Заличени лични данни на основание
чл. 36а, ал.3 от ЗОП

Features

Gigabit Expansion Solution

Highlight Performance

Easy to Use

Specifications

- Interface:

TL-SG1005D: 5 10/100/1000Mbps RJ45 Ports, Auto Negotiation, Auto [illegible]

TL-SG1008D: 8 10/100/1000Mbps RJ45 Ports, Auto Negotiation, Auto [illegible]

Standards: [illegible]

Transmission Method: Store and Forward

Advanced Functions: Green Technology, [illegible] Flow Control, [illegible]

Max Power Consumption (220V/50Hz):

TL-SG1005D: [illegible]W; TL-SG1008D: [illegible]

Power Supply: External Power Adapter (Output: [illegible] / 0.6A)

Certification: FCC, CE, [illegible]

Environment:

Operating Temperature: 0°C~40°C ([illegible])

Storage Temperature: -40°C~70°C (-40°F~[illegible])

Operating Humidity: 10%~90%RH, non-condensing

Storage Humidity: 5%~90%RH, non-condensing

- Dimensions (W x D x H):

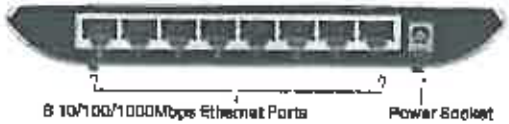
TL-SG1005D: 5.5 × 0.5 × 0.9 in. ([illegible] × [illegible] mm)

TL-SG1008D: 7.1 × 4.5 × 1.0 in. ([illegible] × [illegible] × 25.5 mm)

- TL-SG1005D:



- TL-SG1008D:



- Package Contents:

5/8-Port Gigabit Desktop Switch TL-SG1005D/TL-SG1008D

Power Adapter

Installation Guide

[illegible]

tp-link

5/8-Port
Gigabit Desktop Switch

Gigabi t Wi червено мрежа

Разширяване Solut йон



TL-SG1005D / TL-SG1008D

Преглед

ий-TL-SG1005D / TL-SG1008D Gigabit Desktop Ключове ви осигуряват лесен

чин за надграждане на вашата мрежа, за да 1000Mbps мрежа. Тъй като

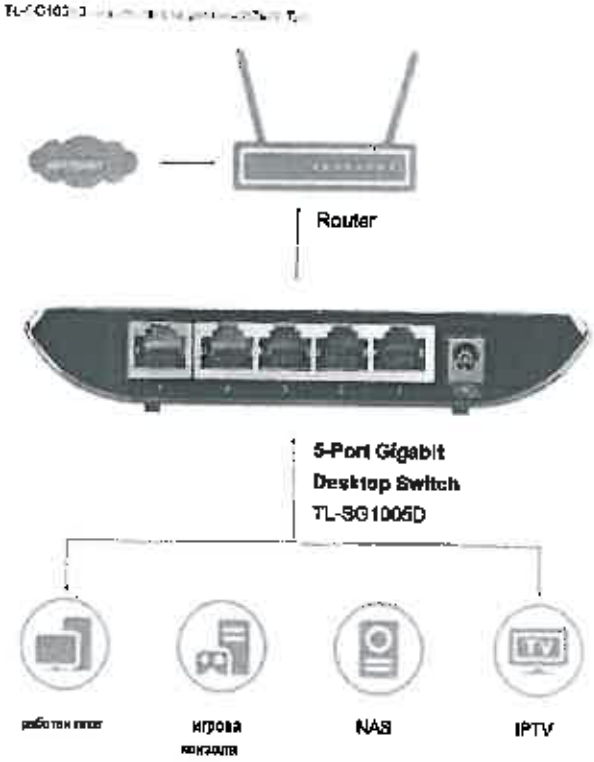
ички портове поддържа автоматично MDI / MDIX, че няма нужда да се

теснявате за вида кабел, за да използвате.

Освен това, с новаторски енергийно ефективни технологии,

TL-SG1005D / TL-SG1008D може да спаси консумация на енергия,

което ги прави екологично чист решение за вашия бизнес мрежа.









Gigabit Расширяване Solution

Highlight Изпълнение

Лесен за използване

[redacted]

Интерфейс:

[illegible]

[illegible]

Стандарти: [illegible]

Предаване Метод: [illegible]

Реализация функции: [illegible]

Мало консумирана енергия (220V / 50Hz):

[illegible]

Захранване: [illegible]

Сертификация: [illegible]

Изменяща среда:

[illegible]

[illegible]

[illegible]

[illegible]

• Размери (Ш x Д x В):

[illegible]

[illegible]

• TL-SG1005D:



5 10/100 / 1000Мбра Ethernet порове и support Socket

• TL-SG1008D:



8 10/100 / 1000Мбра Ethernet порове

Контакт

• Съдържание на пакета:

[illegible]

[illegible]

[redacted]

tp-link

16/24-Port Gigabit Switch

MODELS: TL-SG1016D/ TL-SG1024D Datasheet



Overview

The TL-SG1016D/TL-SG1024D Gigabit Ethernet Switch represents a high-performance, low-cost, simple, seamless, and standardized upgrade that allows you to transform your existing network and achieve 1000Mbps speeds. All 16/24 ports support auto MDI/MDIX, so there is no need to worry about cable types. Simply plug and play. With the innovative energy-efficient technology, the TL-SG1016D/TL-SG1024D can reduce power consumption and the vast majority of its packaging material can be recycled, making it an eco-friendly solution for your business network.

TP-Link Green Technology

The new TL-SG1016D/TL-SG1024D Gigabit Switch features a variety of energy-efficient technologies that allow you to increase your network capacity while consuming less power. The switch limits the carbon footprint of your network by automatically adjusting power consumption in accordance with link status and cable length. It complies with the EU RoHS, which prohibits the use of certain hazardous
materials, and most of the packaging material is recyclable.

Enhanced Performance

All 16/24 ports are Gigabit RJ-45 ports, allowing them to support large file transfers and makes them compatible with 10Mbps and 100Mbps Ethernet devices. Since both switches feature a non-blocking switching architecture, the TL-SG1016D and TL-SG1024D forward and filter packets at full wire-speed, achieving maximum throughput. 10KB Jumbo frame significantly improves performance during large file transfers. IEEE 802.3x flow control supports Full Duplex mode and backpressure for Half Duplex mode alleviates traffic congestion to make the TL-SG1016D/TL-SG1024D more reliable. This makes the TL-SG1016D/TL-SG1024D a perfect choice for upgrading your network to Gigabit speed while protecting your previous investment.

Easy of Use

The automated features of this gigabit switch make installation hassle-free. No configuration required. Auto MDI/MDIX eliminates the need for crossover cables. Auto-negotiation on each port senses the link speed of network devices (10,100, or 1000 Mbps) and intelligently adjusts for compatibility and optimal performance.

Specifications

Features & Performance

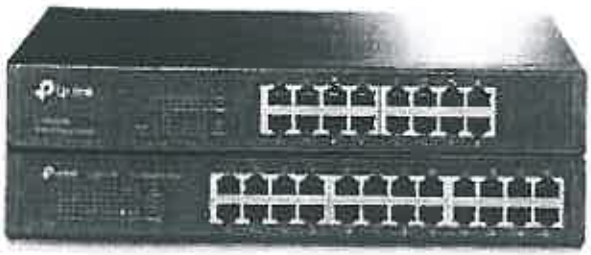




tp-link

16/24-Port Gigabit Switch

МОДЕЛИ: TL-SG1016D / TL-SG1024D пкст



Преглед

Нов TL-SG1016D / TL-SG1024D Gigabit Ethernet Switch предлагат висока производителност, ниска цена, просто, безпроблемно и
сте уверени [illegible], че ви позволяват да преминете към [illegible] по-бързи [illegible] от 1000Mbps. Всички
10/M портове поддържат автоматично MDI / MDIX, така че няма нужда да се притесняваме за видове кабели. Просто включете и
играйте. С изчистен, атрактивен дизайн, TL-SG1016D / TL-SG1024D може да намери концентратора на вашето
почтено място в [illegible] [illegible] [illegible]

Green Technology

Нечувствителният TL-SG1016D / TL-SG1024D Gigabit Switch реагира автоматично на количеството [illegible] и ефективност, като [illegible] за
установяване на връзка по кабела, дължина [illegible] и [illegible]. Превключвателят [illegible] за [illegible] в
режим, [illegible] в [illegible] по кабела [illegible] и [illegible] със [illegible] на [illegible] и [illegible] на кабела. Точно
светлинните [illegible] SC, [illegible] [illegible] на [illegible] [illegible].

[illegible] [illegible] [illegible] [

Спецификации

Характеристики и производителност

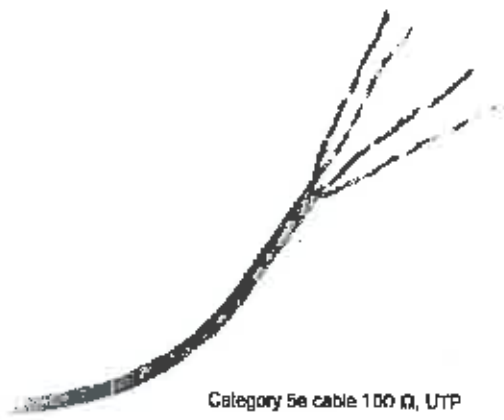




СЪОТВЕТСТВО С ОРИГИНА

3M

Volition™
Category 5e cable 100 Ω, UTP



Category 5e cable 100 Ω, UTP

Part of the 3M™ Volition™ Network Solutions, this 250 MHz UTP cable is a Category 5e TIA/EIA 568 and Class D ISO 11801 and EN 50173 approved range.

The green sheath has length marking which is easy and convenient for the installer and gives a clear identification of cable and link lengths.

A polyester tape between the sheath and twisted pairs allows easier stripping.

As a 3M™ branded product, it offers 3M™ system identity for corporate and warranty approval.

Applications

- IEEE 802.3-IEEE802.5
- FDDI
- ATM
- RNIS

Standards

- EN 50288-1
- EN 50173
- ISO/IEC 11801
- TIA/EIA 568
- IEC 61156-5

Flammability Performances

Fire retardant	IEC 60332-1
Halogen free (LSOH versions)	IEC 60754-1

Installation Characteristics

Maximum pulling tension (N)	80
Minimum bend radius during installation (mm):	40
Minimum installed bend radius (mm)	20
Nominal weight	30 kg/km
Temperature rating (°C)	
Installation	0 to +50
Operation	-20 to +60

Features

- Excellent electrical performance - tested to 250 MHz
- Length markings on the cable sheath
- Low smoke, zero halogen (LSOH) and PVC versions available

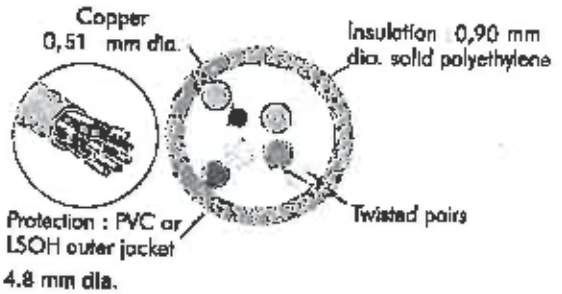
Benefits

- Good headroom over Category 5e performance
- Installer friendly
- Solutions for all levels of fire protection

Specifications

UTP Category 5e
Twisted pair cable

Electrical characteristics at 20° C :	
Conductor resistance at 20° C (max.)	98.6 Ω /km
Dielectric strength at 50 Hz	1 kV/1 min
Insulation resistance (min.)	5000 MΩ/km
Velocity (nom.)	66%
Characteristic impedance from 1 to 100 MHz	100 +/-15 Ω
Mutual capacitance (nom)	<55 pF/m
Propagation delay skew	10 ns/100 m



Cable Performance

Frequency (MHz)		1	4	10	16	20	31.25	62.5	100	155	200
Max attenuat.	Typical value	1.9	3.8	6.0	7.5	8.5	10.6	15.2	19.5	25.0	28.0
(dB/100 m)	Cat 5e (max.)	2.1	4.1	6.5	8.3	9.3	11.7	17.0	22.0	-	-
Min.NEXT	Typical value	72.0	63.0	57.0	54.0	52.0	49.0	45.0	42.0	39.0	3.0
(dB)	Cat 5e (min.)	65.3	56.3	50.3	47.3	45.8	42.9	38.4	35.3	-	-
Min.ACR	Typical value	70.1	59.2	51.0	46.5	43.5	38.4	29.8	22.5	14.0	9.0
(dB)	Cat 5e (min.)	63.2	52.2	43.8	39.0	36.5	31.2	21.4	13.3	-	-
PS NEXT	Typical value	69.0	60.0	54.0	51.0	49.0	46.0	42.0	39.0	36.0	34.0
(dB)	Cat 5e (min.)	62.3	53.3	47.3	44.3	42.8	39.9	35.4	32.3	-	-
ELFEXT	Typical value	75.0	63.0	55.0	51.0	48.0	45.0	39.0	35.0	31.0	29.0
(dB)	Cat 5e (min.)	64.0	52.0	44.0	40.0	38.0	34.0	28.0	24.0	-	-
PS ELFEXT	Typical value	72.0	60.0	52.0	48.0	45.0	42.0	36.0	32.0	28.0	26.0
(dB)	Cat 5e (min.)	61.0	49.0	41.0	37.0	35.0	31.0	25.0	21.0	-	-
Return Loss	Typical value	25.0	25.0	25.0	25.0	25.0	25.0	23.6	23.0	22.0	21.0
(dB)	Cat 5e (min.)	20.0	23.0	25.0	25.0	25.0	23.6	21.6	20.1	-	-

Ordering Information

	Ref.-No.
Volition™, Category 5e cable, 100 Ω	
Volition™ Cat 5e Cable, UTP, PVC, 4 pairs, 305m Box	**VOL-5EUP4-305**
Volition™ Cat 5e Cable, UTP, PVC, 4 pairs, 1000m Drum	**VOL-5EUP4-1000**
Volition™ Cat 5e Cable, UTP, PVC, 2x4 pairs, 1000m Drum	**VOL-5EUP8-1000**
Volition™ Cat 5e Cable, UTP, LSOH, 4 pairs, 305m Box	**VOL-5EUL4-305**
Volition™ Cat 5e Cable, UTP, LSOH, 4 pairs, 1000m Drum	**VOL-5EUL4-1000**

Item/unit: 1 box or drum

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If any goods supplied or process ed by or on behalf of 3M prove on inspection to be def tive in material or workmanship, 3M will (at its option) replace the same or refund to the bu the price of the goods or services. Except as set out above, all warranties and conditio whether express or implied, statutory or otherwise are excluded to the fullest extent permis ble at law.

3M

3M Telecommunications
Europe, Middle East & North Africa
c/o Quante AG
Carl-Schurz-Straße 1 · 41453 Neuss · Germany

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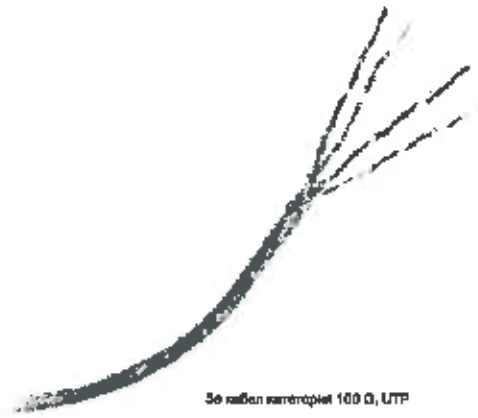
Fax: ++49 (0)2131 / 14-5998
Internet: www.3MTelecommunications.com

3M

ВОЛЯ ™

5е кабел категория 100 Ω, UTP



5е кабел категория 100 Ω, UTP

Част от ™ воля ™ мрежови решения на 3M, таки 250 MHz UTP кабел в категория 5е TIA / EIA 568 и клас D ISO 11801 и EN 50173, одобрен диапазон.

Заменяет обвивка или дълнина шаркировка, които в лесно и удобна за монтажника и дава лоха идентификация на кабелни и лаке дълнини.

А монтаж лента между обвивката и усумки дасбка позволява по-лесно изчистване.

Като 3M ъ видно продукт, кой продлена 3M ъ основана за идентичност характеристика гарантия и одобрения.

Приложения	Стандарти
• IEEE 802.3-IEEE802.5	- ISO 50288-1
• FDDI	- ISO 50 173
• Ethernet	• ISO / IEC 11801
• RNIS	- TIA / EIA 568
	- IEC 61156-5

Запалимост Изпълнения

Пожара квартирата	IEC 60332-1
Халогенни свободни (LSOH версия)	IEC 60754-1

Монтаж Характеристика

Минимално напрежение задвижване (N)	80
Минимален радиус навиване при краве на монтажните (мм): 40	
Минимален радиус навиване при малей (мм)	20
Минимално тегло	30 кг / км
Температура оценка (° C)	
Инсталация	0-60
операция	- 20-60

Характеристика

- Оптично електрическо изпълнение – тестовано 250 MHz
- Дълнина шаркировката и цвет обвивката на кабела
- Ниска дим нула халоген (LSOH) и PVC версия

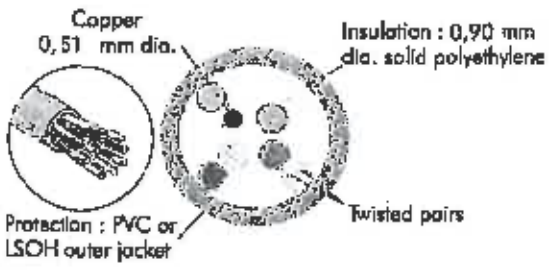
Полза

- Доброволно настоящата над Категория 5е Пиша изпълнения
- Кабелен фиксирован
- Решения на всички нива на защита от пожар

КОНТР
АД
1

Спецификации

UTP Category 5e
Twisted pair cable



Електрически характеристики при 20 °C:	
Максимално съпротивление при 20 °C (макс.)	95.6 Ω / km
Диелектрична якост при 50 Hz	1 кВ / 1мин
Изолационно съпротивление (мин.)	5000 MΩ / km
Скорост (ном.)	66%
Характерно импеданс от 1 до 100 MHz	100 +/- 15 Ω
Взаимен капацитет (ном)	<55 PF / m
Максимална разлика в скоростта на разпространение	10 NS / 100 м

4.8 mm Диаметър.

Кабелна Изпълнение

Честота (MHz)		1	4	10	16	20	31.25	62,5 100		155	200
Мин. затихване	Типична стойност	1.9	3.8	6.0	7.9	8.8	10.5	15.2	18.5	25,0	28.0
(Db / 100 м)	Cat 5e (ном.)	2.1	4.1	6.5	8.2	9.3	11.7	17.0	22.0	-	-
NEXT	Типична стойност	72.0	63.0	57.0	54.0	52.0	49.0	46.0	42.0	39.0	3.0
(dB)	Cat 5e (ном.)	65.3	59.3	50.3	47.3	45.8	42.8	38.4	35.3	-	-
MIN.ACR	Типична стойност	70.1	59.2	51.0	46.5	43.5	38.4	29.8	22.5	14.0	6.0
(dB)	Cat 5e (ном.)	63.2	53.2	43.8	39.0	36.5	31.2	21.4	13.3	-	-
PS NEXT	Типична стойност	69.0	60.0	54.0	51.0	49.0	46.0	42.0	39.0	36.0	34.0
(dB)	Cat 5e (ном.)	62.5	53.5	47.5	44.5	42.9	39.9	35.4	32.3	-	-
ELFEXT	Типична стойност	75.0	63.0	55.0	51.0	49.0	45.0	39.0	35.0	31.0	29.0
(dB)	Cat 5e (ном.)	64.0	52.0	44.0	40.0	38.0	34.0	28.0	24.0	-	-
PS ELFEXT	Типична стойност	72.0	60.0	52.0	48.0	46.0	42.0	36.0	32.0	28.0	26.0
(dB)	Cat 5e (ном.)	61.0	49.0	41.0	37.0	35.0	31.0	25.0	21.0	-	-
Загуби за връщане	Типична стойност	25.0	25.0	25.0	25.0	25.0	25.0	23.0	23.0	22.0	21.0
(dB)	Cat 5e (ном.)	20.0	23.0	25.0	25.0	25.0	23.6	21.5	20.1	-	-

Информация за поръчка

Ref.-No.

VolTitan ™, за кабели категория, 100 ГЦ.

Волта ™ Cat 5e кабел, UTP, PVC, 4 двойки, 305 m Box	VOL-5EUP4-305
Волта ™ Cat 5e кабел, UTP, PVC, 4 Двойки, 1000m Барабан	VOL-5EUP4-1000
Волта ™ Cat 5e кабел, UTP, PVC, 2x4 двойки, 1 000 метров барабан	VOL-5EUP8-1000
VolTitan ™ Cat 5e кабел, UTP, LSOH, 4 двойки, 305 m Box	VOL-5EULA-305
VolTitan ™ Cat 5e кабел, UTP, LSOH, 4 двойки, 1000m барабан	VOL-5EULA-1000

T / конектор: 1 кутия или барабан

3M и логото са търговски марки на 3M. Cicanle е търговска марка на Cicanle AG.

Важно съобщение

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3M

3M Телекомуникации

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Интернет: www.3MTelecommunications.com

КОПИРАК
АД 1

8. Конектор RJ-45 IC Intracom, 151615



Data Sheet

Cisco Catalyst 3850 Series Switches

The digital transformation: Converged wired and wireless access and aggregation

The promise of digital for your business is all about innovating more quickly while reducing risk, cost, and complexity. It will be your network that forms the foundation of your business's transformation.

But supporting your digital organization will require your network to move beyond just connectivity to be a platform for insights, automation, and security.

This is the power of the Cisco® Digital Network Architecture (Cisco DNA®).

Cisco DNA is a monumental shift on how to design and build networks. The Cisco Catalyst® 3850 Series, as part of the Cisco DNA portfolio of next-generation enterprise-class scalable Ethernet and Multigigabit Ethernet access and aggregation layer switches, securely enables time-saving virtualization, greater automation, and valuable analytics data that directly address your evolving business needs, including less cost to install and operate.

The Cisco Catalyst 3850 Series provides capabilities that ideally suited to support the convergence of wired and wireless access. The new Cisco Unified Access Data® Plane (UADP) Application-Specific Integrated Circuit (ASIC) powers the switch and enables uniform wired-wireless policy enforcement, application visibility, flexibility, and application optimization. This convergence is built on the resilience of the new and improved Cisco StackWise®-480 technology.

The Cisco Catalyst 3850 Series switches support full IEEE Cisco Power over Ethernet Plus (PoE+), Cisco Universal Power Over Ethernet (Cisco UPOE®), modular and field-replaceable network modules, RJ-45 and fiber-based downlink interfaces, and redundant fans and power supplies.

ДЛЯ СЛУЖЕБНОГО ПОЛЬЗОВАНИЯ

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Licensing	58
Cisco and Partner Services	59
Ordering Information	60
Cisco Capital	66

Product Overview

- Flexible business continuity capability with:
  - Up to 480 Gbps of stacking capacity per switch (96-port 10 Gig models)
  - Support for any-to-any resilient pathways and cross-member aggregation (switch or stack)
- 12 and 24 10/100/1000 ports PoE and Cisco UPOE variants with Energy Efficient Ethernet (EEE)
- 24 and 48 10/100/1000 ports PoE+ and Cisco UPOE models with Energy Efficient Ethernet (EEE)
- 2- and 4-port 1 Gigabit Ethernet SFP-based models
- 2- and 4-port 10 Gigabit Ethernet SFP+-based models
- 48-port 1/10 Gigabit Ethernet SFP+ models with 4 fixed 40 Gigabit Ethernet QSFP+ uplinks
- Cisco StackWise-480 technology provides 480 Gbps of stacking bandwidth and resiliency with 1:N master election and hot swap
- Cisco StackPower2 technology provides power sharing across stack members for power redundancy[1]
- Five optional uplink modules[2] with 4 x Gigabit Ethernet, 2 x 10 Gigabit Ethernet, 2 x 10 Gigabit Ethernet, 2 x 10 Gigabit Ethernet, or 4 x Gigabit Ethernet QSFP+ ports
- Dual redundant, modular power supplies and fans for fault tolerance, providing 1+1 redundancy
- Full IEEE 802.3at (PoE+) with 60W power on all copper ports in a Rack Unit (1RU) form factor
- Cisco UPOE with 60W power per port in a Rack Unit (1RU) form factor
- IEEE 802.3bz (2.5G/5G BASE-T) to go beyond 1 Gb/s with existing Cat5e and Cat6
- IEEE 802.1 AVB Bridging (AVB) built-in to provide the hooks for AVB ecosystems for bounding improved time synchronization and QoS
- Software support for IPv4 and IPv6 routing, modular operating system, modular Quality of Service (QoS), flexible NetFlow (FNF), and enhanced security features
- Single universal Cisco IOS® Software image across all Access switches, providing an easy upgrade path for software features
- Cisco DNA services delivered through Cisco ONE™ Software, providing simplified, intelligent solutions with license portability and flexibility
- Support for MACsec-128 with the powerful MACSec-256-bit for SFP+ and Multigigabit models and 128-bit encryption algorithm available on all models
- Enhanced Limited Lifetime Warranty (E-LLW) with next-Business Day (NBD) advance hardware replacement, 90-day access to Cisco Technical Assistance Center (TAC) support

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[1] Stacking cables and power cables are ordered separately (4 power cables per switch).

[2] Uplink modules are ordered separately and a maximum of 4 per switch.

[3] Only the 4-port 10 Gigabit Ethernet module is available with the 24-port 10/100/1000 PoE+ switch models.

[4] Available only with Cisco DNA Subscription. Gigabit Ethernet port switch models.

ВЕРНО С ОРИГИНА

Switch Models and Configurations

All switches ship with one of the five power supplies (350 VAC, [illegible] VAC, 350 VAC, [illegible] VAC, or 450 VDC). Figures [illegible] through [illegible] show the Cisco Catalyst 3850 Series Switches.



Figure 1.
Cisco Catalyst 3850 Series Switches



Figure 2.
Cisco Catalyst 3850 Series Switches with 12 and 24 a/10 Gigabit Ethernet SFP ports



Figure 3.
Cisco Catalyst 3850 Series Switches with 12 and 24 a Gigabit Ethernet SFP ports



Figure 4.
Cisco Catalyst 3850 Series Switches with 10 Gigabit Ethernet SFP ports

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[illegible]

[illegible]

[illegible] С ОРИГИ[illegible]

Table [illegible] Cisco Catalyst [illegible] configurations

Table [illegible] Cisco Catalyst [illegible] configurations

Model	Total 10/100/1000 or SFP or SFP+ ports	Default AC power supply	Available PoE power	PoE budget with 1200W secondary PS	StackWise 480	StackPower
WS-C3850-24T	[illegible]	350WAC	[illegible]		Yes	[illegible]
WS-C3850-48T	[illegible]					
WS-C3850-24P	[illegible]	715WAC	[illegible]	[illegible]		
WS-C3850-48P	[illegible]					
WS-C3850-48P	48 PoE+	[illegible]WAC	800W	[illegible]		
WS-C3850-24U	24 UPOE	[illegible]	[illegible]	[illegible]		
WS-C3850-48U	48 UPOE	[illegible]WAC	800W	[illegible]		
WS-C3850-24XU	24 UPOE [illegible]	[illegible]	[illegible]	[illegible]		
WS-C3850-12X48U	48 UPOE (with [illegible] Cisco Ports)	[illegible]WAC	600W	[illegible]		
WS-C3850-12S	[illegible]	[illegible]				
WS-C3850-24S	[illegible]					
WS-C3850-12XS	[illegible] SFP+	350WAC				
WS-C3850-24XS	[illegible] SFP+	715WAC				
WS-C3850-48XS	[illegible] SFP+	350WAC ([illegible])			No	No

[illegible]

Network modules

The Cisco Catalyst 3850 Series Switches [illegible] optional network modules for uplink ports. The default switch configuration does not include the network module. At the time of switch purchase the customer has the flexibility to choose from the network modules described in Table 1.

Figure 5 shows the following network modules:

- 4 x Gigabit Ethernet with Small Form-Factor Pluggable (SFP) receptacles
- 2 x 10 Gigabit Ethernet with SFP+ or 4 x Gigabit Ethernet with SFP receptacles
- 4 x 10 Gigabit Ethernet with SFP+ receptacles (supported only on the 48-port Gigabit Ethernet models or on the 24-port or higher 10 Gigabit Ethernet models)



Figure 5.
Network modules with four Gigabit Ethernet, two 10 Gigabit Ethernet SFP+, or four 10 Gigabit Ethernet SFP+ interfaces

Figure 6 shows the following network modules:

- 8 x 10 Gigabit Ethernet with Small Form-Factor Pluggable+ (SFP+) receptacles
- 2 x 40 Gigabit Ethernet with Quad Small Form-Factor Pluggable+ (QSFP+) receptacles

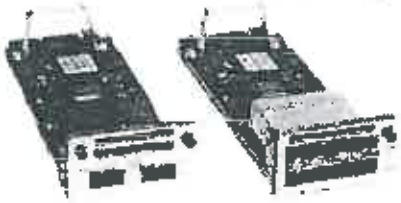

Figure 6.
Network modules with two 40 Gigabit Ethernet QSFP+ or eight 10 Gigabit Ethernet SFP+ interfaces

The C3850-NM-4-10G module is supported only on the 48-port Gigabit Ethernet models or on the 24-port or higher 10 Gigabit Ethernet models. The C3850-NM-8-10G and C3850-NM-2-10G modules are supported on the 24-port and 48-port multigigabit switches and also on the 24-port 10G SFP+ switch model. The C3850-NM-4-1G and C3850-NM-2-10G modules are not supported on the 24-port and 24-port SFP+ models.

Table 1. Network module compatibility matrix

Model	Network modules
WS-C3850-24T	C3850-NM-4-1G, C3850-NM-2-10G
[illegible]	[illegible]

[illegible]

[redacted]

Model	Network modules
WS-C3850-24P	C3850-NM-4-1G, C3850-NM-2-10G
WS-C3850-48P	C3850-NM-4-1G, C3850-NM-2-10G, C3850-NM-4-10G
WS-C3850-24U	C3850-NM-4-1G, C3850-NM-2-10G
WS-C3850-48U	C3850-NM-4-1G, C3850-NM-2-10G, C3850-NM-4-10G
WS-C3850-24T	C3850-NM-4-1G, C3850-NM-2-10G, C3850-NM-4-10G, C3850-NM-8-10G, C3850-NM-2-40G
WS-C3850-12X48U	C3850-NM-4-1G, C3850-NM-2-10G, C3850-NM-4-10G, C3850-NM-8-10G, C3850-NM-2-40G
WS-C3850-12S	C3850-NM-4-1G, C3850-NM-2-10G
WS-C3850-24XS	C3850-NM-4-1G, C3850-NM-2-10G
WS-C3850-12XS	C3850-NM-4-10G
WS-C3850-24XU	C3850-NM-4-10G, C3850-NM-8-10G, C3850-NM-2-40G
WS-C3850-48XS	None

An SFP+ receptacle supports both 10 Gigabit Ethernet and Gigabit Ethernet modules, allowing customers to use their investment in Gigabit Ethernet SFP modules and upgrade to 10 Gigabit Ethernet when business demands change without having to do a costly, extensive upgrade of the access switch. In contrast, SFP receptacles can be used only as Gigabit Ethernet ports, as shown in the examples in Table 3.

Table 3. Network module configuration examples

Network module	Interface options	
	10 Gigabit Ethernet SFP+ ports	Gigabit Ethernet SFP ports
4 x Gigabit Ethernet	0	4
4 x Gigabit Ethernet and 2 x Gigabit Ethernet network modules	2	0
	1	2
	0	4
4 x Gigabit Ethernet and 4 x Gigabit Ethernet network modules	4	0
	0	4
	2	2
	1	3
	4	0

COPIA C ORIGINAL

Dual redundant modular power supplies

The Cisco Catalyst [illegible] Switches support dual redundant power supplies.* The switch ships with one power supply by default, and the second power supply can be purchased at the time of ordering the switch or at a later time. If only one power supply is installed, it should always be in power supply bay [illegible]. The switch also ships with three field-replaceable fans. (See Figure [illegible].)



Figure [illegible].
Dual redundant power supplies

Table [illegible] shows the different power supplies available in these switches and available PoE power.

Table [illegible]. Power supply models

Model	Default power supply	Available PoE power
24-port data switch	PWR-C1-350WAC	-
48-port data switch		
24-port PoE switch	PWR-C1-[illegible]WAC	[illegible]
48-port PoE switch		
48-port full PoE switch	PWR-C1-1100WAC	800W
24-port UPOE switch	PWR-C1-[illegible]WAC	[illegible]
48-port UPOE switch		
24-port Multigigabit UPOE switch	PWR-C1-1100WAC	580W
48-port Multigigabit UPOE switch	PWR-C1-[illegible]WAC	[illegible]
12-port SFP switch	PWR-C1-350WAC	-
24-port SFP switch		
48-port SFP switch	PWR-C1-350WAC	-

*The [illegible] switch [illegible] only [illegible] power supplies [illegible]

[illegible]

Model	Default power supply	Available PoE power
24-port SFP+ switch	PWR-C1-715WAC	
48-port SFP+ switch (WS-C3850-48XS-S and WS-C3850-48XS-E)	PWR-C3-750WAC-I	
48-port SFP+ switch (WS-C3850-48XS-F-S and WS-C3850-48XS-F-E)	PWR-C3-750WAC-I	

In addition to the power supplies listed in Table 5, a 440WDC power supply is available as a configuration option and also as a spare (that is, it can be ordered separately) on all switch models. The DC power supply also delivers PoE capabilities for maximum flexibility (refer to Table 6 for available PoE budget with DC power supplies). Customers can mix and match the AC and DC power supplies in the two available power supply slots. Any of these power supplies can be installed in any of the switches.

Table 5. Available PoE with DC power supply

Model	Number of 440WDC power supplies	Total available PoE budget
24-port PoE switch	1	[illegible]
	2	660W
48-port PoE switch	1	[illegible]
	2	[illegible]
24-port Multigigabit UPOE switch	1	360W
48-port Multigigabit UPOE switch	1	[illegible]

Power over Ethernet Plus (PoE+)

In addition to PoE (IEEE 802.3af), the Cisco Catalyst 3850 Series Switches support PoE+ (IEEE 802.3at standard), which provides up to 30W of power per port. The Cisco Catalyst 3850 Series Switches can provide a lower Total Cost of Ownership (TCO) for deployments that incorporate Cisco IP phones, Cisco Aironet wireless LAN (WLAN) access points, or any IEEE 802.3at-compliant end device. PoE removes the need for wall power to each PoE-enabled device and eliminates the cost for additional electrical cabling and circuits that would otherwise be necessary in IP phone and WLAN deployments. Table 6 shows the power supply combinations required for different PoE needs.

Table 6. Power supply requirements for PoE and PoE+

	24-port PoE switch	48-port PoE switch
PoE on all ports (15.4W per port)	One PWR-C1-715WAC	One PWR-C1-715WAC or two PWR-C1-715WAC
PoE+ on all ports (30W per port)	[illegible]	[illegible]

СЕРНО С ОРИГИНА[illegible]

Cisco Universal Power over Ethernet (Cisco UPOE)

Cisco UPOE (Table 7) is a cabling infrastructure technology, offering the following services and benefits:

- Multipurpose: Enables multiple types of devices such as Security, VoIP clients, RFID tag systems, building automation systems, physical access control devices, IP video surveillance cameras, personal Cisco TelePresence® systems, and physical access control devices
- High availability: Supports uninterrupted services, a requirement for critical applications (e.g.,)
- Low-cost: Operates by providing power reliably only as long as necessary, consolidating backup power into the wiring closet
- Future-ready: Meets all new campus access networking infrastructures by eliminating the need for a power outlet for every endpoint

Table 7. Power supply requirements for Cisco UPOE

	24-port UPOE switch	48-port UPOE switch	24-port multigigabit UPOE switch	48-port multigigabit UPOE switch
UPOE (60W per port) on all (24 port switch) or first 24 ports (48 port switch)	One PWR-C1-1100WAC and one PWR-C1-715WAC	Two PWR-C1-1100WAC	Two PWR-C1-1100WAC	Two PWR-C1-1100WAC

Cisco Catalyst Multigigabit Ethernet technology

Cisco Multigigabit Ethernet is a unique Cisco innovation to the new Cisco Catalyst Ethernet access switches. With the ever-increasing growth of bandwidth and new wireless applications, wireless devices are promoting the demand for more network bandwidth. This creates a need for a technology that supports speeds higher than 1 Gbps on all cabling infrastructure. Cisco Multigigabit technology allows you to achieve port speeds from 1 Gbps through to 10 Gbps over traditional Cat 5e cabling or above. In addition, the Multigigabit ports on select Cisco Catalyst switches support UPOE, which is increasingly important for next-generation dual-radio wireless access and Internet of Things (IoT) access points.

Cisco Multigigabit technology offers significant benefits for a diverse range of speeds, cable types, and PoE power. The benefits can be grouped into three different areas:

- **Multiple speeds:** Cisco Multigigabit technology supports autonegotiation of multiple speeds on switch ports. The supported speeds are 100 Mbps, 2.5 Gbps, 5 Gbps, and 10 Gbps on Cat 5e cable and up to 10 Gbps over Cat 6, 6a, or 7 cabling.
- **Cable types:** The technology supports a wide range of cable types, including Cat 5e, Cat 6, and Cat 6a or above.
- **PoE power:** The technology supports PoE, PoE+, and UPOE for all the supported speeds and cable types.

For more information, visit http://www.cisco.com/c/en/us/solutions/enterprise-networks/catalyst-multigigabit-switching/index.html.

SD-Access architecture

[illegible] you could give [illegible] and provide [illegible] without compromise.

Cisco Software-Defined Access (SD-Access) is the [illegible] solution for the enterprise. Built on the principles of Cisco Digital Network Architecture (Cisco DNA™), SD-Access provides automated, end-to-end segmentation to separate user, device, and application traffic without the need to redesign the network. SD-Access automates user access policy so organizations can make sure the right policies are established for any user or device with any application across the network. This is accomplished with a single network fabric across LAN and WLAN, which creates a consistent user experience anywhere without compromising on security.

Organizations have many challenges today in managing the network to drive business outcomes. These limitations are due to manual configuration and fragmented tool offerings. SD-Access provides:

- A transformational management solution that reduces operational expenses and enhances business agility
- Consistent management of wired and wireless network provisioning and policy
- Automated network segmentation and group-based policy
- Contextual insight for fast issue resolution and capacity planning
- Open and programmable interfaces for integration with third-party solutions

For more information about the SD-Access architecture, refer to the SD-Access Solution Design Guide.

SD-Access licensing

To be able to benefit from the SD-Access architecture, you must [illegible] add-on licensing packages. Such licensing packages include the Cisco DNA Essentials and Cisco DNA Advantage options. Add-on licenses have to be purchased for 3- or 5-year [illegible] are also known as term-based licenses). Product SKUs for these packages are given in Table 1 below.

Ordering and managing license entitlements securely through Cisco Smart Accounts by using the Cisco Smart Software Manager (SSM) enables you to order devices and licensing packages and also to manage your software licenses from a centralized website. You can set up Cisco SSM to receive daily email alerts and to be notified of expiring add-on licenses that you want to renew. When the license term expires, you can either renew the add-on license to continue using it or deactivate the add-on license and then reload the switch to continue operating with the base license capabilities.

Note: You are not required to deploy Cisco DNA Center just to use one of the license packages.

Table 1 shows the features included in the Essentials and Advantage packages.

Table 1. Essentials and Advantage package features

Feature	Cisco DNA Essentials	Cisco DNA Advantage
Day-0 network [illegible] automation Cisco Network Plug-and-Play application, bootstrapping, device discovery	✓	✓
Element management Discovery, inventory, topology, software image management, configuration management, reporting, alarms	✓	✓
Electronic software distribution Patching	✓	✓
NetFlow monitoring Network, application, & application group performance monitoring, Cisco Performance Monitor, Cisco Application Visibility and Control (AVC)	✓	✓

[illegible] Rights Reserved. [illegible] Cisco Public

[illegible]

ИДЕНТИЧНО С ОРИГИНАЛОМ

[illegible] 3

Feature	Cisco DNA Essentials	Cisco DNA Advantage
[illegible]		
Sustainable configuration and monitoring Easy GUI application	✓	✓
Policy based automation SD-[illegible]	✓	✓
[illegible]		
Network analytics and analytics Insights gained from analytics and machine learning for the network, clients and applications that cover on-boarding, connectivity, and performance	✓	✓

Table 9 shows the product IDs for these licenses.

Table 9. Essentials and Advantage package product IDs

	[illegible]	[illegible]
12-port	C3850-DNA-E-[illegible]	C3850 DNA Essentials, 12-port term licenses
	C3850-DNA-E-[illegible]-3Y	C3850 DNA Essentials, 12-port, 3-year term license
	C3850-DNA-E-[illegible]-5Y	C3850 DNA Essentials, 12-port, 5-year term license
	C3850-DNA-A-[illegible]	C3850 DNA Advantage, 12-port term licenses
	C3850-DNA-A-[illegible]-3Y	C3850 DNA Advantage, 12-port, 3-year term license
	C3850-DNA-A-[illegible]-5Y	C3850 DNA Advantage, 12-port, 5-year term license
24-port	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
48-port	C3850-DNA-E-[illegible]	C3850 DNA Essentials, 48-port term licenses
	C3850-DNA-E-[illegible]-3Y	C3850 DNA Essentials, 48-port, 3-year term license
	C3850-DNA-E-48-5Y	C3850 DNA Essentials, 48-port, 5-year term license
	C3850-DNA-A-[illegible]	C3850 DNA Advantage, 48-port term licenses
	C3850-DNA-A-48-3Y	C3850 DNA Advantage, 48-port, 3-year term license
	C3850-DNA-A-48-5Y	C3850 DNA Advantage, 48-port, 5-year term license

Cisco [illegible] Affiliates. All [illegible]

ВЯРНО С ОРИГ

	Product ID	Description
Spares	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]

Benefits

Converged wired plus wireless access

The Cisco Catalyst 3850 is the first stackable access switching platform that enables wired plus wireless services on a single Cisco IOS XE software-based platform. With this, Cisco has pioneered a host of rich capabilities such as high availability based on Stateful Switchover (SSO) on stacking, granular QoS, security, and Flexible NetFlow (FNF) across wired and wireless in a seamless fashion. Also, the wired plus wireless features are bundled into a single Cisco IOS software image, which reduces the number of software images that users have to qualify/certify before enabling them in their network. The single console port for Command-Line Interface (CLI) management reduces the number of touch points to manage for wired plus wireless services, thereby reducing network complexity, simplifying network operations, and lowering the TCO to manage the infrastructure.

Converged wired plus wireless not only improves wireless bandwidth across the network but also the scale of wireless deployment. Each 48-port Cisco Catalyst 3850 provides 40 Gbps of wireless throughput (20 Gbps on the 24-port/12-port models). This wireless capacity increases with the number of members in the stack. This makes sure that the network can scale with current wireless bandwidth requirements, as dictated by IEEE 802.11n-based access points and with future wireless standards such as IEEE 802.11ac. Additionally, the Cisco Catalyst 3850 distributes the wireless controller functions to achieve better scalability. Each Cisco Catalyst 3850 switch/stack can operate as the wireless controller in two modes (Figure 6):

- **Mobility Agent (MA):** This is the default mode in which a Cisco Catalyst 3850 switch ships. In this mode the switch is capable of terminating the CAPWAP tunnels from the access points and providing wireless connectivity to wireless clients. Maintaining wireless client databases and configuring and enforcing security and QoS policies for wireless clients and access points can be enforced in this mode. No additional license on top of IP Base is required to operate the mobility agent mode.
- **Mobility Controller (MC):** In this mode, the Cisco Catalyst 3850 switch can perform all the mobility agent tasks in addition to mobility coordination, Radio Resource Management (RRM), and Cisco CleanAir coordination within a mobility subdomain. The mobility controller mode can be enabled on the switch CLI. IP Base license level is required when the Cisco Catalyst 3850 switch is acting as the mobility controller. A centrally located Cisco 5508 Wireless LAN Controller (WLC 5508), Cisco Wireless Services Module 2 (WiSM2) (when running AirLOS Version 7.3), and Wireless Controller 3750 can also perform this role for larger deployments.

ВЫПИСКА С ОРИГИНАЛ

- With mobility agent [illegible] Prime wiring closets providing 10 Gbps of wireless per 48-port Gigabit Ethernet [illegible] switch (up to 10 Gbps for a stack of [illegible] switches) and mobility controllers managing some of the central wireless functions. The converged [illegible] wireless deployment provides best-in-class scalability for wireless and significantly improved wireless throughput.

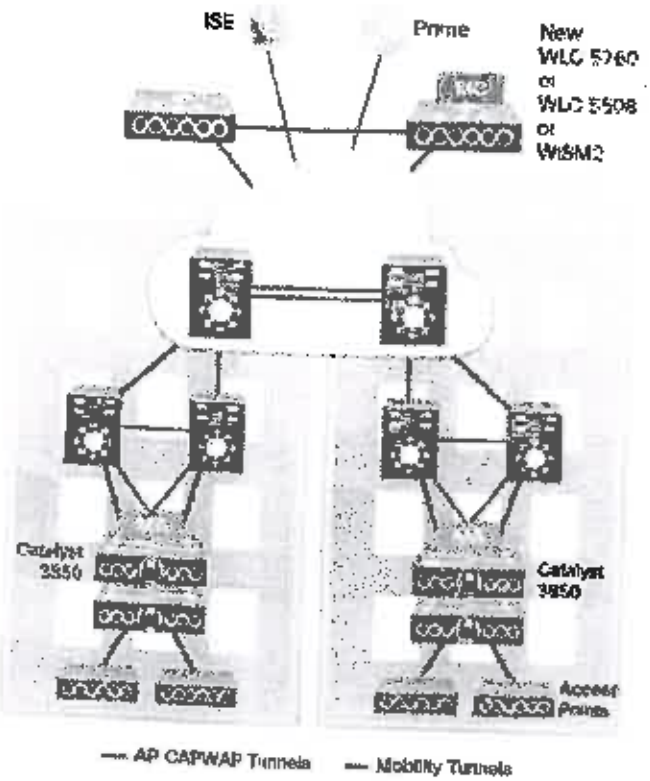

Figure 8.
Mobility Controller (MC) and Mobility Agent (MA)

For more information about Converged Wired plus Wireless Access, refer to the CIAA document here: https://www.cisco.com/c/dam/en/us/products/collateral/switches/catalyst-3850-series-switches/[illegible]-3850-series-switches-faq.pdf.

Distributed intelligent services

[illegible]

Full visibility into the wired plus wireless traffic is achieved because of the access point control and Provisioning of Wireless Access Points (CAPWAP) tunnel termination on the switch. This helps identify users and user traffic flows in order to identify potential attackers and take corrective action at the access layer before the attack penetrates further into the network. This is achieved using FNF, which monitors every single flow entering and exiting the switch stack for wired and wireless users. It also helps identify the top wired, wireless talkers and enforce appropriate bandwidth provisioning policies.

[illegible]

[illegible] С ОРИГИНАЛА

QoS

The Cisco Catalyst 9300 Series switches have extensive advanced and granular QoS capabilities. These are designed to offer QoS control at the interface (port) level, supporting granular traffic classification, policing, queuing, scheduling, and marking capabilities for voice, video, and data traffic. Administrators can define QoS policies on a per-user, per-session, per-application, per-device, or per-VLAN basis. This helps ensure that critical applications receive the necessary bandwidth and low latency, even during periods of network congestion. The switches support granular QoS policies that can be applied to individual users, devices, or applications, providing fine-grained control over network traffic. This level of granularity allows network administrators to prioritize critical traffic, such as voice and video, while also ensuring that less important traffic does not consume excessive bandwidth.

The Cisco Catalyst 9300 Series switches support Application Visibility and Control (AVC), which uses deep packet inspection to identify applications and provide visibility into network traffic. AVC can be used to prioritize, police, or block traffic based on application type, helping to ensure that bandwidth is allocated to the most important applications. The switches also support NetFlow, which provides detailed information about network traffic flows, including source and destination IP addresses, ports, and protocols. This information can be used for network monitoring, troubleshooting, and capacity planning.

In addition to these capabilities, the switch is able to do Class of Service (CoS) or Differentiated Services Code Point (DSCP) based queuing, policing, shaping, and marking of wired plus wireless traffic. This enables users to create common policies that can be used across wired plus wireless traffic. The Cisco Catalyst 9300 Series supports downloadable policy names from the Cisco Identity Services Engine (ISE) when a user successfully authenticates to the network using the ISE.

Security

The Cisco Catalyst 9300 provides a rich set of security features for wired plus wireless users. Features such as IEEE 802.1X, port security, Dynamic Host Configuration Protocol (DHCP) Snooping and Guard, Dynamic ARP Inspection, RA Guard, IP Source Guard, Control Plane Protection (CoPP), Wireless Intrusion Prevention Systems (WIPS), and access control protection against unauthorized users and attackers. With a variety of wired plus wireless users connecting to the network, the switch supports session-aware networking, in which each device connected to the network is identified as one session, and unique Access Control Lists (ACLs) and/or QoS policies can be defined and applied using the ISE for each of the sessions, providing granular control on the devices connecting to the network.

AES-256 MACsec encryption is the IEEE 802.1AE standard for authenticating and encrypting packets between switches and endpoints. The Cisco Catalyst 9300 Series switches support 256-bit (SSP+ and HuddlyBlue models only) and 128-bit Advanced Encryption Standard (AES) on all ports at all speeds, providing the most secure MACsec encryption.

Resiliency

Cisco StackWise-480 technology

Cisco StackWise-480 technology is built on the highly successful industry-leading StackWise technology, which is a premium stacking architecture. StackWise-480 has a stack bandwidth of 480 Gbps. StackWise-480 uses Cisco IOS Software SSO for providing resiliency within the stack. The stack behaves as a single switching unit that is managed by an active switch elected by the member switches.

The active switch automatically elects a standby switch within the stack. The active switch creates and updates all the switching/routing/wireless information and constantly synchronizes this information with the standby switch. If the active switch fails, the standby switch assumes the role of the active switch and continues to keep the stack operational. Access points continue to remain connected during an active-to-standby switchover.

A working stack can accept new members or delete old ones without service interruption. StackWise-480 creates a highly resilient single unified system of up to nine switches, providing simplified management using a single IP address, single Telnet session, single CLI, automatic checking, automatic configuration, and more. StackWise-480 also enables local switching in Cisco Catalyst 9300 Series Switches.

[illegible] StackWise-480 technology [illegible]

[illegible]

ВЕРНО С ОРИГИНАЛА

The Cisco Catalyst 9300 Series uses the Cisco StackPower[1] technology present on the Cisco Catalyst 9300 Series. StackPower is an innovative power interconnect system that allows the power supplies in a stack to be shared by a common resource among all the switches. Cisco StackPower unifies the individual power supplies installed in the switches and creates a pool of power, directing that power where it is needed. Up to four switches[2] can be configured in a StackPower stack with the special connector at the back of the switch using the StackPower cable, which is different than the StackWise-480 cables. (See Figure 3.)

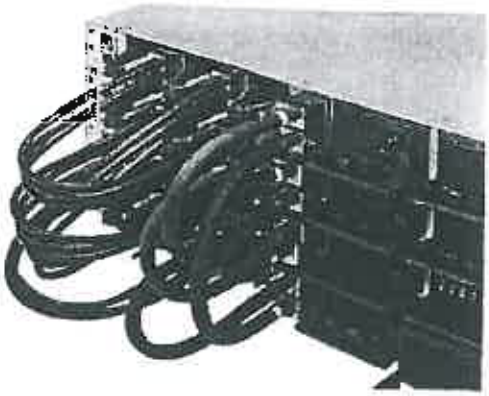

Figure 3.
StackWise-480 and StackPower connectors

StackPower can be deployed in either power-sharing mode or redundancy mode. In power-sharing mode, the power of all the power supplies in the stack is aggregated and distributed among the switches in the stack. In redundant mode, when the total power budget of the stack is calculated, the wattage of the largest power supply is not included. That power is held in reserve and used to maintain power to switches and attached devices when one power supply fails, enabling the network to operate without interruption. Following the failure of one power supply, the StackPower mode becomes power sharing.

StackPower allows customers to simply add one extra power supply in any switch of the stack and either provide power redundancy for any of the stack members or simply add more power to the shared pool. StackPower eliminates the need for an external redundant power system or installation of dual power supplies in all the stack members. StackPower is available in LAN Base license level (or higher). For LAN Base, cables need to be purchased separately.

[1] StackPower is not supported in the Cisco Catalyst 9300 Series [illegible]

[2] Up to nine switches are supported in a stack [illegible]

[illegible]

The [illegible] of the Cisco [illegible] is the UADP ASIC with [illegible] for future features and intelligence with investment protection. The new ASIC provides the foundation for converged IMNs [illegible] and wireless, Cisco Open Network Environment, Software-Defined Networking (SDN) requirements, and OneFIT SDN through software update [illegible] the product lifetime.

Software features and services on Cisco Catalyst 3850 Series Switches

Software services supported on the Cisco Catalyst 3850 Series Switches can be classified into five broad categories:

- Ease of operations
- Advanced security features
- Resiliency
- Application visibility and control
- Audio Video Bridging

Ease of operations

The Cisco Catalyst 3850 help reduce the operating costs through:

- Cisco Catalyst SmartOperations
- Easy-to-use deployment and control features
- Efficient switch operations
- Network management tools

Cisco Catalyst SmartOperations

Cisco Catalyst SmartOperations is a comprehensive set of capabilities that simplify LAN deployment, configuration, and troubleshooting. In addition to adaptive, always-on technologies such as StackWise-480 and StackPower, Cisco Catalyst SmartOperations enable zero-touch installation and replacement of switches, fast upgrade, and ease of troubleshooting with reduced operational cost. Features includes Smart Install, Auto Smartports, Smart Configuration, and Smart Troubleshooting to enhance operational excellence:

- Cisco Smart Install is a transparent plug-and-play technology to configure the Cisco IOS Software image and switch configuration without user intervention. Smart Install utilizes dynamic IP address allocation and the assistance of other switches to facilitate installation, providing transparent network plug and play.
- Cisco Auto Smartports provide automatic configuration as devices connect to the switch port, allowing autodetection and plug and play of the device onto the network.
- Cisco Smart Troubleshooting is an extensive array of debug diagnostic commands and system health checks within the switch, including Generic Online Diagnostics (GOLD) and Onboard Failure Logging (OBFL).
- Embedded Event Manager (EEM) is a powerful and flexible feature that provides real-time network event detection and onboard automation. Using EEM, customers can adapt the behavior of their network devices to align with their business needs. This feature requires the IP Base feature set.

ВЯРНО С ОРИГИН

- User application:
  - IP Service-Level Agreements (SLA) allow customers to account for business-critical IP applications, such as call setup, during network congestion, voice, video, or data. With SLA, customers can deploy multiple services simultaneously.
  - DHCP autoconfiguration over multiple switches through a boot server across switch deployment.
  - Automatic QoS (AutoQoS) simplifies the configuration in Voice over IP (VoIP) networks by issuing interface and global switch commands to detect Cisco IP phones, classify traffic, and help enable egress queue configuration.
  - Auto-negotiation on all ports automatically selects half- or full-duplex transmission mode to optimize bandwidth.
  - Automatic medium-dependent interface crossover (Auto-MDIX) automatically adjusts transmit and receive pairs if an incorrect cable type (crossover or straight-through) is installed.
  - AVB Bridging provides reliable time-synchronized transmission with no packet clicks or video droppouts.
- Simplified configuration and connectivity:
  - Dynamic Trunking Protocol (DTP) facilitates dynamic trunk configuration across all switch ports.
  - Port Aggregation Protocol (PAgP) automates the creation of Cisco Fast EtherChannel groups or Gigabit EtherChannel groups to link to another switch, router, or server.
  - Link Aggregation Control Protocol (LACP) allows the creation of Ethernet channeling with devices that conform to IEEE 802.3ad. This feature is similar to Cisco EtherChannel technology and PAgP.
  - Unidirectional Link Detection Protocol (UDLD) and aggressive UDLD allow unidirectional links caused by incorrect fiber-optic wiring or port faults to be detected and disabled on fiber-optic interfaces.
  - Cisco VLAN Trunking Protocol (VTP) Version 3 supports dynamic VLANs and dynamic trunk configuration across all switches.
  - AVB Bridging provides reliable A/V streaming without the need for the installer to perform extensive hand tuning of the network.
- Efficient switch operation:
  - Switching Database Manager (SDM) templates, VLAN template (specifies LAN Base licensed level), and Advanced template allow the administrator to enable policy, that is, the Ternary Content-Addressable Memory (TCAM) allocation to the desired features based on deployment-specific requirements.
  - Local proxy Address Resolution Protocol (ARP) works in conjunction with private VLAN edge to minimize broadcasts and maximize available bandwidth.
  - Stacking master configuration manager using Cisco StackWise-480 technology helps make sure that all stack units are automatically upgraded when the master switch receives a new software version. Automatic software version checking and updating help ensure that all stack members have the same software version.
  - Trivial File Transfer Protocol (TFTP) reduces the cost of administering software upgrades by downloading from a centralized location.
  - Network Timing Protocol (NTP) provides an accurate and consistent timestamp to all Internet switches.

КОПИЯ С ОРИГИ

- Multicast

  Optimized multicast with wired plus wireless: Cisco Catalyst 9600 offers greater multicast efficiency by avoiding replication of multicast packets for multicast clients that join the same multicast group. Internet Group Management Protocol (IGMP) v1, v2, v3 snooping for IPv4 fabric clients and Multicast Listener Discovery (MLD) v1 and v2 snooping provides fast client join and leave of multicast streams and limits bandwidth consumption to only interested clients.

- Monitoring:

  - Remote Switched Port Analyzer (RSPAN) allows administrators to remotely monitor ports in a wiring closet switch from any other switch in the same network.

    For enhanced traffic management, visibility, and analytics, the Embedded Remote Monitoring (ERM) software agent supports four RMON groups (history, statistics, alarms, and events).

    Layer 2 traceroute eases troubleshooting by identifying the physical path that a packet takes from source to destination.

    Wireless RF management provides real-time and historical information about RF interference impacting network performance across controllers using software like Cisco CleanAir technology integration.

Cisco Catalyst 9600 Series Switches, designed and engineered by Cisco, provide premium power over Ethernet (PoE+) (or IEEE 802.3at), low-power operations for industry best-in-class power management and power consumption capabilities. The Cisco Catalyst 9600 Series Switches are capable of reducing power consumption in the common idle state (low power utilization state). Other efficient switch operation features are:

- Cisco Discovery Protocol Version 2 allows the Cisco Catalyst 9600 Series Switches to negotiate a more granular power setting when connecting to a Cisco powered device such as IP phones or access points than what is provided by IEEE classification.
- Per-port power consumption command allows customers to specify maximum power setting on an individual port. Per-port PoE power sensing measures actual power being drawn, enabling more intelligent control of powered devices.
- The PoE dashboard provides proactive visibility into power usage and allows customers to set different notification level thresholds.

Organizations may choose to turn off access point radios to reduce power consumption during off-peak hours. The integrated wireless LAN controller avoids the deployment of additional devices in the network.

The Cisco Catalyst 9600 Series Switches offer both a web interface GUI for detailed configuration and Cisco Prime® Infrastructure for unified cloud plus wireless management. Prime Infrastructure provides day-0 and ongoing provisioning, ongoing monitoring and maintenance, configuration templates, and device and user-centric views and drill-downs for PoE collection for user-centric views using the Prime Assurance Manager module.

For detailed Infrastructure about Cisco Prime Infrastructure, go to [illegible]

Advanced Security Features

Cisco Catalyst 9600 Series Switches support advanced security features, including but not limited to:

- Protection against attackers:

[illegible] С ОРИГИНА

Port security secures the access to an access or trunk port based on MAC address. It limits the number of learned MAC addresses to deny MAC address flooding.

DHCP snooping prevents malicious users from spoofing a DHCP server and sending out bogus addresses. This feature is used by other primary security features to prevent a number of other attacks such as ARP poisoning.

Dynamic ARP inspection (DAI) helps ensure user integrity by preventing malicious users from exploiting the insecure nature of ARP.

- IP source guard prevents a malicious user from spoofing (check, taking over) another user's IP address by creating a binding table between the client's IP and MAC address, port, and VLAN, and by using it to selectively block bogus packets.

  The Unicast Reverse Path Forwarding (URPF) feature helps mitigate problems caused by the introduction of malformed or forged (spoofed) IP source addresses into a network by discarding IP packets that lack a verifiable IP source address.

  Bidirectional data support on a SPAN port allows the Cisco Intrusion Detection System (IDS) to take sessions than an intrusion is detected.

- User authentication:

  Flexible authentication that supports multiple authentication mechanisms, including 802.1X, MAC authentication bypass, and web authentication using a single consistent configuration.

  IDAI/UDI change of authorization and downloadable calls for comprehensive policy management capabilities.

  Private VLAN edge restricts traffic between hosts in a switch by segregating traffic at Layer 2, turning a broadcast segment into a non-broadcast multiaccess-like segment. Private VLAN edge provides security and isolation between switch ports, which helps ensure that users cannot snoop on other users' traffic.

  Multidomain authentication allows an IP phone and a PC to authenticate on the same switch port while placing them on appropriate voice and data VLAN.

  MAC address notification allows administrators to be notified of users added to or removed from the network.

  Mobility and security for secure, reliable wireless connectivity and consistent end-user experience. Increased network availability through proactive blocking of known threats.

  IGMP filtering provides multicast authentication by filtering out nonsubscribers and limits the number of concurrent multicast streams available per port.

- ACLs:

  Cisco security VLAN ACLs on all VLANs prevent unauthorized data flows from being bridged within VLANs.

  Cisco standard and extended IP security router ACLs define security policies on routed interfaces for control-plane and data-plane traffic. IPv6 ACLs can be applied to filter IPv6 traffic.

  Port-based ACLs for Layer 2 interfaces allow security policies to be applied on individual switch ports.

- Management

  Secure Shell (SSH) Protocol v2 and Simple Network Management Protocol Version 3 (SNMPv3) provide network security by encrypting administrator traffic during Telnet and SNMP sessions. SSH Protocol v2 is the cryptographic successor of SSHv1, which is available in all Cisco IOS Software images that include cryptographic support.

  TACACS+ and RADIUS authentication facilitate centralized control of the switch and restrict unauthorized users from altering the configuration.

  Additional security on console access prevents unauthorized users from altering the switch configuration.

- Layer 2 protocols: Cisco UDLD protocol and Spanning Tree Root Guard can be enabled on interfaces when UDLD and Root Guard are required for additional topology integrity.
- Spanning Tree Protocol Guard (STPG) prevents active devices not in Cisco Unified Communications Manager's control from becoming Spanning Tree Protocol root nodes.
- Wireless endpoints authenticate CAPWAP-compliant DTLS encryption to make sure of end-to-end security between access points and controllers across routed WAN links.

Mobility

Borderless networks and the enterprise mobility and business-grade video services. Industry's first unified wired and wireless (plus wireless) location services enable tracking of mobile assets and the users of those assets for both Cisco and third-party wireless devices. The borderless experience is enabled by the following features in the Cisco Catalyst 3850 Series Switches:

- High availability
- High-performance IP routing
- Superior QoS

High availability

In addition to StackWise-480 and StackPower,[1] the Cisco Catalyst 3850 Series supports high-availability features including but not limited to the following:

- Cross-Stack EtherChannel provides the ability to configure Cisco EtherChannel technology across different members of the stack for high resiliency.
- Flexlink provides link redundancy with convergence times less than 200 ms.
- IEEE 802.1s Multiple Spanning Tree Protocol (MSTP) provides rapid spanning-tree convergence independent of spanning-tree timers and also offers the benefit of Layer 2 load balancing and distributed processing.
- Per-VLAN Rapid Spanning Tree (PVRST+) allows rapid spanning-tree (IEEE 802.1w) reconvergence on a per-VLAN spanning-tree basis, providing simpler configuration than MSTP. In both MSTP and PVRST+ modes, stacked units behave as a single spanning-tree node.
- Switch-port auto-recovery (errdisable recovery) automatically attempts to reactivate a link that is disabled because of a network error.

[1] StackPower is supported only on the 350W AC power supply.

[2] Cisco IOS Software Release 3.3.0SE for Cisco Catalyst 3850 Series Switches.

ВЕРНО С ОРИГИНАЛА

The Cisco Express Forwarding hardware routing architecture delivers extremely high performance IP routing in the Cisco Catalyst 9Ga Series Switches:

- IP unicast routing protocols (Static, Routing Information Protocol Version 1 (RIPv1), and RIPv2, RIPng, Enhanced Interior Gateway Routing Protocol (EIGRP), and) are supported for small-network routing applications with the IP Base feature set. Limited static routing with the IP Base feature set. Equal-cost routing facilitates Layer 3 load balancing and redundancy across the stack.
- Enhanced IP unicast routing protocols (Open Shortest Path First (OSPF), EIGRP, Border Gateway Protocol Version 4 (BGPv4), and Intermediate System-to-Intermediate System Version 4 (IS-ISv4)) are supported for load balancing and constructing scalable LANs. IPv6 routing (OSPFv3, EIGRPv6) is supported in hardware for maximum performance. OSPF for routed access is included in the IP Base image. The IP Services feature set is required for full OSPF, EIGRP, BGPv4, and IS-ISv4.
- Policy-based Routing (PBR) allows superior control by facilitating flow redirection regardless of the routing protocol configured. The IP Base feature set is required for PBR. Virtual Routing and Forwarding (VRF)-Lite enables service providers to support two or more VRFs, with overlapping IP addresses. The IP Services feature set is required for VRF-Lite.
- Protocol-Independent Multicast (PIM) for IP multicast routing is supported, including PIM Sparse Mode (PIM-SM), PIM Dense Mode (PIM-DM), PIM sparse-dense mode, and Source-Specific Multicast (SSM). The IP Services feature set is required.
- IPv6 addressing is supported on interfaces with appropriate show commands for monitoring and troubleshooting.

The Cisco Catalyst 9Ga Series offers Gigabit Ethernet speed with intelligent services that keep traffic flowing smoothly, even at an time the normal network speed. Industry-leading mechanisms for cross-stack marking, classification, and scheduling deliver superior performance for data, voice, and video traffic, all at wire speed.

The following are some of the QoS features supported in the Cisco Catalyst 9Ga Series Switches:

- Granular wireless bandwidth management and fair sharing use Cisco's proven Cisco IOS Software and UADP ASIC technology to provide hierarchical bandwidth management at line rate (per access point, per radio, per SSID, per client based policies). Fair sharing across the users within an SSID makes sure that no single user is starved because of other heavy-hitting users. Fair sharing is automatically enabled for wireless at user level as well as SSID level.
- Boatup CoS and DSCP field classification is provided, using marking and reclassification on a per-packet basis by source and destination IP address, MAC address, or Layer 4 Transmission Control Protocol/User Datagram Protocol (TCP/UDP) port number.
- Shaped Round Robin (SRR) scheduling helps ensure differential prioritization of packet flows by intelligently servicing the ingress queues and egress queues. Weighted Tail Drop (WTD) provides congestion avoidance at the ingress and egress queues before a disruption occurs. Strict priority queuing helps ensure that the highest priority packets are serviced ahead of all other traffic.
- The Cisco Committed Information Rate (CIR) function provides bandwidth in increments as low as [illegible] p.p.
- Rate limiting is provided based on source and destination IP address, source and destination MAC address, Layer 4 TCP/UDP information, or any combination of these fields, using QoS ACLs (IP ACLs or MAC ACLs), class maps, and policy maps.
- Eight egress queues per port for wired traffic and four egress queues for wireless help enable differential management of different traffic types across the stack for wired traffic. Up to 400 aggregate policies are available per switch.

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[redacted]

ВЯРНО С ОРИГИНАЛ

Application visibility and control using Flexible NetFlow

Cisco Catalyst 3650 switches provide application visibility and control (AVC) by leveraging the Cisco Flexible NetFlow technology. AVC helps enterprises optimize their network infrastructure, reducing operational costs, and improve capacity planning and security incident detection with increased network availability. The Cisco Catalyst 3650 provides optimized application visibility with 512 bi-directional flows. The switch is capable of up to 256 application flow entries per switch and up to 8 flow entries per switch port on Layer 2 access ports and Layer 3 switched ports (SVI, Uplink, AGG, Core). Catalyst 3650 switches leverage standard flow technologies with unprecedented flexibility and comprehensive visibility, providing from Layer 2 (MAC and VLAN) to Layer 4 (TCP/UDP) flow fields as well as user-defined flow fields. The Cisco Catalyst 3650 switch is results not capable to provide visibility and troubleshooting capabilities for encrypted (wired) video traffic. Specific medianet features will be enabled in future software updates.

The flow data collected by FNF can be exported to an external collector for analysis and reporting or stored by the ESM. The Cisco Catalyst 3650 enables powerful workflow and customizable event correlation and policy actions with ESM, allowing the switches to trigger automated event actions or policy actions when the predefined conditions exist. With no external appliance required, customers are able to use existing infrastructure to perform traffic monitoring, making traffic visibility ubiquitous even on a large IP network.

Details about Cisco AVC are available at:
http://www.cisco.com/en/US/products/ps6616/products_ios_protocol_group_home.html

High-performance video over wireless is made possible by Cisco VideoStream technology to optimize the delivery of video applications across the WLAN.

Wireless unified communications

Wired and wireless IP telephony support is provided for improved collaboration through instant video, presence, and conferencing and supports all Cisco Unified Communications wireless IP phones for cost-effective, real-time voice service.

Audio video bridging

With Cisco IOS XE Software Release 3.3.0, Cisco Catalyst 3650 Multigigabit and 3650 10G SFP+ models support the IEEE 802.1 AVB standard. This standard provides the means for highly reliable delivery of low-latency, time-synchronized AV streaming services through Layer 2 Ethernet networks. The standard also makes it easier to integrate new services and for AV equipment from different vendors to interoperate. Whether the AV endpoint connections are analog or are inherently digital one to one, the network treats it end to end, providing transparent plug-and-play connections for multiple AV endpoints.

КОПИЯ С ОРИГИНАЛ

Benefits

- Improve [illegible] of [illegible] jitter and [illegible] for time-synchronized delivery of high-quality AV
- Provide [illegible] of applications across [illegible] deployments, including expansive and complex AV infrastructure
- Lower Total Cost of Ownership (TCO) with reduced cabling (lower CapEx) and [illegible] fees (lower OpEx)

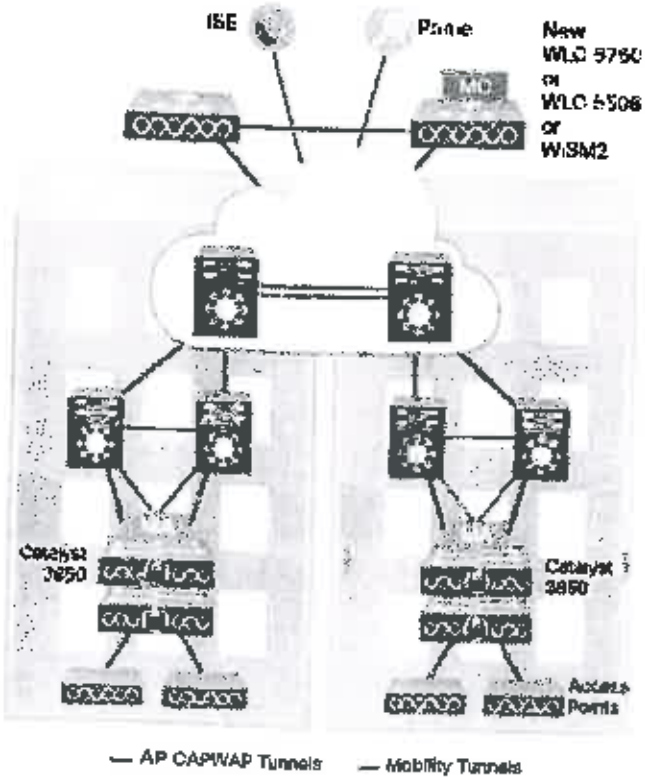
[illegible]

Deployment options

[illegible]

In a campus-type deployment, operating the Cisco Catalyst 3850 in the mobility or [illegible] and centralizing the mobility controller functionality in a WLC 5760, WLC 5508, or WiSM2 helps achieve better scalability and performance. The Cisco Catalyst 3850 provides CAPWAP termination for access points, uniform policy enforcement for wireless clients, better wireless bandwidth, and uniform Cisco IOS Software-based configuration and monitoring for wired plus wireless features. The mobility controller provides central mobility, RRM, and Cleanair coordination.

Backward compatibility with traditional centralized wireless deployment mode on the WLC 5508, WiSM2, and WLC 5760 helps ensure that customers can migrate to the Cisco Catalyst 3850-based converged access approach in phases, providing a continued controller for existing access points. This migration also provides investment protection on the existing wireless controller infrastructure. A phased adoption of the new Cisco Catalyst 3850 helps ensure that migration to the converged access mode of wireless is seamless. Figure 10 shows a Cisco Catalyst 3850 Series Switch in a campus-type deployment.



[illegible] All rights reserved. [illegible]

ВЯРНО С ОРИГИН

Figure [illegible]
Mobility Controller [illegible] Mobility Agent [illegible]

The Cisco Catalyst 3850 is optimized for branch deployments when it operates in mobility controller mode. In this mode, not only can the switch terminate CAPWAP tunnels from the [illegible] and provide client connectivity, it can also manage mobility within the branch. This eliminates the need for a local controller in every branch in addition to the access-layer switches. Also, complete visibility into the wired plus wireless [illegible] means that the WAN router can prioritize the right wired plus wireless traffic in and out of the branch. Figure [illegible] shows a Cisco Catalyst 3850 in a branch access type deployment.

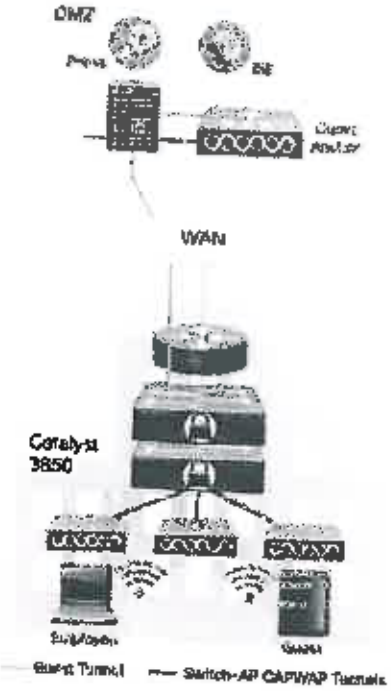


Figure [illegible]
Deploying the Cisco Catalyst 3850 Series for branch access

The new [illegible]-port and [illegible]-port SFP+ or SFP-based Cisco Catalyst 3850 models as well as the nonstackable [illegible]-port SFP+ model can also be used in the branch to aggregate traffic from smaller access switches through fiber links for more secure and EMI-sensitive deployments (Figure [illegible]).

[redacted]

[redacted]

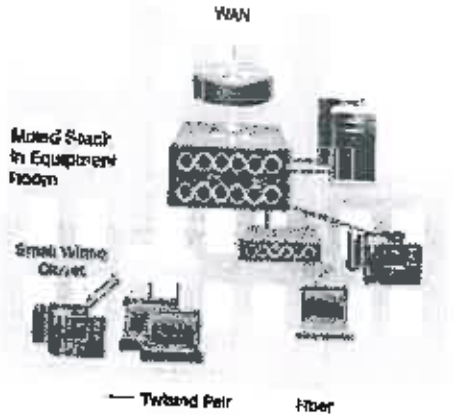


Figure 2.
Deploying wired copper and fiber connections with a Cisco Catalyst 9350 Series switching [illegible]

Specifications

Switch performance

Table 2 shows the Cisco Catalyst 9350 Series switching performance specifications.

Table 2. Cisco Catalyst 9350 Series performance specifications

Performance numbers for all switch models	
Switching capacity	[illegible] Gbps on [illegible]-port Gigabit Ethernet model [illegible] Gbps on 24-port Gigabit Ethernet model [illegible] Gbps on [illegible]-port Gigabit Ethernet model [illegible] Gbps on [illegible]-port Multigigabit Ethernet model [illegible] Gbps on [illegible]-port Multigigabit Ethernet model [illegible] Gbps on [illegible]-port 10 Gigabit Ethernet SFP+ model [illegible] Gbps on [illegible]-port 10 Gigabit Ethernet SFP+ model 320 Gbps on [illegible]-port 10 Gigabit Ethernet SFP+ model
Stacking bandwidth	[illegible] Gbps
Total number of MAC addresses	[illegible]
Total number of IPv4 routes (ARP plus learned routes)	[illegible]
PoE [illegible]	[illegible] Gigabit Ethernet models [illegible] Gigabit Ethernet models [illegible] Gigabit Ethernet SFP+ model [illegible] Gigabit Ethernet SFP+ model [illegible] Gigabit Ethernet SFP+ model
Cables	[illegible]

[illegible]

[illegible]

Performance numbers for all switch models	
Flash	[illegible]
VLAN [illegible]	[illegible]
Total Switched Virtual Interfaces (SVIs)	[illegible]
Jumbo frame	[illegible]
Time-to-end power per [illegible]	[illegible]
Wireless	
Number of access points per switch/stack	[illegible]
Number of wireless clients per switch/stack	[illegible]
Total number of VLANs per switch	[illegible]
Wireless bandwidth per switch	[illegible]
Supported Aironet access point series	[illegible]

For sending rate of switch models (with [illegible] Gigabit [illegible] Gigabit Ethernet uplink for [illegible] models)

Model	Forwarding rate
WS-C3850-[illegible]	[illegible]
WS-C3850-[illegible]	[illegible]
WS-C3850-[illegible]	
WS-C3850-[illegible]	
WS-C3850-[illegible]	[illegible]
WS-C3850-[illegible]	
WS-C3850-[illegible]	
WS-C3850-[illegible]	[illegible] (Gulf packets)
WS-C3850-[illegible]	460 [illegible] (GPS packets)
WS-C3850-[illegible]	[illegible]
WS-C3850-[illegible]	[illegible]
WS-C3850-[illegible]	[illegible]

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[illegible] С ОРИГИНА[illegible]

Dimensions, weight, acoustic, mean time between failures, and environmental range specifications for Cisco Catalyst 3850 Series Switches

Table [illegible] dimensions, weight, acoustic, Mean Time Between Failure (MTBF), and environmental range. Weight does not include a [illegible]. Weight includes the chassis assembly and is shipped (with fans), one power supply and [illegible] supply [illegible].

Table [illegible] Dimensions, weight, acoustic, MTBF, and environmental ranges

Dimensions (H x W x D)	Inches	Centimeters
WS-C3850-[illegible]	[illegible]	[illegible]
WS-C3850-[illegible]		
WS-C3850-[illegible]		
WS-C3850-[illegible]		
WS-C3850-[illegible]		
WS-C3850-[illegible]		

[illegible]

[illegible]

[illegible]

[illegible]

Dimensions (H x W x D)	Inches	Centimeters
[illegible]	[illegible]	[illegible]
[illegible]		
[illegible]		
[illegible]		
[illegible]		
[illegible]		
[illegible]		
[illegible]		
Weight	Pounds	Kilograms
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Dimensions (H x W x D)	Inches	Centimeters
[illegible]		
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]

Dimensions (H x W x D)	Inches	Centimeters
Environmental Ranges		
With AC power supply Operating environment and altitude	Normal operating temperature and altitude: • [illegible] • [illegible] • [illegible] Minimum ambient temperature for cold attack is [illegible] (0°C) Short-term exceptional conditions: • [illegible] • [illegible] • [illegible] [illegible]	
With DC power supply, Operating environment and altitude (NEBS)	Normal operating temperature and altitude: • [illegible] • [illegible] • [illegible] [illegible] • [illegible] • [illegible] • [illegible] • [illegible] [illegible]	
Relative humidity	[illegible] to [illegible], noncondensing	
Acoustic noise Measured per ISO 7779 and declared per ISO 9296	[illegible] • [illegible] • [illegible]	
Bystander positions operation to an ambient temperature of [illegible]	[illegible] [illegible]	
Storage environment	Temperature: [illegible] to [illegible] Altitude: [illegible]	
Vibration	[illegible] [illegible]	
Shock	Operating: [illegible], [illegible] half-sine Nonoperating: [illegible], [illegible]	

С ОРИГИНАЛ