mirroring | Yes | Yes | Yes | Yes | Yes | Yes |
| Broadcast storm control | Yes | Yes | Yes | Yes | Yes | Yes |
| Priority queues | 4 | 4 | 4 | 4 | 2 | 2 |
| DiffServ (DSCP) | | | | | | |
| 802.1Q VLAN | Yes | Yes | Yes | Yes | Yes | Yes |
| 802.1p support | Yes | Yes | Yes | Yes | Yes | Yes |
| VLAN Groups | 256 Static | 256 Static | 256 Static | 256 Static | 256 Static | 256 Static |
| Asymmetric VLANs | | | | | | |
| GVRP support | | | | | | |
| TACACS+ authentication | | | | | | |
| SSH/SSL | | | | | | |
| Password Protected | Yes | Yes | Yes | Yes | Yes | Yes |
| Port Security function | Yes | Yes | Yes | Yes | Yes | Yes |
| 802.1x | Yes | Yes | Yes | Yes | Yes | Yes |
| ACL (access control list) | | | | | | |
| Rate limiting | | | | | | |
| Single IP to Manage the whole stack | | | | | | |
| Web-GUI | Yes | Yes | Yes | Yes | Yes | Yes |
| CLI, Telnet | | | | | | |
| TFTP | | | | | | |
| SNMP v1, v2c, 3 | SNMPv1 | SNMPv1 | SNMPv1 | SNMPv1 | SNMPv1 | SNMPv1 |
| RMON (4 groups) | | | | | | |
| DHCP client | Yes | Yes | Yes | Yes | Yes | Yes |
| SNTP | | | | | | |
| SYSLOG | | | | | | |
| Web GUI traffic monitoring | Yes | Yes | Yes | Yes | Yes | Yes |
| Web MAC address Browsing | Yes | Yes | Yes | Yes | Yes | Yes |
| Auto-Discovery of other Smart Switch | Yes | Yes | Yes | Yes | Yes | Yes |
| Traps on abnormal events | Yes | Yes | Yes | Yes | Yes | Yes |

Figure 5. D-Link Web Smart switches come in 16, 24 and 48 port flavors.

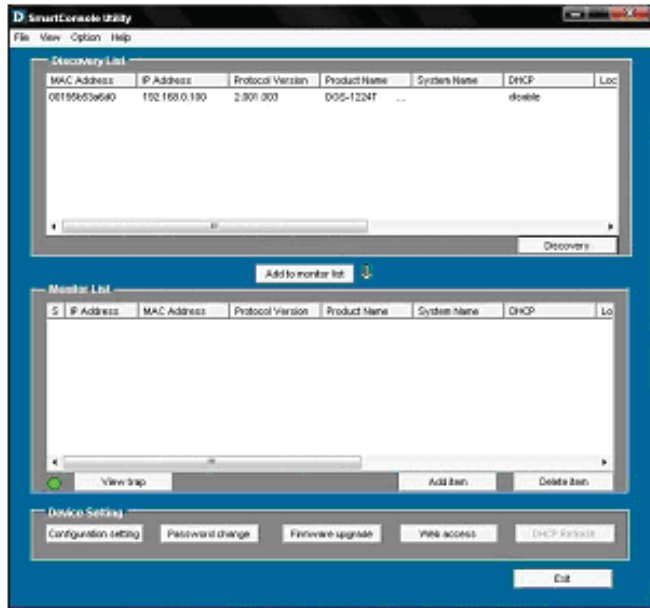


Figure 6. The Web Smart utility's user-friendly interface allows for easy configuration of the switches

The Web-browser interface on D-Link Web Smart is intuitive, making it easy to optimize the network. Pluggable (SFP) GBIC slots for fiber transceivers provide optional 100Base-FX and Gigabit fiber connectivity to enable secure, long distance connections between

switches. Auto-MDI/MDI-X crossover on all ports and automatic speed negotiation are common across the product line. The D-Link DES-1228P switch delivers 15.4 watts per PoE enabled port (24 ports total).

Key Web Smart Features

- The D-Link Safeguard Engine protects Web Smart switches from Denial of Service (DoS) flood traffic, increasing the robustness and availability of the network infrastructure.
- D-Link DES-1228, DES-1228P, and DES-1252 Web Smart models provide 4 Gigabit connections for Gigabit uplinks and inter-switch or server connections.
- 802.1X support enables per-port user authentication.
- Group Management Protocol (GMP) snooping limits bandwidth-intensive video traffic to only the requestors without flooding to all users.
- Built-in Simple Network Management Protocol (SNMP) Management Information Base (MIB) enables integration with SNMP-based networks for centralized management.
- Layer 2 management features include 802.1Q VLAN, 802.1p QoS, and 802.1D STP.
- D-Link Smart Console Utility helps users easily discover relative D-Link Web Smart Switches in the Layer 2 network topology easily. Users can also upgrade firmware with the utility.

SWITCHES



- **DES-1228** - Web Smart 24-Port 10/100 + (4) 1000BASE-T Ports + 2 Combo Ports Switch



- **DES-1228P** - Web Smart 24-Port PoE 10/100 + (4) 1000BASE-T Ports + 2 Combo Ports Switch



- **DES-1252** - Web Smart 48-Port 10/100 + 2 Combo GbE + (2) 1000BASE-T Ports Switch



- **DGS-1216T** - Web Smart 16-Port 10/100/1000 + 2 combo SFP Switch



- **DGS-1224T** - Web Smart 24-Port 10/100/1000 + 2 combo SFP Switch



- **DGS-1248T** - Web Smart 48-Port 10/100/1000 + 4 combo SFP Switch

For more information about D-Link Web Smart solutions please visit <http://www.dlink.com/products/websmart/> or call 1-800-326-1688.