

Gigabit Ethernet Unified Switch

Model Name: **DWS-3160-24TC ver. A1**

20 10/100/1000Base-T ports Unified Switch with 4 Combo
1000Base-T/SFP ports

Model Name: **DWS-3160-24PC ver. A1**

20 10/100/1000Base-T PoE ports Unified Switch with 4 Combo
1000Base-T PoE/SFP ports

External Specification

Version 1.0

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Revision History

Version	Revised Date	Author	Content Revised
1.0	2011/07/22	Will Tseng	First Edition

1 Product Briefs

DWS-3160 Series are targeting for Small/ Remote office product segment to fulfill growing demand in this segment. The DWS-3160 Unified Switch provides a performance optimized, cost effective solution for Small/Remote office and small to medium size enterprise wireless network deployments. DWS-3160 series provide 20 10/100/1000Base-T ports with 4 Combo 1000Base-T SFP ports, and also offer PoE model for variety deployment use. Each 10/100/1000Mbps port supports 802.3af and 802.3at Power over Ethernet Standard to connect with PoE devices such as high speed 802.11n APs, IP phones or Cameras.

DWS-3160 series default support 12 unified APs management capability, and can manage up to 48 unified APs per unified switch through license upgrade. Up to 4 DWS-3160 can form a cluster; it is ideal for user to manage up to 192 unified APs centrally with single IP.

2 Product Specifications

2.1 Hardware Specifications

Chassis	
Dimension	19-inch, 1U Rack-mount size DWS-3160-24TC : 440mm x 210mm x 44mm DWS-3160-24PC : 440mm x 310mm x 44mm
Weight	DWS-3160-24TC : 2.552 kg DWS-3160-24PC : 5.242 kg
Console port	<ul style="list-style-type: none"> ● For out-of-band management (CLI configuration) ● RJ-45 interface type (Cisco compatible) ● Support baud rate 115200 ● In the front of switch
Acoustics	DWS-3160-24TC : ~30°C: < 46.3 dB , 30°C~: < 33.0 dB DWS-3160-24PC : ~30°C: < 39.8 dB , 30°C~: < 51.1 dB
Heat Dissipation	DWS-3160-24TC : 128.6 BTU/hr DWS-3160-24PC (with 370W PoE load) : 1593.5 BTU/hr
Fan	<ul style="list-style-type: none"> • Smart fan with sensor IC that provides different fan speed Based on different temperature • When temperature over 39°C, fan switches to high speed and remains high until the temperature is down to 36°C • The number of fans for each model DWS-3160-24TC: 2 DWS-3160-24PC: 4
Real Time Clock (RTC)	Can maintain the time setting when the device power is off
MTBF	DWS-3160-24TC: 561829.573 Hours DWS-3160-24PC: 282541.698 Hours
Operating Temperature	0-50°C

Storage Temperature	- 40 °C to 70 °C
Humidity	Operation: 10%-90% RH Storage: 5% ~ 90% RH
SD Card	<ol style="list-style-type: none"> 1. Support LED indicator in the front of the switch 2. Support standard size SD, SDHC card. (32 mm x 24 mm x 2.1 mm), up to 32G supported 3. Support FAT16/32 file system
Power	
Internal Power Supply	AC Input: 100 - 240 VAC, 50-60 Hz
Support optional external Redundant Power Supply	<ol style="list-style-type: none"> 1. Provide one connector in rear panel to install optional external RPS to enhance the reliability. When internal power fails, the optional external RPS will take over all the power immediately and automatically. 2. DWS-3160-24PC: Support PoE+ RPS <ul style="list-style-type: none"> ● Redundant mode: When internal power fails, external power will start to feed the power for the whole system. ● Expansion mode: When RPS is inserted with expansion mode, the PoE power budget will expand to 740W 3. Supported RPS model: <ul style="list-style-type: none"> ● DPS-200: DWS-3160-24TC ● DPS-700: DWS-3160-24PC
Maximum Power Consumption	DWS-3160-24TC: 37.7 Watts DWS-3160-24PC (with 370W PoE load): 467.3 Watts
Key Components	
SDRAM for CPU	DDR 256MB
Flash Memory	32 MB NOR flash Support External SD card memory
Performance	
Switching Capacity	DWS-3160-24TC : 48Gps DWS-3160-24PC : 48Gps

64 Byte system packet forwarding rate	DWS-3160-24TC : 35.71 million packets per second DWS-3160-24PC : 35.71 million packets per second
Packet Buffer	2 MB
Forwarding Mode	Store and Forward
Priority Queues	8 Priority Queues per port
Port Function	
10/100/1000BASE-T Ports	<ol style="list-style-type: none"> DWS-3160-24TC/24PC: 20 10/100/1000BASE-T 10/100/1000BASE-T ports are compliant with the following standards: <ul style="list-style-type: none"> IEEE 802.3 compliance IEEE 802.3u compliance IEEE 802.3ab compliance Support Half/Full-Duplex operations Auto-negotiation Auto MDI/MDIX IEEE 802.3x Flow Control support for Full-Duplex mode, Back Pressure when Half-Duplex mode, and Head-of-line blocking prevention
SFP Ports	<ol style="list-style-type: none"> SFP ports are compliant with the following standards: <ul style="list-style-type: none"> IEEE 802.3z compliance IEEE 802.3x Flow Control support for Full-Duplex mode. SFP Transceivers Supported: <ul style="list-style-type: none"> DEM-310GT (1000BASE-LX, Single-mode, 10km) DEM-311GT (1000BASE -SX, Mutli-mode, 500m) DEM-312GT2 (1000BASE-SX, Multi-mode, 2km) DEM-314GT (1000BASE-LH, Single-mode, 50km) DEM-315GT (1000BASE-ZX, Single-mode, 80km) DEM-210 (100BASE-FX, Single-mode, 15km) DEM-211 (100BASE-FX, Multi-mode, 2km)

	<ul style="list-style-type: none"> ● DGS-712 (1G Copper, 1000BASE-T, 100m) <p>3. WDM transceiver Supported:</p> <ul style="list-style-type: none"> ● DEM-330T (TX-1550/RX-1310nm), up to 10km, Single-Mode ● DEM-330R (TX-1310/RX-1550 nm), up to 10km, Single-Mode ● DEM-331T (TX-1550/RX-1310 nm) , up to 40km, Single-Mode ● DEM-331R (TX-1310/RX-1550 nm), up to 40km, Single-Mode ● DEM-220T (100BASE-BX, TX-1550/RX-1310nm), up to 20km, Single-Mode ● DEM-220R (100BASE-BX, TX-1310/RX-1550 nm), up to 20km, Single-Mode
Combo Ports	<p>1. DWS-3160-24TC/24PC: 10/100/1000BASE-T/SFP ports</p> <p>2. 10/100/1000BASE-T ports are compliant with the following standards:</p> <ul style="list-style-type: none"> ● IEEE 802.3 compliance ● IEEE 802.3u compliance ● IEEE 802.3ab compliance ● Support Half/Full-Duplex operations ● Auto-negotiation ● Auto MDI/MDIX ● IEEE 802.3x Flow Control support for Full-Duplex mode, Back Pressure when Half-Duplex mode, and Head-of-line blocking prevention <p>4. SFP ports are compliant with the following standards:</p> <ul style="list-style-type: none"> ● IEEE 802.3z compliance ● IEEE 802.3x Flow Control support for Full-Duplex mode. <p>5. SFP Transceivers Supported:</p> <ul style="list-style-type: none"> ● DEM-310GT (1000BASE-LX, Single-mode, 10km) ● DEM-311GT (1000BASE -SX, Mutli-mode, 500m)

	<ul style="list-style-type: none">● DEM-312GT2 (1000BASE-SX, Multi-mode, 2km)● DEM-314GT (1000BASE-LH, Single-mode, 50km)● DEM-315GT (1000BASE-ZX, Single-mode, 80km)● DEM-210 (100BASE-FX, Single-mode, 15km)● DEM-211 (100BASE-FX, Multi-mode, 2km)● DGS-712 (1G Copper, 1000BASE-T, 100m) <p>6. WDM transceiver Supported:</p> <ul style="list-style-type: none">● DEM-330T (TX-1550/RX-1310nm), up to 10km, Single-Mode● DEM-330R (TX-1310/RX-1550 nm), up to 10km, Single-Mode● DEM-331T (TX-1550/RX-1310 nm) , up to 40km, Single-Mode● DEM-331R (TX-1310/RX-1550 nm), up to 40km, Single-Mode● DEM-220T (100BASE-BX, TX-1550/RX-1310nm), up to 20km, Single-Mode● DEM-220R (100BASE-BX, TX-1310/RX-1550 nm), up to 20km, Single-Mode																		
PoE Capability (DWS-3160-24PC)																			
PoE Specification	<p>1. IEEE 802.3af compliance</p> <p>2. Provides up to 15.4W per 10/100/1000M port</p> <p>3. Default power budget is 370W.</p> <p>4. PoE power budget is configurable when connecting with DPS-700 external RPS.</p> <p>Two modes are supported when connecting with DPS-700</p> <ul style="list-style-type: none">● Redundant Mode: System PoE power budget is <u>370W</u>.● Expansion Mode: System PoE power budget is <u>740W</u>. <p>5. Auto discover the connection of PD and immediately provides power</p> <p>6. Auto disable port if the port current is over 350mA</p> <p>7. Provide the power following the classification below</p> <table><tr><th>Class</th><th>Usage</th><th>Max power used by PD</th></tr><tr><td>0</td><td>Default</td><td>15.4W</td></tr><tr><td>1</td><td>Optional</td><td>4.0W</td></tr><tr><td>2</td><td>Optional</td><td>7.0W</td></tr><tr><td>3</td><td>Optional</td><td>15.4W</td></tr><tr><td>4</td><td>Reserved</td><td>15.4W</td></tr></table>	Class	Usage	Max power used by PD	0	Default	15.4W	1	Optional	4.0W	2	Optional	7.0W	3	Optional	15.4W	4	Reserved	15.4W
Class	Usage	Max power used by PD																	
0	Default	15.4W																	
1	Optional	4.0W																	
2	Optional	7.0W																	
3	Optional	15.4W																	
4	Reserved	15.4W																	

	Feeding power over pin 1, 2, 3, 6 of 8 wires of UTP cables
PoE Plus Specification	<ol style="list-style-type: none"> 1. IEEE 802.3at compliance 2. Provides up to 30W per 10/100/1000M port 3. Default power budget is 370W. 4. PoE power budget is configurable when connecting with DPS-700 external RPS. Two modes are supported when connecting with DPS-700 <ul style="list-style-type: none"> ● Redundant Mode: System PoE power budget is <u>370W</u>. ● Expansion Mode: System PoE power budget is <u>740W</u>. 5. Auto discovers the connection of PD and immediately provides power 6. Auto disable port if the port current is over 625mA 7. Overload current detection range (I_{CUT} parameter) is about 625mA (Default) 8. Feeding power over pin 1, 2, 3, 6 of 8 wires of UTP cables 9. Class 0 ----- 15.4W Class 1 ----- 4.0W Class 2 ----- 7.0W Class 3 ----- 15.4W Class 4 ----- 30.0W (IEEE 802.3at Support)

2.2 Software Features

2.2.1 WLAN

WLAN Features	Detailed Description	Standard	Schedule
Max. AP per switch	48		FCS
Max. user per switch	Up to 1024 Tunneled users Up to 2048 non-Tunneled users		FCS
Switch Clustering	1. Up to 4 switches per cluster 2. Provides Single IP Management		FCS
Switch/AP Discovery			FCS
Fast Roaming			FCS
Wi-Fi phone hand-off time (latency) when roaming between APs	None: 10~30 ms Static WEP Open: 15~35 ms Static WEP Shared: 15~35 ms Dynamic WEP: 500~2000 ms WPA-PSK: 55~80 ms		FCS

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	WPA2-PSK: 55~80 ms WPA Enterprise: 300~700 ms WPA2 Enterprise: 40~60 ms (Dynamic WEP & WPA Enterprise protocols do not support Fast Roaming)		
Intra-switch Roaming			FCS
Inter-switch Roaming	- Clients can roam between APs managed by different switches - Up to 4 peer switches can form a roaming group		FCS
L2 Roaming (Intra-subnet Roaming)			FCS
L3 Roaming (Inter-subnet Roaming)	Support seamless roaming when APs are located in different subnets		FCS
Tunnel Protocol	DWAPP (D-Link Wireless AP Protocol), a CAPWAP-like protocol		FCS
Path MTU	When under Tunnel mode, the switch & AP can notify the sending party to resize oversized packets to meet the MTU setting of the tunnel	RFC1191	FCS
MSS Reduction			FCS
Adaptable Wireless	Supports Tunnel (L3 Tunneling) and non-Tunnel (VLAN Forwarding) modes		FCS
AP-AP Tunnel	Enables L3 roaming between wireless clients without traffic going back to wireless switch		FCS
RF Management and Control			
Multiple ESSIDs per AP	Up to 16 SSIDs per radio, 32 SSIDs per AP		FCS
Multiple SSIDs per Switch	Up to 64 SSIDs can be configured and stored on the switch		FCS
Automatic AP RF channel adjustment			FCS
Automatic AP transmit output power adjustment			FCS
RF Self-healing around Failed AP			FCS

Load Balancing	Based on WLAN utilization or number of users per AP		FCS
AP Management			
AP software version auto-detection & central firmware dispatch			FCS
AP auto-discovery			FCS
Remote AP reboot			FCS
AP monitoring	Can list managed, rogue, and authentication failed AP		FCS
Client monitoring	Can list clients associated with each managed AP		FCS
Ad-hoc clients monitoring			FCS
AP Authentication	Supports local & Radius authentication		FCS
Centralized RF/Security policy management			FCS
Visualized AP Management Tool	Support up to 16 jpg files		FCS
Unified AP Support	DWL-8600AP/3600AP/6600AP The AP supports Managed/Standalone mode		FCS
Quality of Service			
WMM (Wireless Multimedia)			FCS
SVP (Spectralink Voice Protocol)			FCS
Security			
Wireless Standards	IEEE 802.11a, 802.11b, 802.11g, 802.11d, 802.11h, 802.11n		FCS
Support 802.11 security type	WEP, WPA, WPA2 (802.11i)		FCS
WEP Cipher Suite	RC4 64,128,152 bits		FCS
WPA Cipher Suite	TKIP: RC4 40-bit, MIC		FCS
WPA2 Cipher Suite	AES-CCMP: 128/256bits		FCS
Security Mode	None WEP - Open System WEP - Shared Key WEP - 802.1x (Dynamic WEP) WPA/WPA2 - Shared Key (Personal) WPA/WPA2 - 802.1x (Enterprise)		FCS
802.1X EAP Types	EAP-MD5, EAP-TLS, EAP-TTLS, EAP-FAST, EAP-SIM, PEAP-GTC, PEAP-TLS, PEAP-MS-CHAPv2	RFC1321, 2865, 2284, 2716,	FCS

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		2759, 3580, 3748	
Wireless Intrusion Detection System (WIDS)	Detects wireless threats		FCS
Rogue AP Detection			FCS
Station and AP classification	AP information collection (RF channel, MAC address, SSID used, time detected)		FCS
Rogue or Valid AP classification based on MAC addresses			FCS
Rogue AP Mitigation	Can jam rogue AP or rogue clients		FCS
Captive Portal	1. Support Radius & local user database 2. Up to 128 users in local database 3. Up to 1024 concurrent on-line users 4. Captive Portal clients can roam within switch and across switches within the cluster 5. Support IE and Firefox 6. Support Wired Captive Portal 7. Customizable Web GUI 8. Captive Portal logout popup window 9. Support up to 6 customized web page		FCS
Station Isolation	Per-radio		FCS

2.2.2 LAN

Stackability	Detailed Description	Standard	Schedule
Switch Clustering	1. Up to 4 switches per cluster 2. Provides Single IP Management		FCS
L2 Features	Detailed Description	Standard	Schedule
MAC Address	1. Max 16K MAC Address Table 2. Support 256 static MAC 3. Support 128 static multicast addresses		FCS
Flow Control	1. 802.3x when full duplex, 2. Back Pressure when half duplex 3. Head-of-line blocking prevention		FCS
Jumbo Frame	Up to 13 KB		FCS
Spanning Tree	1. Support 802.1D STP 2004 Edition 2. Support 802.1w RSTP (IEEE802.1D-2004) 3. Support 802.1s MSTP (IEEE802.1Q-2005) 4. Support max. 16 MSTP Instances 5. Support per port/device BPDU filtering 6. Support Root Restriction (defined in 802.1Q-2005) 7. Support edge port in STP mode 8. BPDU Attack Protection		FCS

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Loopback Detection (LBD)	1. D-Link Loopback Detection 4.03 2. STP independent 3. Support per port/per VLAN shutdown		FCS
802.3ad Link Aggregation	1. Support max 32 groups per device, 8 ports per group 2. High availability LACP to prevent single or multiple ports failure in an aggregation channel. 3. Support following load sharing mechanisms <ul style="list-style-type: none"> ● L2 hash : Source MAC + Destination MAC ● L3 hash : Source IP + Destination IP (IPv4/IPv6) ● L4 hash : Source Port + Destination Port 		FCS
	4. LACP trap definition v1.1		R2
802.1AX Link Aggregation			R2
Mirroring	1. Port Mirroring <ul style="list-style-type: none"> ● Support 4 mirroring groups ● One-to-one mode ● Many-to-one mode ● Port mirroring for Tx/Rx/Both 2. Flow-Based (ACL) mirroring 3. RSPAN		FCS
L2 protocol Tunneling			R2
Multicasting	Detailed Description	Standard	Schedule
IGMP snooping	1. Support IGMP v1, v2, v3 2. Up to 1024 IGMP snooping groups 3. Support 128 static multicast group per system 4. Be able to forward the multicast traffic from the multicast-enabled router only 5. Be able to forbid multicast traffic to specific ports (can config forbid_mc_router) 6. IGMP snooping Per VLAN 7. Support flooding/filtering mode for non-joined multicast traffic 8. Support IGMP snooping fast leave 9. Support host-based IGMP Snooping fast leave 10. Load-balancing with multicast traffic		FCS
	11. Static IGMP snooping group		R2
IGMP authentication	1. Check the validity of client's MAC address, Switch IP, Port, and Multicast group IP 2. Only the authenticated port can join IGMP group		R2
MLD snooping	1. Support MLD v1, v2		FCS
	2. Up to 1024 MLD snooping groups		

	3. Support 128 static multicast addresses per system 4. Be able to forward the multicast traffic from the multicast-enabled router only 5. Be able to forbid multicast traffic to specific ports (can config forbid_mc_router) 6. MLD snooping Per VLAN 7. Support flooding/filtering mode for non-joined multicast traffic.		
VLAN			
VLAN Group	1. Max 4K VLAN groups; 2. Max. (4094 static/ 255 dynamic) VLAN groups; 3. Configurable vid from 1~4094 4. TPID: 0x8100		FCS
802.1v	1. Be able to configure the untagged port of different protocols on same physical port 2. Be able to configure 802.1Q and 802.1v untagged port on same physical port 3. Each protocol can map to different VLAN on different port		FCS
Enhancement of 802.1v protocol VLAN	1. Supports more than one 802.1v untagged port on same physical port, Switch should auto-assign VID to those untagged packets depends on protocol ID. 2. Supports one 802.1Q untagged port and (one or more) 802.1v untagged port on same physical port.		FCS
802.1Q	Support 802.1Q 2005 edition		FCS
GVRP	1. 4K VLAN (255 dynamic) groups 2. GVRP advertisement both on dynamic and static VLAN 3. GVRP enabled/disabled per port/VLAN/system basis		FCS
Voice VLAN	Identify the voice VLAN by MAC address Voice VLAN 2.1(R2)		FCS
Protocol-based VLAN	1. Support up to 16 protocol-based VLAN. 2. Support 16 protocol-based VLAN per physical port		FCS
Port-based VLAN	Support VLAN tagging based on PVID		FCS
MAC-based VLAN	Support max 1024 entries		FCS
Asymmetric VLAN			FCS

ISM-VLAN	1. Support up to 5 dedicated ISM VLANs		FCS
	2. Support up to 512 multicast address ranges per ISM VLAN		
	3. Be able to filter unknown multicast packets per ISM VLAN		
	4. Support tagged and untagged member while the port still belongs to:		
	- Port-based VLAN		
	- 802.1Q VLAN whose VID is different from ISM VLAN		
	5. The IGMP snooping function in ISM VLAN is independent from global IGMP snooping		
	6. Support IGMP v1/v2/v3		
	7. Support up to 80 ISM profiles per system, each ISM VLAN can bind up to 16 profiles		
	8. Each ISM profile can support up to 32 address ranges		
VLAN Trunking	1. Port based 4K VLAN assignment (automation)		FCS
	2. Allow a physical network interface to carry and pass multiple tagged VLAN traffic so different VLAN information can be exchanged between switches		
Private VLAN			FCS
L3 features			
IP Interface	Support 16 IP interfaces		FCS
Gratuitous ARP			FCS
ARP Proxy			FCS
VRRP			FCS
IPv6 Neighbor Discovery (ND)			FCS
IPv6 tunneling			R2
L3 Routing			
Static Route	1. Support 16 IP interfaces		FCS
	2. Support 512 static routes		
QoS (Quality Of Service)			
802.1p support	Per system configurable 802.1p to CoS mapping		FCS
Number of Queues	8		FCS
Queue handling	Support following mode		FCS
	- Strict		

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	- Weighted Round Robin		
Class of Service	Be able to classify packets according to following contents:		FCS
	- VID		
	- 802.1p priority		
	- MAC address		
	- Ether type		
	IPv4 address & IPv6 address		
	- DSCP		
	- Protocol type		
	- TCP/UDP port number		
	IPv6 Traffic Class		
	- IPv6 flow label		
	- User defined packet content		
	per queue minimum bandwidth guarantee		
	per port bandwidth control(traffic shaping)		
	per flow bandwidth control(can be setup by ACL)		
QoS Flow Actions	Support following actions for flows		FCS
	- Remark 802.1p priority tag		
	- Remark TOS/DSCP tag		
	- Bandwidth Control		
Bandwidth Control	1. Support Port and Flow based bandwidth control		FCS
	2. Minimum granularity 64Kb/s		
	3. Ingress / Egress bandwidth control		
L3 Control Packet Filtering	support part of command dvmrp/pim/igmp query		R2
ACL (Access Control List)			
Access Profiles/Rules	1.Ingress ACL: support 6 profiles and 256 rules		FCS
	2. Each rule can be associated to a single port, multiple ports or all ports.		
	3.Support Ingress		
	4. Support following ACL policy packet contents		
	- VID		
	- MAC address		

	- Ether Type		
	- 802.1p priority		
	- DSCP		
	- IPv4 address / IPv6 address		
	- Protocol type		
	- TCP/UDP port		
	- IPv6 traffic class		
	- IPv6 flow label		
Based on User Defined Packet Content			FCS
Time Based ACL			FCS
CPU interface filtering (software ACL)	5 profiles, 100 rules/per profile (total : 500 rules)		FCS
Security			
SSH	Support v2		FCS
SSL	Support v1/v2/v3		FCS
Port Security	1. Support max 3072 MACs per port		FCS
	2. Support max 3072 MACs per VLAN		
	3. Send trap if violated		
Unicast/Broadcast/Multicast Storm Control	1. Allow specifying the threshold in terms of pkt/s for per port		FCS
	2. Allow specifying when broadcast / multicast / unknown unicast traffic hit the definable threshold, switch will disable the port. Only after the broadcast/ multicast / unknown unicast traffic fall below the definable threshold, the port will be activated again		
	3. Min granularity: 1 pps		
	4. Auto-recovery for disabled ports from broadcast storm		
Traffic Segmentation			FCS
D-Link Safeguard Engine	1. System will send out trap and log when CPU utilization hit the definable threshold		FCS
	2. Protect CPU from Broadcast / Multicast / Unicast flooding		
	3. Protect CPU from protocol control packets attack		
	4. Support Strict/Fuzzy mode		
DHCP Server Screening			FCS
ARP Spoofing Prevention			FCS

FDB security	'Show fdb security' command to show MACs inserted to FDB by security modules only for egress ports		FCS
NetBIOS/NetBEUI filter	Support RPC Port Mapper feature		R2
DoS prevention			FCS
AAA			
802.1X	1. Support Port-based Access Control		FCS
	2. Support Host-based Access Control		
	- Maximum 448 MACs per port		
	3. Be able to configure 802.1X packet transparency / filtering when 802.1X is disabled		
	4. Support EAP, OTP, TLS, TTLS and PEAP		
	5. Support MD5 authentication		
	6. Be able to force the 802.1X client to be off-line		
	7. Support 802.1X session timeout attribute		
	8. Can assign VLAN, ingress/egress bandwidth control, ACL and 802.1p default priority to the port based on the attributes dispatched from the RADIUS server.		
	9. Can authenticate client MAC address simultaneously		
	10. Dynamic VLAN Assignment and Guest VLAN can be enabled separately		
	11. 802.1X Host-based access control: Per port limitation=Per system limitation.		
Captive Portal	1. Support local/RADIUS database 2. Support Host-based authentication 3. Can authenticate client MAC address simultaneously 4. Support logout and logout timer function 5.Support HTTPS 6.WAC customized web page		FCS
MAC-based Access Control (MAC)	1. Support local/RADIUS database 2. Support Port-based authentication 3. Support Host-based authentication 4. Support dynamic VLAN assignment 5. Dynamic VLAN Assignment and Guest VLAN can be enabled separately.		FCS

IP-MAC-Port Binding	<ol style="list-style-type: none"> 1. Support D-Link IMPB v3.90 2. Support 510 address binding entries per device 3. ARP mode <ul style="list-style-type: none"> - ARP packet inspection 4. ACL mode <ul style="list-style-type: none"> - ARP packet inspection - IP packet inspection 5. Support IPv4/v6 DHCP snooping to dynamically collect IP-Mac-Port information 6. Send trap/syslog while access violation happens 7. Support IPv6 ND Snooping 		R2
Compound Authentication	<ol style="list-style-type: none"> 1. Can enable IMPB, MAC,802.1X or CP on the same port 2. Support following authentication criteria: <ul style="list-style-type: none"> - Any: must pass one of IMPB, 802.1X , MAC or CP - Dot1X_IMP: must pass both 802.1X & IMPB - IMPB_CP: must pass both IMPB & CP 		FCS
Guest VLAN	<ol style="list-style-type: none"> 1. Port-Based Guest VLAN 2. MAC-Based Guest VLAN 3. Be able to work with below authentication protocol: <ul style="list-style-type: none"> -802.1X -MAC-based Access Control 		FCS
Microsoft [®] NAP	<ol style="list-style-type: none"> 1. Support IPV4/IPv6 2. DHCP NAP 		FCS
RADIUS Accounting	<ol style="list-style-type: none"> 1. Support Network accounting (for 802.1X user) 2. Radius Accounting for CP 	RFC2866	FCS
RADIUS Auth. For Mgm Access	RFC2869 RADIUS extension standard for two attribute "Acct-Input-Gigawords & Acct-Output-Gigawords"	RFC2138, 2139	FCS
TACACS+ Auth. For Mgm Access		RFC1492	FCS
User privilege authorization by TACACS+ authentication			R2
"Enable Admin" for upgrading user privileges			FCS

User Account Privilege for Mgm Access	Support 4 level user account - User (Read only) - Operator (Read / Write, without user account modification) - Admin - Power User		FCS
Trusted Host	1. Trusted host with service type: (Telnet/SNMP/HTTP/HTTPS/SSH/Ping)		FCS
	2. Ability to input not only one IP for host, but IP address of the network with variable mask.		
	3. Support max 30 trust hosts		
	4. Trusted Host by Application		
User account length	1. Enlarge password length to 32 characters for user account		R2
Authentication Database Failover	Allows to configure the switch to check local database or bypass authentication when configured RADIUS server fails - Support CP, 802.1X, MAC, Compound authentication		FCS
	when radius server times out, bypass client authentication		
Block username "enable" at the first time login			FCS
Enhance greeting message	Support 24 lines, each line support 80 bytes		FCS
Command logging with account message			FCS
Management			
Web-based GUI	Compatible with following browsers	RFC2068	FCS
	- IE5.5 or later version		
	- Netscape		
	- Mozilla		
	- Firefox		
	- Safari		
	Support IPv4/v6		
	Support HTTPS Management		
CLI	1. Configurable CLI Terminal length		FCS
	2. Show system uptime on CLI		
Telnet Server/Client	Support IPv4	RFC854	FCS
	Support IPv6		

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TFTP client	Support IPv4	RFC783	FCS
	Support IPv6		
ZModem			FCS
SNMP	1. SNMP v1/v2c/v3	RFC1157, 1901, 1908, 2570, 2575	FCS
	2. SNMP over IPv6		
	3. Enable/Disable SNMP trap by each functional module 4. LBD v4.0 enhancement to support enable / disable SNMP trap		
SNMP Trap	SNMP Trap support following events - MAC Notification - Power and fan errors/recovery - Cold / Warm start-up - Link state change - STP state change - SNMP authentication failure - Access violation alert for IP-MAC-Port Binding & port security - Loopback occurred and recovery		FCS
SYSLOG	Support IPv4/ v6 log server	RFC3164, 3195	FCS
	Add the log for storm control block mode		
Trap/ Alarm/ Log Severity Control	Allow to divide the severity of logs into 8 levels, and config to trigger logging only for certain level of logs specify what 8 levels		FCS
RMON v1	Support 4 groups	RFC2819	FCS
RMON v2	Support Probe config group		FCS
sFlow	Per port		FCS
BootP/DHCP client	1. DHCP option 12	RFC951, 1542	R2
	2. DHCPv6 Client		
DHCP Auto-configuration			FCS
DHCP relay	1. DHCP relay option 82 2. Support DHCP local relay to insert option 82 information on DHCP broadcast packets in client's VLAN 3. DHCP local relay with keep, replace and drop action 4. Support DHCP relay option 12 5. Enable/disable DHCP Relay per VLAN 6. DHCP Relay Agent		FCS
			R2

Log admin password/IP change activity enhancement			R2
Multi Image			FCS
Multi Configuration			FCS
Port Description			FCS
Editable Login Banner			FCS
Editable System Prompt			FCS
CPU Monitoring	Allow monitoring the utilization of CPU via Web/ CLI/ SNMP		FCS
Time Setting	SNTP		FCS
0.0.0.0 IP Setting	IP 0.0.0.0 configurable		FCS
Password Encryption			FCS
Password Recovery	Password Recovery: Can delete a specific account or a specific account's password		FCS
LLDP	1.LLDP-MED	IEEE 802.1AB	FCS
	2.To take system IP address into LLDP management IP interface configuration		
NLB support	Single interface for layer 2(FDB) , Support max 10 L2 NLB entries		FCS
PPPoE Circuit-ID Tag Insertion			R2
ICMP	ICMP Ping broadcast IP enhancement TRACERT TRACERT IPv6 ICMP IPv6		FCS
Exception/Debug Handler			FCS
DDM-SFP information monitoring			R2
Send a trap after save	Send a trap after save, download/upload configuration file completed		FCS
SMTP	1. Transmitting critical events to a e-mail address		R2
	2. Support following events		
	- System start(reboot)		
	- Port link up or link down		
	- SNMP Authentication Failure		
	- Config or log saving by user		
	- Config reset by user		

	- TFTP update fw status		
SD Card management			R2
DLINK switch backdoor password			R2
OAM			
Cable Diagnostics			FCS
802.3ah Ethernet Link OAM	1. Support 802.3ah link layer remote loopback and discovery 2. 802.3ah D-Link extension: D-Link Unidirectional Link Detection (DULD)		FCS
	3. Support following dying gasp PDUs and traps: - Device reboot - All fan fail		R2
802.1ag			FCS
ITU-T Y.1731	Support following Y.1731 functions - Continuity Check Message (CCM) - Loopback Message (LBM) - Link Trace Message (LTM) - Alarm Indication Signal (AIS) - Locked (LCK)		FCS
Optical Transceiver Digital Diagnostic Monitoring (DDM)	1. Comply with SFF-8472 real time access to optical transceiver operating parameters 2. Support configurable warning and auto shut down threshold for following events - Internally measured transceiver temperature - Internally measured transceiver supply voltage - Measured TX bias current in uA - Measured TX output power in mW - Measured RX received optical power in mW 3. Support trap/log for both thresholds		R2
MIB			
MIBII			FCS
Bridge MIB		RFC1493	FCS
SNMPv2 MIB		RFC1907	FCS
RMON MIB		RFC1757, 2819	FCS
RMONv2 MIB		RFC2021	FCS
Ether-like MIB		RFC1643, 2358, 2665	FCS
802.1p MIB		RFC2674	FCS
IF MIB		RFC2233, 2863	FCS

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RADIUS Authentication Client MIB		RFC2618	FCS
RADIUS Accounting Client MIB		RFC2620	FCS
Ping & TRACEROUTE MIB	Can configure the frequency of ping	RFC2925	FCS
Private MIB			FCS
IPv6 MIB	Support RFC1213, 2465 and 4293		FCS
IP MIB		RFC4293	FCS
TCP MIB		RFC4022	FCS
Zone Defense MIB			FCS
Management Information for TCP/IP-based Internets		RFC1213	FCS
UDP		RFC1213	FCS
ICMP		RFC1213	FCS
ARP		RFC1213	FCS
Entity MIB		RFC2737	FCS
Green			
Power Saving	1. Support power saving function on all Gigabit RJ-45 ports		FCS
	2. Support 2 power saving modes		
	- Link down mode		
	- Cable length mode		
Time-based PoE	1. Be able to change the port PoE setting by the pre-defined time profile		FCS
WMM-PS (WMM Power Save)	The WiFi alliance certification for both access points and client devices uses mechanisms from the recently ratified IEEE 802.11e standard		FCS
802.11e U-APSD	Unscheduled Automatic Power Save Delivery		FCS
Intelligent Green Network (D-Link Green 3.0)	1. Power saving by Time-based PoE		R2
	- PoE ports can be turned on/off by port or system through schedule or admin control (enable/disable forever) via GUI or command.		
	2. Power Saving by LED Shut-Off:		
	- Powered LEDs can be turned on/off by port or system through schedule or admin control (enable/disable forever) via GUI or command.		
	3. Power Saving by Port Shut-Off:		
	- Each port on the system can be turned on/off by schedule or admin control (enable/disable		

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	forever) via GUI or command.		
	4. Power Saving by Port Standby:		
	- Each port on the system enters sleep mode by schedule or admin control (enable/disable forever) via GUI and command. The port can be turned on via either GUI, command, or any packet sent from link partner.		
	5. Power Saving by System Hibernation:		
	- System enters hibernation by schedule or admin control (enable/disable forever) via GUI and command. In this mode, switches get most power-saving figures since main chipsets (both MAC and PHY) are disabled for all ports, and energy required to power the CPU is minimal. The port can be turned on via command.		

2.2.3 DLMS

DLMS License	Detailed Description	Standard	Schedule
DWS-3160-AP12-LIC	Software Upgrade License for 12 APs. Increases number of supported APs by 12		FCS
DWS-3160-AP24-LIC	Software Upgrade License for 24 APs. Increases number of supported APs by 24		FCS

3 Mechanism and ID Design:

3.1 DWS-3160-24TC/24PC

Front Panel

DWS-3160-24TC



DWS-3160-24PC



Rear Panel

DWS-3160-24TC



DWS-3160-24PC



3.2 LED indicators

Location	LED Indicative	Color	Status	Description
Per Device	Power	Green	Solid Light	Power On
			Light off	Power Off
	Console	Green	Solid Light	Console on
			Light off	Console off
	RPS	Green	Blinking	When switch detects that RPS cable is connected
			Solid Light	RPS in using

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			Light off	RPS off
	Fan Err	Red	Blinking	When any of the fans has failed
			Light off	When all fans work normally
	Port LED Mode Indicator	Green	Solid Light	A LED Mode Select Button to switch Link/Act/Speed Mode
			Solid Light	A LED Mode Select Button to switch PoE Mode
LED Per 10/100/1000 Mbps Port	Link/Act/Speed Mode	Green	Solid Light	When there is a secure connection (or link) to 1000Mbps Ethernet device at any of the ports.
			Blinking	When there is reception or transmission of data occurring at 1000Mbps.
		Orange	Solid Light	When there is a secure connection (or link) to 10/100Mbps Ethernet device at any of the ports.
			Blinking	When there is reception or transmission of data occurring at 10/100Mbps.
		Off	Light off	No link
	PoE Mode	Green	Solid Light	Power feeding
		Orange	Solid Light	Error Condition
		Off	Light off	No Power feeding
LED Per SFP Port	Link/Act	Green	Solid Light	When there is a secure connection (or link) to 1000Mbps Ethernet device at any of the ports.
			Blinking	When there is reception or transmission of data occurring at 1000Mbps.
		Orange	Solid Light	When there is a secure connection (or link) to 100Mbps Ethernet device at any of the ports.
			Blinking	When there is reception or transmission of data occurring at 100Mbps.
		Off	Light off	No link
SD		Green	Solid Light	SD card plug-in

			Blinking	Read/Write
			Light off	No link
		Red	Solid Light	SD card failure

4 Physical & Environment

4.1 AC input

- 100-240 VAC, 50/60Hz
- Internal universal power supply

4.2 Operation Temperature

- 0-50°C

4.3 Storage Temperature

- -40-70°C

4.4 Humidity

- Operation: 10%-90% RH
- Storage: 5% ~ 90% RH

5 Environment Requirement

5.1 Surge/Lightening Protection

DGS-3160 equips a circuit protection with the AC power and complies with the standard of IEC 61000-4-5 Class 3 or ANSI/TIA-968-A. (IEC 61000-4-5 allows temporary out of function, but it needs back to normal in 10 minutes)

6 Certifications/Test Reports

6.1 EMC Certificates and Test Reports

Certification	Class	Detailed Description
CE	A	CE Report (89/336/EEC(EN55022/24), 2004/108/EC)
FCC	A	FCC report(FCC CFR 47 Part 15 B)
IC	A	IC report(ICES-003)
C-Tick	A	C-Tick Report(AS/NZS CISPR 22)
VCCI	A	VCCI Report(CISPR 22)

6.2 Safety Certificates and Test Reports

Certifications	Standards/Edition	Region
cUL Listed Mark	UL/CSA 60950-1	North/ South America
CB Report	IEC60950-1: 2001 EN60950-1 :2001	50s' list

Certifications	Standards/Edition	Region
CE LVD report (LVD : 2006/95/EC)	EN60950-1: 2006	European Union

6.3 RoHS

Description	Limitation/ ppm
Cadmium/ Cadmium Compounds	<80
Hexavalent Chromium/ Hexavalent Chromium Compounds	<800
Lead/ Lead Compounds	<800
Mercury/ Mercury Compounds	<800
Polybrominated Biphenyls (PBBs)	<800
Polybrominated Diphenylethers (PBDEs)	<800