

## Smlouva č. CTU/2020\_008

uzavřená ve smyslu zákona č. 89/2012 Sb., občanský zákoník, ve znění pozdějších předpisů (dále jen „občanský zákoník“)

### 1. Smluvní strany

#### ICZ a.s.

se sídlem: Na hřebenech II 1718/10, 140 00 Praha 4  
zastoupena: [redacted] na základě plné moci  
IČO: 251 45 444  
DIČ: CZ699000372  
zapsaný v obchodním rejstříku vedeném Městským soudem v Praze, sp. zn. B 4840  
(dále jen „prodávající“)

a

#### Česká republika – Český telekomunikační úřad

se sídlem: Sokolovská 219/58, 190 00 Praha 9 – Vysočany  
Adresa pro doručování: poštovní příhrádka 02, 225 02 Praha 025  
jehož jménem jedná: Mgr. Ing. Hana Továřková, předsedkyně Rady ČTÚ  
bank. spojení: ČNB Praha  
č. ú.: [redacted]  
IČO: 701 06 975  
DIČ: CZ70106975 (osoba identifikovaná k dani)  
(dále jen „kupující“)

uzavírají na základě výsledku zadávacího řízení na veřejnou zakázku s názvem „Obnova síťových prvků ČTÚ“ smlouvu následujícího znění:

### 2. Účel a předmět smlouvy

1. Účelem této smlouvy je stanovení obsahových požadavků, postupů, obchodních podmínek a dalších smluvních ujednání, na jejichž základě dojde k realizaci dodávky a instalaci síťových prvků LAN a Wifi (dále jen „síťové prvky“) s přenesením současného nastavení kupujícím využívaných síťových prvků, to vše v návaznosti na výsledky zadávacího řízení v rámci veřejné zakázky na dodávky s názvem „Obnova síťových prvků ČTÚ“.
2. Poptávané řešení je určeno pro provozování významných informačních systémů a informačních systémů veřejné správy ve smyslu zákona č. 365/2000 Sb., o informačních systémech veřejné správy a o změně některých dalších zákonů, ve znění pozdějších předpisů. Kupující tedy spadá do působnosti zákona č. 181/2014 Sb., o kybernetické bezpečnosti a o změně souvisejících zákonů (zákon o kybernetické bezpečnosti), ve znění pozdějších předpisů (dále jen „ZKB“) a dodané řešení nesmí být tedy v rozporu s požadavky Národního úřadu pro kybernetickou a informační bezpečnost (dále jen „NÚKIB“) pro provoz významných informačních systémů informačních systémů veřejné správy. Dodané řešení musí proto splňovat všechny související požadavky a nařízení a musí umožňovat kupujícímu řádné plnění povinností podle ZKB. V souladu s výše uvedeným je povinností kupujícího podle ust. § 5 vyhlášky č. 82/2018 Sb., o bezpečnostních opatřeních, kybernetických bezpečnostních incidentech, reaktivních opatřeních, náležitostech podání v oblasti kybernetické bezpečnosti a likvidaci dat

(vyhláška o kybernetické bezpečnosti), ve znění pozdějších předpisů, provádět analýzu rizik a identifikovaná rizika řídit. Současně je kupující povinen zabývat se všemi hrozbami, které prostřednictvím varování vydává NÚKIB, těmito hrozbami se dále zabývat a zohlednit je v analýze rizik. Kupující proto provedl, s přihlédnutím k vydanému „varování“ NÚKIB, analýzu rizik a v hodnocení se řídil pokyny uvedenými v dokumentu NÚKIB „Metodika k varování ze dne 17. prosince 2018“. Veškerá bezpečnostní opatření, která bude nutné u dodaného řešení na základě výsledků analýzy rizik přijmout, nesmí pro kupujícího znamenat žádné další náklady. Uvedeným opatřením, v případě dodávek řešení výrobců, před kterými varoval NÚKIB, je dodávka a zajištění stavu vysoké dostupnosti řešení – tj. ke každému kusu dodaného hardware od výrobce Huawei Technologies Co., Ltd., Šen-čen, Čínská lidová republika, a ZTE Corporation, Šen-čen, Čínská lidová republika dodávka druhého kusu hardware od jiného výrobce a jejich plná společná integrace tak, aby takové řešení plnilo funkci zajištění vysoké dostupnosti a současně i veškeré kupujícím definované požadavky v rámci zadávacích podmínek k veřejné zakázce.

3. Předmětem plnění je na straně jedné závazek prodávajícího dodat a instalovat síťové prvky (nové, nerepasované) s přenesením současného nastavení a dat dosud využívaných síťových prvků v sídle kupujícího, a to včetně dodávky nástroje pro správu síťové infrastruktury a nástroje pro monitorování síťové infrastruktury, to vše s požadovanými parametry podle přílohy č. 1, resp. 2 této smlouvy, poskytnout související plnění podle této smlouvy a převést na kupujícího vlastnické právo k síťovým prvkům, a na druhé straně závazek kupujícího za řádně a včas poskytnuté plnění zaplatit prodávajícímu sjednanou cenu.

### **3.**

#### **Místo a doba plnění**

1. Místem plnění je sídlo kupujícího.
2. Doba plnění je sjednána do 60 dnů ode dne účinnosti smlouvy. Ostatní termíny jsou stanoveny v příloze č. 4 smlouvy (Harmonogram řešení).

### **4.**

#### **Cena a platební podmínky**

1. Prodávající se zavazuje poskytnout kupujícímu plnění podle této smlouvy za celkovou cenu ve výši 9.460.384 Kč bez DPH. Z toho:
  - a) cena za dodávku HW činí 6.815.727 Kč bez DPH,
  - b) cena za licence SW činí 2.131.157 Kč bez DPH,
  - c) cena za instalaci činí 513.500 Kč bez DPH.
2. Cena je stanovena jako pevná a lze ji měnit, pouze pokud dojde ke změně sazby DPH. K ceně bude při její fakturaci připočtena DPH v aktuální výši ke dni uskutečnění zdanitelného plnění.
3. Cenu plnění bude kupující hradit na základě daňového dokladu – faktury (dále jen „faktura“) vystavené prodávajícím se splatností 30 dnů ode dne doručení kupujícímu na základě oboustranně potvrzeného předávacího protokolu. Faktura vystavená v prosinci bude předána kupujícímu nejpozději do desátého dne v uvedeném měsíci, nebude-li dohodnuto jinak. V případě faktury doručené kupujícímu mezi 10. prosincem a 10. lednem je taková faktura splatná nejdříve následujícího 1. února. Platební povinnosti kupujícího plynoucí z této smlouvy jsou splněny dnem odepsání fakturované částky ve prospěch účtu prodávajícího. Úhrada bude provedena bezhotovostním převodem z účtu kupujícího ve prospěch účtu prodávajícího.

4. Faktura musí obsahovat náležitosti daňového a účetního dokladu podle zákona č. 563/1991 Sb., o účetnictví, ve znění pozdějších předpisů, zákona č. 235/2004 Sb., o dani z přidané hodnoty, ve znění pozdějších předpisů, § 435 občanského zákoníku a současně číslo této smlouvy.
5. V případě, že faktura nebude obsahovat náležitosti podle platných právních předpisů, popř. bude obsahovat jiné chyby či nedostatky, je kupující oprávněn fakturu vrátit, přičemž nová lhůta splatnosti počíná běžet dnem doručení opravené faktury kupujícímu.

## **5. Dodací podmínky**

1. Prodávající se zavazuje nejméně tři pracovní dny předem písemně uvědomit kontaktní osobu kupujícího o předpokládaném termínu dodání síťových prvků.
2. Kupující je povinen převzít síťové prvky, které jsou dodány řádně, tj. které zejména vykazují všechny vlastnosti a vyhovuje všem podmínkám uvedeným v této smlouvě či stanoveným kupujícím nebo právními předpisy a technickými normami, a včas.
3. Prodávající je povinen společně se síťovými prvky předat kupujícímu doklady, jež jsou nutné k jejich převzetí a užívání podle občanského zákoníku a předpisů souvisejících, a to zejména provozní dokumentaci v českém jazyce, uživatelské manuály, certifikáty shody, povolení k distribuci na území České republiky a další obdobné dokumenty, které jsou obvykle k takovému druhu plnění dodávány, včetně potvrzení výrobce (anebo jeho oficiálního zastoupení pro území České republiky), že veškeré komponenty, které jsou součástí předmětu plnění podle čl. 2 odst. 3 této smlouvy, jsou nové (tj. nepoužité, resp. nerepasované). V případě absence uvedených dokumentů nebude kupujícím považováno plnění za řádné a bude důvodem pro odmítnutí potvrzení řádného dodání síťových prvků.
4. Řádné dodání (instalaci) síťových prvků potvrdí kupující prodávajícímu formou podpisu předávacího protokolu pověřenou osobou podle čl. 9 odst. 4 této smlouvy.

## **6. Zajištění závazků**

1. Je-li kupující v prodlení s uhrazením faktury, prodávající má právo účtovat zákonný úrok z prodlení z dlužné částky za každý započatý den prodlení.
2. V případě prodlení prodávajícího s řádným plněním oproti sjednanému harmonogramu řešení je prodávající povinen zaplatit kupujícímu smluvní pokutu ve výši 5.000 Kč za každý i započatý den prodlení.
3. V případě prodlení prodávajícího s odstraněním ohlášené vady síťového prvku podle čl. 6 této smlouvy je prodávající povinen zaplatit kupujícímu smluvní pokutu ve výši 0,05 % z celkové ceny podle čl. 4 odst. této smlouvy za každý i započatý den prodlení.
4. Kupující nemá právo uplatnit smluvní pokutu, jestliže prodávající prokáže, že kupující neposkytl prodávajícímu spolupůsobení nutné k tomu, aby prodávající mohl splnit svůj závazek.

## **7. Záruka a odpovědnost za vady**

1. Na dodané síťové prvky poskytuje prodávající kupujícímu záruku za jakost v délce 60 měsíců. Záruční doba počíná běžet dnem převzetí síťových prvků kupujícím. Záruční doba se prodlouží o dobu, po kterou nebude moci kupující užívat síťové prvky z důvodu

- vad, za něž odpovídá prodávající, a to ode dne oznámení kupujícího o vadě prodávajícímu do dne vrácení bezvadné věci kupujícímu podle odstavce 4 tohoto článku smlouvy.
2. Poskytnutou zárukou se prodávající zavazuje, že po dobu záruční lhůty budou síťové prvky použitelné k dohodnutému nebo obvyklému účelu. Záruka se nevztahuje na opotřebení v rozsahu odpovídajícímu obvyklému způsobu užívání.
  3. Zjistí-li kupující vadu v době trvání záruční doby stanovené touto smlouvou, oznámí prokazatelně tuto skutečnost neprodleně prodávajícímu. Proávající zajistí kupujícímu přístup na webový portál servisní podpory prodávajícího v režimu 24x7.
  4. Po ohlášení vady a způsobu, jakým se vada projevuje, má prodávající za povinnost zahájit bezplatně co nejrychlejší odstranění vady, a tuto odstranit nejpozději do 7 pracovních dnů ode dne oznámení vady. Proávající po analýze vady síťového prvku odstraní vadu podle své volby, a to opravou věci nebo dodáním nové věci. V případě opravy sepíše s kontaktní osobou kupujícího protokol o převzetí síťového prvku do opravy. V případě odstranění vady dodáním nové věci (včetně výměny součástí), dodáním chybějící věci nebo opravou věci se prodávající zavazuje k odstranění vady užít pouze takové věci (včetně součástí), které byly vyrobeny přímo výrobcem původního plnění (tj. originální díly) nebo jejichž použití je výrobcem původního plnění schváleno s garancí zachování všech kupujícím požadovaných parametrů daného zařízení, přičemž takto dodané věci (včetně součástí) budou věci nové (tj. nepoužité, resp. nerepasované). Splnění podmínek podle tohoto odstavce tohoto článku této Smlouvy je Proávající povinen prokázat před provedením odstranění příslušné závady (zejména předložením potvrzení výrobce či jeho oficiálního zastoupení pro území České republiky).
  5. Oprávnění k bezplatné záruční opravě síťového prvku zanikne v případě, kdy k jeho vadě dojde prokazatelným mechanickým poškozením síťového prvku nebo jeho prokazatelným provozováním v nevhodném prostředí.

## **8. Ukončení smlouvy**

1. Tato smlouva může být ukončena splněním, písemnou dohodou obou smluvních stran nebo odstoupením od smlouvy.
2. Kterákoliv ze smluvních stran může odstoupit od smlouvy v případě, že druhá smluvní strana poruší podstatným způsobem své povinnosti vyplývající z této smlouvy.
3. Za podstatné porušení smluvních povinností kupujícím se bude podle této smlouvy považovat prodlení kupujícího s uhrazením kupní ceny o více než 30 dnů.
4. Za podstatné porušení smluvních povinností prodávajícím se považuje:
  - a) nedodržení stanoveného termínu dodání,
  - b) neodstranění vady ve sjednané lhůtě.
5. Stanoví-li oprávněná smluvní strana druhé smluvní straně pro splnění jejího závazku náhradní (dodatečnou) lhůtu, vzniká jí právo odstoupit od smlouvy až po marném uplynutí této lhůty, to neplatí, jestliže druhá smluvní strana v průběhu této lhůty prohlásí, že svůj závazek nesplní.
6. Kupující si vyhrazuje v případě změny kontroly nad dodavatelem právo následně reagovat, včetně možnosti odstoupit od smlouvy.
7. Odstoupení od smlouvy musí být provedeno písemně a doručeno druhé smluvní straně. Právní účinky nastávají dnem doručení odstoupení od smlouvy druhé smluvní straně.



respektovat požadavky vyplývající ze zákona č. 181/2014 Sb., o kybernetické bezpečnosti a o změně souvisejících zákonů (zákon o kybernetické bezpečnosti), ve znění pozdějších předpisů, a prováděcí vyhlášky č. 82/2018 Sb., o bezpečnostních opatřeních, kybernetických bezpečnostních incidentech, reaktivních opatřeních, náležitostech podání v oblasti kybernetické bezpečnosti a likvidaci dat (vyhláška o kybernetické bezpečnosti).

2. Tato smlouva je vyhotovena v listinné podobě ve třech vyhotoveních, z nichž dvě obdrží kupující a jedno prodávající. Současně se smluvní strany dohodly na vytvoření smlouvy rovněž v elektronické podobě, kdy bude příslušný dokument opatřen elektronickými podpisy zástupců obou smluvních stran.
3. Nedílnou součástí této smlouvy jsou přílohy:
  - Příloha č. 1 – Technická specifikace  
(pozn.: v listinné podobě smlouvy v rámci technického nosiče dat)
  - Příloha č. 2 – Parametry technického vybavení  
(pozn.: v listinné podobě smlouvy v rámci technického nosiče dat)
  - Příloha č. 3 – Podrobný položkový rozpočet
  - Příloha č. 4 – Harmonogram řešení.
4. Tato smlouva vzniká dnem podpisu oprávněnými zástupci obou smluvních stran a účinnosti uveřejněním této smlouvy podle zákona č. 340/2015 Sb., o zvláštních podmínkách účinnosti některých smluv, uveřejňování těchto smluv a o registru smluv (zákon o registru smluv), ve znění pozdějších předpisů. Uveřejnění zajistí kupující.
5. Tato smlouva může být měněna pouze formou vzestupně číslovaných písemných, oboustranně odsouhlasených dodatků.
6. Obě smluvní strany potvrzují autentičnost této smlouvy svými podpisy. Prohlašují, že si smlouvu přečetly a že nebyla ujednána za jednostranně nevýhodných podmínek.

Prodávající:


Kupující:

18. 6. 2020

23. 6. 2020

.....  
datum a podpis

.....  
datum a podpis

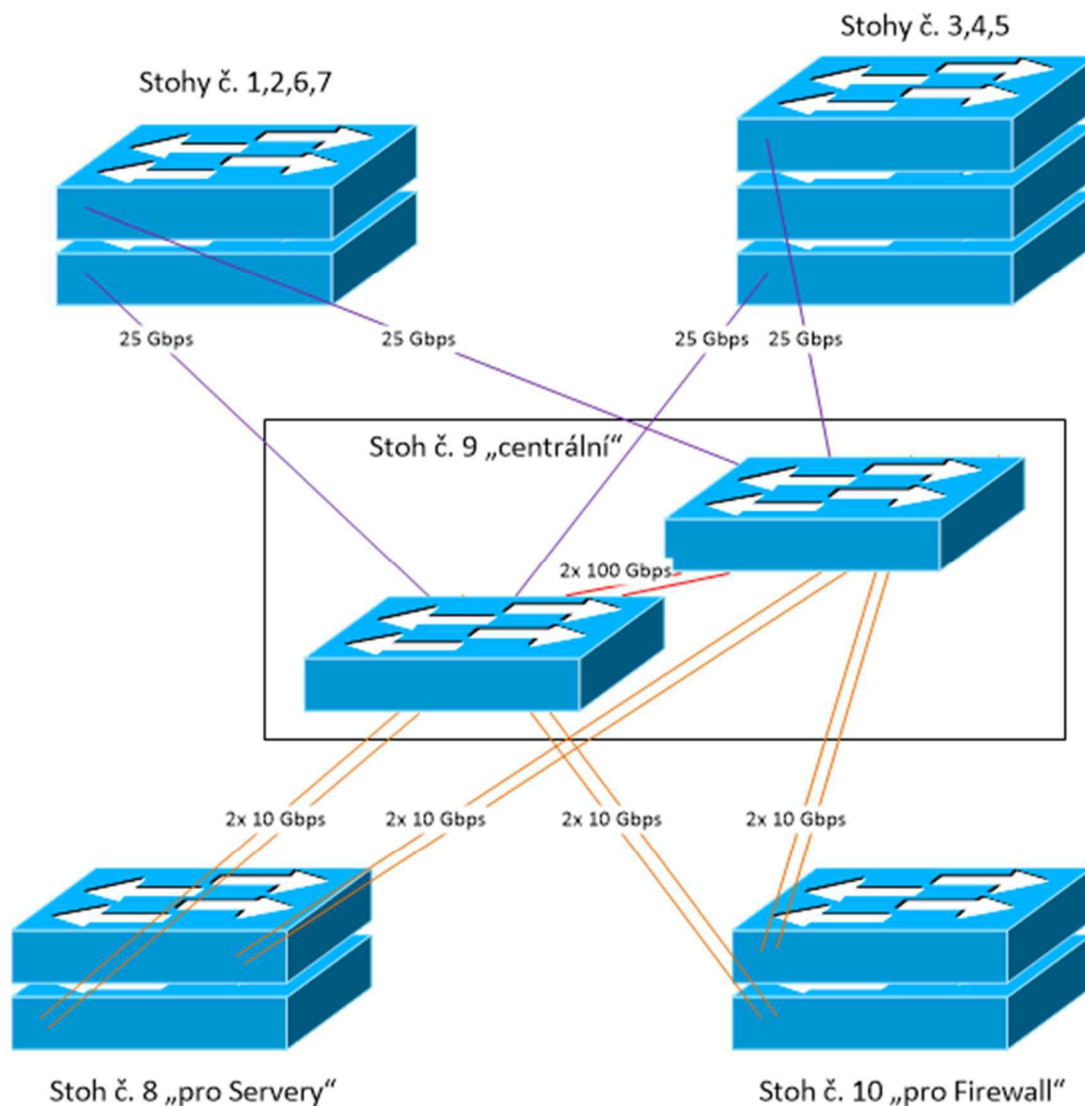
  
na základě plné moci  
ICZ a.s.

Mgr. Ing. Hana Továřková  
předsedkyně Rady  
Českého telekomunikačního úřadu

## TECHNICKÁ SPECIFIKACE

Účelem veřejné zakázky je obnova síťových prvků LAN a Wifi s přenesením současného nastavení využívaných síťových prvků v sídle kupujícího, včetně dodávky nástroje pro správu síťové infrastruktury a nástroje pro monitorování síťové infrastruktury tak, aby vyhovovaly současným i předpokládaným budoucím požadavkům.

Z hlediska fyzické topologie požadujeme zapojení do hvězdy.



Jednotlivé patrové rozvaděče jsou propojeny s centrálním patrovým rozvaděčem nově vybudovanými multimodovými optickými vlákny kategorie OM4 s koncovými konektory LC.

V jednotlivých patrových rozvaděčích budou instalovány nové přístupové přepínače, které budou v příslušném patrovém rozvaděči spojeny do jednoho logického celku „stoh“ spravovaného jako jeden prvek. Rychlost propoje mezi fyzickými přepínači v rámci jednoho logického celku musí být minimálně 200 Gbps (nebo vyšší viz podrobná specifikace).

Kupující v současné době používá aktivní prvky WS-C3750E a WS-C3750G propojené pomocí starých kategorií multimodových optických vláken, která pro nové zapojení nebudou využita. **Součástí plnění prodávajícího je však přenesení konfigurace stávajících aktivních prvků do nových aktivních prvků.**

Ze 7 přístupových stohů (stoh č. 1 až 7) budou ideálně 4 stohy tvořené ze 2 přepínačů a 3 stohy tvořené ze 3 přepínačů. Každý ze 7 stohů bude propojen minimálně dvěma fyzickými 25 Gbps propoji „uplinky“ sdruženými do logického propoje protokolem LACP (50 Gbps). Každý přepínač musí disponovat 48 porty o rychlosti až 1 Gbps. V každém ze 7 stohů musí být alespoň jeden přepínač umožňující napájení dle standardu 802.3af (PoE) a IEEE802.3at, přičemž minimální PoE budget musí umožnit napájení minimálně 36 portů dle IEEE802.3at. Přepínače neosazené „uplinky“ musí umožňovat budoucí osazení buď 2x 25 Gbps, nebo 4x 10 Gbps RJ45, nebo 8x 10 Gbps pro SPF+. **Je požadováno 7 přepínačů s vlastnostmi dle specifikace Tab. SE4, 7 přepínačů s vlastnostmi dle specifikace Tab. ST5 a 3 přepínače s vlastnostmi dle specifikace Tab. ST6.**

V centrálním patrovém rozvaděči bude navíc stoh (č. 9 „centrální“) tvořen ze 2 přepínačů navzájem propojených minimálně dvěma fyzickými 100 Gbps propoji sdruženými do logického propoje 200 Gbps pomocí uplink portů. Každý přepínač tohoto stohu musí disponovat alespoň 24 porty 1/10/25GE s volitelným fyzickým rozhraním typu SFP28 a 4 uplink porty 100GE QSFP28 (z nichž 2 budou využity). **Jsou požadovány 2 přepínače s vlastnostmi dle specifikace Tab. SC1.**

V patrovém rozvaděči datového centra budou další 2 stohy (stoh č. 8 a 10).

Stoh č. 8 určený pro připojení vysoce výkonných serverů bude tvořen ze 2 přepínačů, z nichž každý musí disponovat 48 porty (1 Gbps), avšak minimálně 12 portů z uvedených 48 RJ45 musí umožňovat rychlost až 10 Gbps. Současně musí každý z přepínačů stohu č. 8 umožnit 8 optických připojení rychlostí 10 Gbps pomocí SFP+ modulů (počet dodávaných SFP+ modulů k „osazení“ v rámci této zakázky je specifikován podrobněji dále). **Jsou požadovány 2 přepínače s vlastnostmi dle specifikace Tab. SS2.**

Stoh č. 10 určený pro připojení síťových „zón“ a „uzlů“ Firewallu bude tvořen ze 2 přepínačů, z nichž každý musí disponovat 48 porty (1 Gbps), avšak minimálně 12 portů z uvedených 48 RJ45 musí umožňovat rychlost až 10 Gbps. Současně musí každý z přepínačů stohu č. 10 umožnit 8 optických připojení rychlostí 10 Gbps pomocí SFP+ modulů (počet dodávaných SFP+ modulů k „osazení“ v rámci této zakázky je specifikován podrobněji dále) a navíc musí podporovat Virtual routing and forwarding (VRF). **Jsou požadovány 2 přepínače s vlastnostmi dle specifikace Tab. SF3.**

Stoh č. 8 a 10. bude každý propojen k centrálnímu stohu uplinky tvořené čtyřmi fyzickými 10 Gbps propoji sdruženými do logického propoje protokolem LACP (40 Gbps) (2 využití SFP+ moduly z 8 možných u každého přepínače).

Selhání jednotlivého přístupového přepínače nesmí vést k celkové ztrátě konektivity daného stohu, je možné jen zmenšení počtu dostupných portů. Řešení postavená na chassi jsou možná, avšak chassi musí být minimálně dvě v každém patře a současně musí být zachována podmínka sloučení obou chassi do jednoho logického celku.

V rámci každého stohu je požadováno redundantní napájení.



V blízké budoucnosti se počítá s nasazením autentizace pomocí IEEE 802.1x. Pro toto nasazení musí přepínače umožnit autentizaci zařízení protokolem EAPoL vůči suplikantu a Radius protokolem vůči autentizačnímu serveru. Je nezbytné, aby přepínač umožnil autentizaci hostů (guest access) pomocí Centrální Webové Autentizace na autentizačním serveru. Současně s tím musí umožnit autentizovat zvláště telefon a zvláště PC za telefonem při zachování možnosti prioritizovat hlasový provoz QoS – obvykle se hlasový provoz posílá tagovaný dle IEEE 802.1Q a provoz z PC jako netagovaný.

Pro uvedené přepínače **je požadováno příslušenství dle Tab. SP7.**

Dále je požadováno dodání a nakonfigurování nových prvků a technologií pro:

- Wireless, **požadováno 10 ks WiFi access point dle Tab. WA8** a pro jejich podporu a řízení **2 ks Wireless Controller** (primární a redundantní) **dle Tab. WC9** včetně případného Rack Mount kitu pro oba Controllery
- kompletní **system správy síťové infrastruktury** zajišťující monitoring, správu a řízení drátové a bezdrátové síťové infrastruktury, poskytující nástroje pro troubleshooting připojení koncových klientů a umožňující monitorovat a vizualizovat aplikační provoz v síti na úrovni sítě, síťových zařízení, jejich rozhraní a připojených klientů **dle specifikace Tab. SW10** s licenci na 5 let pro všechny prvky a technologie dodávané v rámci této zakázky
- **monitorování sítě dle specifikace Tab. MS11** s primárním zaměřením na identifikaci bezpečnostních incidentů zejména v šifrovaném provozu na Internetovém vstupu. Používá NetFlow záznamy shromážděné z exportu od všech připojených zařízení v síti. Postupně tak vytváří obraz do hloubky každého rozhovoru a průtoku dat vyskytující se v síti. System shromažďuje informace Netflow, IPFIX, sFlow, stejně jako ekvivalenty třetích stran (jFlow a podobně). Korelace těchto informací společně umožňuje nahlédnout na zdrojovou a cílovou adresu, zdrojový a cílový port, rozhraní, IP TOS, IP protokol, Next Hop IP, TCP značky, informace o šifrovaném provozu v síti. stejně jako na informace L7 aplikací pomocí Flowsensor-ů,

včetně zaškolení až 3 administrátorů kupujícího.

**Potřebné licence** pokrývající specifikovanou funkcionalitu v tabulkách této přílohy **jsou požadovány na dobu 5 let.**

Dodaný HW bude namontován a zprovozněn prodávajícím ve spolupráci se zaměstnanci kupujícího po dohodě na termínu montáže s ohledem na pracovní dobu kupujícího tak, aby práce způsobující výpadky provozu sítě proběhly mimo běžnou pracovní dobu kupujícího (7:00-17:00).

Součástí veškerého nabízeného plnění budou i všechny potřebné licence (HW, SW), které budou již zahrnuty v nabídkové ceně.

Veškerý dodaný HW i SW musí být nový, nepoužitý a určený výrobcem pro český trh a kupujícího. Proávající je povinen na vyžádání kupujícího předložit potvrzení zastoupení výrobce o určení dodávaného HW (seznamu sériových čísel dodávaných zařízení) a SW (seznam licenčních klíčů) pro český trh a kupujícího.

**Tab. SC1** – požadovány 2 ks přepínačů s vlastnostmi:

Požadovaná funkcionality/vlastnost	Způsob splnění požadované funkcionality/vlastnosti	Splňuje
Typ přepínače	L2/L3 přepínač	ANO
Minimální počet neblokovaných portů 1/10/25GE s volitelným fyzickým rozhraním typu SFP28	24	ANO, 24
Uplink porty	4x100GE QSFP28	ANO, 4x100GE QSFP28
Interní redundantní napájecí zdroj	ANO	ANO
Min. velikost sdíleného systémového bufferu	36MB	ANO
Velikost MAC address tabulky	80000	ANO
Min. počet IPv4 routes	100000	ANO
Min. počet IPv6 routes	100000	ANO
Min. počet konfigurovatelných security ACL	27000	ANO
Flexibilní alokace SRAM a TCAM zdrojů	ANO	ANO
IEEE 802.3ad (Link Aggregation - LAG)	ANO	ANO
IEEE 802.3ad přes více přepínačů ve stohu nebo více šasis	ANO	ANO
ISSU	ANO	ANO
Minimální počet aktivních VLAN	4000	ANO
IEEE 802.1w - Rapid Spanning Tree Protocol	ANO	ANO
Podpora instance spanning-tree protokolu per VLAN	ANO	ANO
Podpora jumbo rámců (min. 9216 bytes)	ANO	ANO
Detekce protilehlého zařízení (např. CDP nebo LLDP)	ANO	ANO
Protokol MVRP nebo VTP pro definici a správu VLAN sítí	ANO	ANO
OSPFv2, OSPFv3	ANO	ANO
ISIS	ANO	ANO
BGPv4	ANO	ANO
Graceful Insertion and Removal	ANO	ANO
IP Multicast ( PIM SSM, PIM SM)	ANO	ANO
Virtualizace směrovacích tabulek - např. Virtual Routing and Forwarding (VRF)	ANO	ANO
Min. počet oddělených (nezávislých) směrovacích tabulek	10	ANO
MPLS VPN	ANO	ANO
MPLS VPN - 6VPE	ANO	ANO
First Hop Redundancy Protokol (např. VRRP, HSRP) pro IPv4 i IPv6	ANO	ANO
Reverse path check (uRPF)	ANO	ANO
Minimální počet HW QoS front	8	ANO
QoS - Strict Priority Queue	ANO	ANO
QoS classification – ACL, DSCP, CoS based	ANO	ANO
QoS marking - DSCP, CoS	ANO	ANO
QoS Policing	ANO	ANO
QoS-Hierarchical QoS	ANO, min. 2 úrovně	ANO

## Příloha č. 1 smlouvy

Automatické nastavení QoS parametrů (AutoQoS nebo ekvivalentní)	ANO	ANO
IPv6 First Hop Security (RA guard, DHCPv6 guard, IPv6 source guard)	ANO	ANO
Port ACL, VLAN ACL	ANO	ANO
Paketové filtry (ACL) jsou stále aplikovány a filtrují i v případě, že jsou na nich prováděny změny	ANO	ANO
Ochrana proti nahrání modifikovaného software do zařízení prostřednictvím image signing a funkce secure boot, která ověřuje autentičnost a integritu jak bootloadeu, tak i samotného operačního systému zařízení prostřednictvím interních HW prostředků - tzv. trusted modulů	ANO	ANO
HW trusted modul využíván pro bezpečné uložení hesel a šifrovaných klíčů	ANO	ANO
Podpora SUDI (IEEE 802.1AR) autentizace	ANO	ANO
IPv6 Port ACL, VLAN ACL	ANO	ANO
IEEE 802.1AE na všech portech	ANO	ANO
IEEE 802.1ae (AES-GCM-256) na všech portech	ANO	ANO
Source-Group Tag Exchange Protocol nebo ekvivalentní	ANO	ANO
IGMPv2/v3 snooping	ANO	ANO
MLD snooping	ANO	ANO
Multicast DNS (mDNS) gateway	ANO	ANO
Application Visibility - Monitorování aplikačních toků (všech paketů) prostřednictvím technologie NetFlow nebo ekvivalentní	ANO	ANO
Application Visibility - Možnost definice klíčových atributů a parametrů monitorovaných toků včetně parametrů: zdrojová/cílová MAC adresa, zdrojová/cílová IP adresa, zdrojová/cílová VLAN, TCP flags, hodnota TTL, ICMP kód, IGMP type	ANO	ANO
Export monitorovaných dat ve formátu NetFlow v9 nebo IPFIX	ANO	ANO
SSHv2	ANO	ANO
CLI rozhraní	ANO	ANO
Vzdálená identifikace zařízení pomocí "Blue Beacon" mechanismu	ANO	ANO
Model-driven programovatelnost prostřednictvím RESTCONF, NETCONF/YANG	ANO	ANO
Python scripting	ANO	ANO
Linux shell	ANO	ANO
Interpretace uživatelských skriptů a jejich aktivace asynchronní událostí v systému zařízení	ANO	ANO
Application hosting	ANO	ANO
Aplikace softwarových záplat, nikoli povyšování celého firmware	ANO	ANO
Streaming telemetrie prostřednictvím NETCONF/XML	ANO	ANO
SNMPv2/v3	ANO	ANO
Inventarizovatelnost komponent integrovanou RFID identifikací	ANO	ANO
TACACS+ nebo RADIUS klient pro AAA (autentizace, autorizace, accounting)	ANO	ANO
Vzdálený port mirroring (ERSPAN)	ANO	ANO
NTPv3 server	ANO	ANO
Podpora 8x5xNBD	5 let	ANO

**Tab. SS2** – požadovány 2 ks přepínačů s vlastnostmi:

Požadovaná funkcionality/vlastnost	Způsob splnění požadované funkcionality/vlastnosti	Splňuje
Typ přepínače	L2/L3 přepínač	ANO, L2/L3 přepínač
Formát přepínače	Stohovatelný	ANO, Stohovatelný
Počet dedikovaných stohovacích portů	2	ANO, 2
Minimální počet zařízení ve stohu	8	ANO
Minimální kapacita sběrnice stohu	400 Gb/s	ANO
Sdílení výkonu napájecích zdrojů napříč celým stohem	ANO	ANO
Stateful Switch Over v rámci stohu	ANO	ANO
Non-stop Forwarding	ANO, i povýšením firmware	ANO povýšením licence
Možnost instalovat interní redundantní napájecí zdroj	ANO	ANO
Interní redundantní napájecí zdroj požadován	ANO	ANO
Datový stohovací kabel požadován	ANO, min. 0,5 m	ANO
Napájecí stohovací kabel požadován	ANO, min. 0,3 m	ANO
Počet portů 10/100/1000 Base-TX	0	ANO
Počet portů 10/100/1000 Base-TX s PoE napájením	0	ANO
Počet portů 1/2.5/5/10 Gbase-T s PoE napájením	12	ANO
Počet portů 1/2.5 Gbase-T s PoE napájením	36	ANO
Minimální PoE budget	1500W	ANO
Uplink porty	8x10GE SFP+	ANO
Min. velikost sdíleného systémového bufferu	32 MB	ANO
Velikost MAC address tabulky	30000	ANO
Min. počet IPv4 routes	600	ANO
Min. počet IPv6 routes	300	ANO
Min. počet konfigurovatelných security ACL	5000	ANO
IEEE 802.3ad (Link Aggregation)	ANO	ANO
IEEE 802.3ad přes více přepínačů ve stohu nebo více šasis	ANO	ANO
Minimálně 8 linek jako součást Link Aggregation Group trunku	ANO	ANO
Minimální počet konfigurovatelných Link Aggregation Group trunků	128	ANO
IEEE 802.1Q	ANO	ANO
Minimální počet aktivních VLAN	1000	ANO
IEEE 802.1x	ANO	ANO
Konfigurovatelná kombinace pořadí postupného ověřování zařízení na portu (IEEE 802.1x, MAC adresou, Web autentizací)	ANO	ANO
Integrace IEEE 802.1x s IP telefonním prostředím (802.1x Multi-domain authentication)	ANO	ANO
Možnost provozu 802.1x v tzv. audit módu bez omezení přístupu koncových uživatelů	ANO	ANO
RADIUS CoA	ANO	ANO
Podpora instance spanning-tree protokolu per VLAN	ANO	ANO
IEEE 802.1w - Rapid Spanning Tree Protocol	ANO	ANO
Protokol MVRP nebo VTP pro definici a správu VLAN sítí	ANO	ANO
Podpora jumbo rámců (min. 9198 bytes)	ANO	ANO
Detekce protilehlého zařízení (např. CDP nebo LLDP)	ANO	ANO
Směrování protokolů IPv4 a IPv6 v hardware	ANO	ANO

## Příloha č. 1 smlouvy

OSPFv2	ANO	ANO
OSPFv3	ANO	ANO
ISIS	ANO, i povýšením firmware	ANO povýšením licence
BGPv4	ANO, i povýšením firmware	ANO povýšením licence
Graceful Insertion and Removal	ANO, i povýšením firmware	ANO povýšení licence
IP Multicast ( PIM SSM, PIM SM)	ANO, i povýšením firmware	ANO povýšením licence
Virtualizace směrovacích tabulek - např. Virtual Routing and Forwarding (VRF)	ANO, i povýšením firmware	ANO povýšením licence
MPLS VPN	ANO, i povýšením firmware	ANO povýšením licence
MPLS VPN - 6VPE	ANO, i povýšením firmware	ANO povýšením licence
First Hop Redundancy Protokol (např. VRRP, HSRP)	ANO, i povýšením firmware	ANO povýšením licence
Reverse path check (uRPF) pro IPv4 i IPv6	ANO, i povýšením firmware	ANO povýšením licence
IGMPv2, IGMPv3	ANO	ANO
IGMP snooping	ANO	ANO
MLD snooping	ANO	ANO
DHCP relay	ANO, i povýšením firmware	ANO
Minimální počet HW QoS front	8	ANO
QoS classification – ACL, DSCP, CoS based	ANO	ANO
QoS marking - DSCP, CoS	ANO	ANO
QoS - Strict Priority Queue	ANO	ANO
Automatické nastavení QoS parametrů (AutoQoS nebo ekvivalentní)	ANO	ANO
QoS Policing	ANO	ANO
QoS-Per Flow policing	ANO	ANO
QoS-Hierarchical QoS	ANO, min. 2 úrovně	ANO
First Hop Redundancy Protokol pro IPv6 (HSRP nebo VRRP)	ANO	ANO
IPv6 services (Telnet, SSH, Syslog, DHCP)	ANO	ANO
IPv6 QoS	ANO	ANO
IPv6 First Hop Security (RA guard, DHCPv6 snooping, IPv6 source guard)	ANO	ANO
IPv6 Port ACL, VLAN ACL	ANO	ANO
Možnost definovat povolené MAC adresy na portu	ANO	ANO
PACL, VAACL	ANO	ANO
Paketové filtry (ACL) jsou stále aplikovány a filtrují i v případě, že jsou na nich prováděny změny	ANO, i povýšením firmware	ANO, povýšením licence
IEEE 802.1ae na uplink portech	ANO	ANO

## Příloha č. 1 smlouvy

IEEE 802.1ae (AES-GCM-256) na uplink portech	ANO, i povýšením firmware	ANO, povýšením licence
Bezpečnostní funkce umožňující ochranu proti podvržení zdrojové MAC a IP adresy	ANO	ANO
Bezpečnostní funkce umožňující ochranu proti připojení neautorizovaného DHCP serveru	ANO	ANO
Bezpečnostní funkce umožňující inspekci provozu protokolu ARP	ANO	ANO
Ochrana proti nahrání modifikovaného software do zařízení prostřednictvím image signing a funkce secure boot, která ověřuje autentičnost a integritu jak bootloaderu, tak i samotného operačního systému zařízení prostřednictvím interních HW prostředků - tzv. trusted modulů	ANO	ANO
HW trusted modul využíván pro bezpečné uložení hesel a šifrovacích klíčů	ANO	ANO
Podpora SUDI (IEEE 802.1AR) autentizace	ANO	ANO
IEEE 802.3af	ANO	ANO
IEEE 802.3at	ANO	ANO
Schopnost poskytovat PoE napájení připojeným zřízením i během restartu přepínače	ANO	ANO
IEEE 802.3az	ANO	ANO
Automatická aplikace specifické konfigurace pro dané zařízení po detekci jeho připojení na portu	ANO	ANO
Multicast DNS (mDNS) gateway	ANO, i povýšením firmware	ANO, povýšením licence
Inteligentní PoE management - zajištění napájení připojeného zařízení podle konkrétních požadavků daného typu zařízení	ANO	ANO
Application Visibility - Pokročilá detekce a klasifikace jednotlivých přenášených aplikací (DPI na 7. vrstvě OSI modelu dle aplikačních signatur)	ANO, i povýšením firmware	ANO, povýšením licence
Application Visibility - Monitorování aplikačních toků (všech paketů) prostřednictvím technologie NetFlow nebo ekvivalentní	ANO	ANO
Application Visibility - Možnost definice klíčových atributů a parametrů monitorovaných toků včetně parametrů: zdrojová/cílová MAC adresa, zdrojová/cílová IP adresa, zdrojová/cílová VLAN, TCP flags, hodnota TTL, ICMP kód, IGMP type	ANO	ANO
Application Visibility – Schopnost detekce bezpečnostních hrozeb v šifrovaném provozu, např. v HTTPS	ANO, i povýšením firmware	ANO, povýšením licence
Export monitorovaných dat ve formátu NetFlow v9 nebo IPFIX	ANO	ANO
SSHv2	ANO	ANO
CLI rozhraní	ANO	ANO
Vzdálená identifikace zařízení pomocí "Blue Beacon" mechanismu	ANO	ANO
Model-driven programovatelnost prostřednictvím RESTCONF, NETCONF/YANG	ANO	ANO
Python scripting	ANO	ANO
Linux shell	ANO	ANO
Interpretace uživatelských skriptů a jejich aktivace asynchronní událostí v systému zařízení	ANO	ANO
Application hosting	ANO, i povýšením firmware	ANO, povýšením licence

## Příloha č. 1 smlouvy

Aplikace softwarových záplat, nikoli povýšování celého firmware	ANO, i povýšením firmware	ANO, povýšením licence
Streaming telemetrie prostřednictvím NETCONF/XML	ANO	ANO
SNMPv2/v3	ANO	ANO
Podpora network boot (iPXE) přes IPv4 i IPv6	ANO	ANO
Inventarizovatelnost komponent integrovanou RFID identifikací	ANO	ANO
TACACS+ nebo RADIUS klient pro AAA (autentizace, autorizace, accounting)	ANO	ANO
Vzdálený port mirroring (ERSPAN)	ANO, i povýšením firmware	ANO
NTPv3 server	ANO	ANO
Podpora 8x5xNBD	5 let	ANO 5 let

**Tab. SF3** – požadovány 2 ks přepínačů s vlastnostmi:

Požadovaná funkcionality/vlastnost	Způsob splnění požadované funkcionality/vlastnosti	Splňuje
Typ přepínače	L2/L3 přepínač	ANO
Formát přepínače	Stohovatelný	ANO
Počet dedikovaných stohovacích portů	2	ANO
Minimální počet zařízení ve stohu	8	ANO
Minimální kapacita sběrnice stohu	400 Gb/s	ANO
Sdílení výkonu napájecích zdrojů napříč celým stohem	ANO	ANO
Stateful Switch Over v rámci stohu	ANO	ANO
Non-stop Forwarding	ANO	ANO
Možnost instalovat interní redundantní napájecí zdroj	ANO	ANO
Interní redundantní napájecí zdroj požadován	ANO	ANO
Datový stohovací kabel požadován	ANO, min. 0,5 m	ANO
Napájecí stohovací kabel požadován	ANO, min. 0,3 m	ANO
Počet portů 10/100/1000 Base-TX	0	0
Počet portů 10/100/1000 Base-TX s PoE napájením	0	0
Počet portů 1/2.5/5/10 Gbase-T s PoE napájením	12	12
Počet portů 1/2.5 Gbase-T s PoE napájením	36	36
Minimální PoE budget	1500W	ANO
Uplink porty	8x10GE SFP+	8x10GE SFP+
Min. velikost sdíleného systémového bufferu	32 MB	ANO
Velikost MAC address tabulky	30000	ANO
Min. počet IPv4 routes	32000	ANO
Min. počet IPv6 routes	16000	ANO
Min. počet konfigurovatelných security ACL	5000	ANO
IEEE 802.3ad (Link Aggregation)	ANO	ANO
IEEE 802.3ad přes více přepínačů ve stohu nebo více šasis	ANO	ANO
Minimálně 8 linek jako součást Link Aggregation Group trunku	ANO	ANO
Minimální počet konfigurovatelných Link Aggregation Group trunků	128	ANO
IEEE 802.1Q	ANO	ANO
Minimální počet aktivních VLAN	1000	ANO
IEEE 802.1x	ANO	ANO
Konfigurovatelná kombinace pořadí postupného ověřování zařízení na portu (IEEE 802.1x, MAC adresou, Web autentizací)	ANO	ANO
Integrace IEEE 802.1x s IP telefonním prostředím (802.1x Multi-domain authentication)	ANO	ANO
Možnost provozu 802.1x v tzv. audit módu bez omezení přístupu koncových uživatelů	ANO	ANO
RADIUS CoA	ANO	ANO
Podpora instance spanning-tree protokolu per VLAN	ANO	ANO
IEEE 802.1w - Rapid Spanning Tree Protocol	ANO	ANO
Protokol MVRP nebo VTP pro definici a správu VLAN sítí	ANO	ANO
Podpora jumbo rámců (min. 9198 bytes)	ANO	ANO
Detekce protilehlého zařízení (např. CDP nebo LLDP)	ANO	ANO
Směrování protokolů IPv4 a IPv6 v hardware	ANO	ANO
OSPFv2	ANO	ANO
OSPFv3	ANO	ANO
ISIS	ANO	ANO
BGPv4	ANO	ANO
Graceful Insertion and Removal	ANO	ANO



## Příloha č. 1 smlouvy

IP Multicast (PIM SSM, PIM SM)	ANO	ANO
Virtualizace směrovacích tabulek - např. Virtual Routing and Forwarding (VRF)	ANO	ANO
MPLS VPN	ANO	ANO
MPLS VPN - 6VPE	ANO	ANO
First Hop Redundancy Protokol (např. VRRP, HSRP)	ANO	ANO
Reverse path check (uRPF) pro IPv4 i IPv6	ANO	ANO
IGMPv2, IGMPv3	ANO	ANO
IGMP snooping	ANO	ANO
MLD snooping	ANO	ANO
DHCP relay	ANO	ANO
Minimální počet HW QoS front	8	ANO
QoS classification – ACL, DSCP, CoS based	ANO	ANO
QoS marking - DSCP, CoS	ANO	ANO
QoS - Strict Priority Queue	ANO	ANO
Automatické nastavení QoS parametrů (AutoQoS nebo ekvivalentní)	ANO	ANO
QoS Policing	ANO	ANO
QoS-Per Flow policing	ANO	ANO
QoS-Hierarchical QoS	ANO, min. 2 úrovně	ANO
First Hop Redundancy Protokol pro IPv6 (HSRP nebo VRRP)	ANO	ANO
IPv6 services (Telnet, SSH, Syslog, DHCP)	ANO	ANO
IPv6 QoS	ANO	ANO
IPv6 First Hop Security (RA guard, DHCPv6 snooping, IPv6 source guard)	ANO	ANO
IPv6 Port ACL, VLAN ACL	ANO	ANO
Možnost definovat povolené MAC adresy na portu	ANO	ANO
PACL, VACL	ANO	ANO
Paketové filtry (ACL) jsou stále aplikovány a filtrují i v případě, že jsou na nich prováděny změny	ANO	ANO
IEEE 802.1ae na uplink portech	ANO	ANO
IEEE 802.1ae (AES-GCM-256) na uplink portech	ANO	ANO
Bezpečnostní funkce umožňující ochranu proti podvržení zdrojové MAC a IP adresy	ANO	ANO
Bezpečnostní funkce umožňující ochranu proti připojení neautorizovaného DHCP serveru	ANO	ANO
Bezpečnostní funkce umožňující inspekci provozu protokolu ARP	ANO	ANO
Ochrana proti nahrání modifikovaného software do zařízení prostřednictvím image signing a funkce secure boot, která ověřuje autentičnost a integritu jak bootloaderu, tak i samotného operačního systému zařízení prostřednictvím interních HW prostředků - tzv. trusted modulů	ANO	ANO
HW trusted modul využíván pro bezpečné uložení hesel a šifrovacích klíčů	ANO	ANO
Podpora SUDI (IEEE 802.1AR) autentizace	ANO	ANO
IEEE 802.3af	ANO	ANO
IEEE 802.3at	ANO	ANO
Schopnost poskytovat PoE napájení připojeným zřízením i během restartu přepínače	ANO	ANO
IEEE 802.3az	ANO	ANO
Automatická aplikace specifické konfigurace pro dané zařízení po detekci jeho připojení na portu	ANO	ANO
Multicast DNS (mDNS) gateway	ANO	ANO
Inteligentní PoE management - zajištění napájení připojeného zařízení podle konkrétních požadavků daného typu zařízení	ANO	ANO

## Příloha č. 1 smlouvy

Application Visibility - Pokročilá detekce a klasifikace jednotlivých přenášených aplikací (DPI na 7. vrstvě OSI modelu dle aplikačních signatur)	ANO	ANO
Application Visibility - Monitorování aplikačních toků (všech paketů) prostřednictvím technologie NetFlow nebo ekvivalentní	ANO	ANO
Application Visibility - Možnost definice klíčových atributů a parametrů monitorovaných toků včetně parametrů: zdrojová/cílová MAC adresa, zdrojová/cílová IP adresa, zdrojová/cílová VLAN, TCP flags, hodnota TTL, ICMP kód, IGMP type	ANO	ANO
Application Visibility – Schopnost detekce bezpečnostních hrozeb v šifrovaném provozu, např. v HTTPS	ANO	ANO
Export monitorovaných dat ve formátu NetFlow v9 nebo IPFIX	ANO	ANO
SSHv2	ANO	ANO
CLI rozhraní	ANO	ANO
Vzdálená identifikace zařízení pomocí "Blue Beacon" mechanismu	ANO	ANO
Model-driven programovatelnost prostřednictvím RESTCONF, NETCONF/YANG	ANO	ANO
Python scripting	ANO	ANO
Linux shell	ANO	ANO
Interpretace uživatelských skriptů a jejich aktivace asynchronní událostí v systému zařízení	ANO	ANO
Application hosting	ANO	ANO
Aplikace softwarových záplat, nikoli povyšování celého firmware	ANO	ANO
Streaming telemetrie prostřednictvím NETCONF/XML	ANO	ANO
SNMPv2/v3	ANO	ANO
Podpora network boot (iPXE) přes IPv4 i IPv6	ANO	ANO
Inventarizovatelnost komponent integrovanou RFID identifikací	ANO	ANO
TACACS+ nebo RADIUS klient pro AAA (autentizace, autorizace, accounting)	ANO	ANO
Vzdálený port mirroring (ERSPAN)	ANO	ANO
NTPv3 server	ANO	ANO
Podpora 8x5xNBD	5 let	ANO 5let

**Tab. SE4** – požadováno 7 ks přepínačů s vlastnostmi:

Požadovaná funkcionality/vlastnost	Způsob splnění požadované funkcionality/vlastnosti	Splňuje
Typ přepínače	L2/L3 přepínač	ANO
Formát přepínače	Stohovatelný	ANO
Počet dedikovaných stohovacích portů	2	ANO
Minimální počet zařízení ve stohu	8	ANO
Minimální kapacita sběrnice stohu	400 Gb/s	ANO
Sdílení výkonu napájecích zdrojů napříč celým stohem	ANO	ANO
Stateful Switch Over v rámci stohu	ANO	ANO
Non-stop Forwarding	ANO, i povýšením firmware	ANO
Možnost instalovat interní redundantní napájecí zdroj	ANO	ANO
Interní redundantní napájecí zdroj požadován	ANO	ANO
Datový stohovací kabel požadován	ANO, min. 0,5 m	ANO
Napájecí stohovací kabel požadován	ANO, min. 0,3 m	ANO
Počet portů 10/100/1000 Base-TX	0	0
Počet portů 10/100/1000 Base-TX s PoE napájením	48	48
Počet portů 1/2.5/5/10 Gbase-T s PoE napájením	0	0
Počet portů 1/2.5 Gbase-T s PoE napájením	0	0
Minimální PoE budget	1100W	ANO
Uplink porty	2x25GE SFP28	ANO
Min. velikost sdíleného systémového bufferu	16MB	ANO
Velikost MAC address tabulky	30000	ANO
Min. počet IPv4 routes	600	ANO
Min. počet IPv6 routes	300	ANO
Min. počet konfigurovatelných security ACL	5000	ANO
IEEE 802.3ad (Link Aggregation)	ANO	ANO
IEEE 802.3ad přes více přepínačů ve stohu nebo více šasis	ANO	ANO
Minimálně 8 linek jako součást Link Aggregation Group trunku	ANO	ANO
Minimální počet konfigurovatelných Link Aggregation Group trunků	128	ANO
IEEE 802.1Q	ANO	ANO
Minimální počet aktivních VLAN	1000	ANO
IEEE 802.1x	ANO	ANO
Konfigurovatelná kombinace pořadí postupného ověřování zařízení na portu (IEEE 802.1x, MAC adresou, Web autentizací)	ANO	ANO
Integrace IEEE 802.1x s IP telefonním prostředím (802.1x Multi-domain authentication)	ANO	ANO
Možnost provozu 802.1x v tzv. audit módu bez omezení přístupu koncových uživatelů	ANO	ANO
RADIUS CoA	ANO	ANO
Podpora instance spanning-tree protokolu per VLAN	ANO	ANO
IEEE 802.1w - Rapid Spanning Tree Protocol	ANO	ANO
Protokol MVRP nebo VTP pro definici a správu VLAN sítí	ANO	ANO
Podpora jumbo rámců (min. 9198 bytes)	ANO	ANO
Detekce protilehlého zařízení (např. CDP nebo LLDP)	ANO	ANO
Směrování protokolů IPv4 a IPv6 v hardware	ANO	ANO
OSPFv2	ANO	ANO
OSPFv3	ANO	ANO
ISIS	ANO, i povýšením firmware	Ano, povýšením licence

## Příloha č. 1 smlouvy

BGPv4	ANO, i povýšením firmware	Ano, povýšením licence
Graceful Insertion and Removal	ANO, i povýšením firmware	Ano, povýšením licence
IP Multicast ( PIM SSM, PIM SM)	ANO, i povýšením firmware	Ano, povýšením licence
Virtualizace směrovacích tabulek - např. Virtual Routing and Forwarding (VRF)	ANO, i povýšením firmware	Ano, povýšením licence
MPLS VPN	ANO, i povýšením firmware	Ano, povýšením licence
MPLS VPN - 6VPE	ANO, i povýšením firmware	Ano, povýšením licence
First Hop Redundancy Protokol (např. VRRP, HSRP)	ANO, i povýšením firmware	ANO
Reverse path check (uRPF) pro IPv4 i IPv6	ANO, i povýšením firmware	Ano, povýšením licence
IGMPv2, IGMPv3	ANO	ANO
IGMP snooping	ANO	ANO
MLD snooping	ANO	ANO
DHCP relay	ANO, i povýšením firmware	ANO
Minimální počet HW QoS front	8	ANO
QoS classification – ACL, DSCP, CoS based	ANO	ANO
QoS marking - DSCP, CoS	ANO	ANO
QoS - Strict Priority Queue	ANO	ANO
Automatické nastavení QoS parametrů (AutoQoS nebo ekvivalentní)	ANO	ANO
QoS Policing	ANO	ANO
QoS-Per Flow policing	ANO	ANO
QoS-Hierarchical QoS	ANO, min. 2 úrovně	ANO
First Hop Redundancy Protokol pro IPv6 (HSRP nebo VRRP)	ANO	ANO
IPv6 services (Telnet, SSH, Syslog, DHCP)	ANO	ANO
IPv6 QoS	ANO	ANO
IPv6 First Hop Security (RA guard, DHCPv6 snooping, IPv6 source guard)	ANO	ANO
IPv6 Port ACL, VLAN ACL	ANO	ANO
Možnost definovat povolené MAC adresy na portu	ANO	ANO
PACL, VAACL	ANO	ANO
Paketové filtry (ACL) jsou stále aplikovány a filtrují i v případě, že jsou na nich prováděny změny	ANO, i povýšením firmware	Ano, povýšením licence
IEEE 802.1ae na uplink portech	ANO	ANO
IEEE 802.1ae (AES-GCM-256) na uplink portech	ANO, i povýšením firmware	Ano, povýšením licence
Bezpečnostní funkce umožňující ochranu proti podvržení zdrojové MAC a IP adresy	ANO	ANO
Bezpečnostní funkce umožňující ochranu proti připojení neautorizovaného DHCP serveru	ANO	ANO

## Příloha č. 1 smlouvy

Bezpečnostní funkce umožňující inspekci provozu protokolu ARP	ANO	ANO
Ochrana proti nahrání modifikovaného software do zařízení prostřednictvím image signing a funkce secure boot, která ověřuje autentičnost a integritu jak bootloADERu, tak i samotného operačního systému zařízení prostřednictvím interních HW prostředků - tzv. trusted modulů	ANO	ANO
HW trusted modul využíván pro bezpečné uložení hesel a šifrovacích klíčů	ANO	ANO
Podpora SUDI (IEEE 802.1AR) autentizace	ANO	ANO
IEEE 802.3af	ANO	ANO
IEEE 802.3at	ANO	ANO
Schopnost poskytovat PoE napájení připojeným zřízením i během restartu přepínače	ANO	ANO
IEEE 802.3az	ANO	ANO
Automatická aplikace specifické konfigurace pro dané zařízení po detekci jeho připojení na portu	ANO	ANO
Multicast DNS (mDNS) gateway	ANO, i povýšením firmware	Ano, povýšením licence
Inteligentní PoE management - zajištění napájení připojeného zařízení podle konkrétních požadavků daného typu zařízení	ANO	ANO
Application Visibility - Pokročilá detekce a klasifikace jednotlivých přenášených aplikací (DPI na 7. vrstvě OSI modelu dle aplikačních signatur)	ANO, i povýšením firmware	Ano, povýšením licence
Application Visibility - Monitorování aplikačních toků (všech paketů) prostřednictvím technologie NetFlow nebo ekvivalentní	ANO	ANO
Application Visibility - Možnost definice klíčových atributů a parametrů monitorovaných toků včetně parametrů: zdrojová/cílová MAC adresa, zdrojová/cílová IP adresa, zdrojová/cílová VLAN, TCP flags, hodnota TTL, ICMP kód, IGMP type	ANO	ANO
Application Visibility – Schopnost detekce bezpečnostních hrozeb v šifrovaném provozu, např. v HTTPS	ANO, i povýšením firmware	Ano, povýšením licence
Export monitorovaných dat ve formátu NetFlow v9 nebo IPFIX	ANO	ANO
SSHv2	ANO	ANO
CLI rozhraní	ANO	ANO
Vzdálená identifikace zařízení pomocí "Blue Beacon" mechanismu	ANO	ANO
Model-driven programovatelnost prostřednictvím RESTCONF, NETCONF/YANG	ANO	ANO
Python scripting	ANO	ANO
Linux shell	ANO	ANO
Interpretace uživatelských skriptů a jejich aktivace asynchronní událostí v systému zařízení	ANO	ANO
Application hosting	ANO, i povýšením firmware	Ano, povýšením licence
Aplikace softwarových záplat, nikoli povyšování celého firmware	ANO, i povýšením firmware	Ano, povýšením licence
Streaming telemetrie prostřednictvím NETCONF/XML	ANO	
SNMPv2/v3	ANO	ANO
Podpora network boot (iPXE) přes IPv4 i IPv6	ANO	ANO
Inventarizovatelnost komponent integrovanou RFID identifikací	ANO	ANO

Příloha č. 1 smlouvy

TACACS+ nebo RADIUS klient pro AAA (autentizace, autorizace, accounting)	ANO	ANO
Vzdálený port mirroring (ERSPAN)	ANO, i povýšením firmware	Ano, povýšením licence
NTPv3 server	ANO	ANO
Podpora 8x5xNBD	5 let	ANO, 5 let

**Tab. ST5** – požadováno 7 ks přepínačů s vlastnostmi:

Požadovaná funkcionality/vlastnost	Způsob splnění požadované funkcionality/vlastnosti	Splňuje
Typ přepínače	L2/L3 přepínač	ANO
Formát přepínače	Stohovatelný	ANO
Počet dedikovaných stohovacích portů	2	ANO
Minimální počet zařízení ve stohu	8	ANO
Minimální kapacita sběrnice stohu	400 Gb/s	ANO
Sdílení výkonu napájecích zdrojů napříč celým stohem	ANO	ANO
Stateful Switch Over v rámci stohu	ANO	ANO
Non-stop Forwarding	ANO, i povýšením firmware	ANO, povýšením licence
Možnost instalovat interní redundantní napájecí zdroj	ANO	ANO
Interní redundantní napájecí zdroj požadován	ANO	ANO, v rámci stohu
Datový stohovací kabel požadován	ANO, min. 0,5 m	ANO
Napájecí stohovací kabel požadován	ANO, min. 0,3 m	ANO
Počet portů 10/100/1000 Base-TX	48	48
Počet portů 10/100/1000 Base-TX s PoE napájením	0	0
Počet portů 1/2.5/5/10 Gbase-T s PoE napájením	0	0
Počet portů 1/2.5 Gbase-T s PoE napájením	0	0
Minimální PoE budget	0W	0W – přepínač bez PoE
Uplink porty	2x25GE SFP28	ANO, 2x25GE SFP28
Min. velikost sdíleného systémového bufferu	16MB	ANO
Velikost MAC address tabulky	30000	ANO
Min. počet IPv4 routes	600	ANO
Min. počet IPv6 routes	300	ANO
Min. počet konfigurovatelných security ACL	5000	ANO
IEEE 802.3ad (Link Aggregation)	ANO	ANO
IEEE 802.3ad přes více přepínačů ve stohu nebo více šasis	ANO	ANO
Minimálně 8 linek jako součást Link Aggregation Group trunku	ANO	ANO
Minimální počet konfigurovatelných Link Aggregation Group trunků	128	ANO
IEEE 802.1Q	ANO	ANO
Minimální počet aktivních VLAN	1000	ANO
IEEE 802.1x	ANO	ANO
Konfigurovatelná kombinace pořadí postupného ověřování zařízení na portu (IEEE 802.1x, MAC adresou, Web autentizací)	ANO	ANO
Integrace IEEE 802.1x s IP telefonním prostředím (802.1x Multi-domain authentication)	ANO	ANO
Možnost provozu 802.1x v tzv. audit módu bez omezování přístupu koncových uživatelů	ANO	ANO
RADIUS CoA	ANO	ANO
Podpora instance spanning-tree protokolu per VLAN	ANO	ANO
IEEE 802.1w - Rapid Spanning Tree Protocol	ANO	ANO
Protokol MVRP nebo VTP pro definici a správu VLAN sítí	ANO	ANO
Podpora jumbo rámců (min. 9198 bytes)	ANO	ANO

## Příloha č. 1 smlouvy

Detekce protilehlého zařízení (např. CDP nebo LLDP)	ANO	ANO
Směrování protokolů IPv4 a IPv6 v hardware	ANO	ANO
OSPFv2	ANO	ANO
OSPFv3	ANO	ANO
ISIS	ANO, i povýšením firmware	ANO, povýšením licence
BGPv4	ANO, i povýšením firmware	ANO, povýšením licence
Graceful Insertion and Removal	ANO, i povýšením firmware	ANO, povýšením licence
IP Multicast (PIM SSM, PIM SM)	ANO, i povýšením firmware	ANO, povýšením licence
Virtualizace směrovacích tabulek - např. Virtual Routing and Forwarding (VRF)	ANO, i povýšením firmware	ANO, povýšením licence
MPLS VPN	ANO, i povýšením firmware	ANO, povýšením licence
MPLS VPN - 6VPE	ANO, i povýšením firmware	ANO, povýšením licence
First Hop Redundancy Protokol (např. VRRP, HSRP)	ANO, i povýšením firmware	ANO, povýšením licence
Reverse path check (uRPF) pro IPv4 i IPv6	ANO, i povýšením firmware	ANO, povýšením licence
IGMPv2, IGMPv3	ANO	ANO
IGMP snooping	ANO	ANO
MLD snooping	ANO	ANO
DHCP relay	ANO, i povýšením firmware	ANO, povýšením licence
Minimální počet HW QoS front	8	ANO
QoS classification – ACL, DSCP, CoS based	ANO	ANO
QoS marking - DSCP, CoS	ANO	ANO
QoS - Strict Priority Queue	ANO	ANO
Automatické nastavení QoS parametrů (AutoQoS nebo ekvivalentní)	ANO	ANO
QoS Policing	ANO	ANO
QoS-Per Flow policing	ANO	ANO
QoS-Hierarchical QoS	ANO, min. 2 úrovně	ANO
First Hop Redundancy Protokol pro IPv6 (HSRP nebo VRRP)	ANO	ANO
IPv6 services (Telnet, SSH, Syslog, DHCP)	ANO	ANO
IPv6 QoS	ANO	ANO
IPv6 First Hop Security (RA guard, DHCPv6 snooping, IPv6 source guard)	ANO	ANO
IPv6 Port ACL, VLAN ACL	ANO	ANO
Možnost definovat povolené MAC adresy na portu	ANO	ANO
PACL, VAACL	ANO	ANO



## Příloha č. 1 smlouvy

Paketové filtry (ACL) jsou stále aplikovány a filtrují i v případě, že jsou na nich prováděny změny	ANO, i povýšením firmware	ANO, povýšením licence
IEEE 802.1ae na uplink portech	ANO	ANO
IEEE 802.1ae (AES-GCM-256) na uplink portech	ANO, i povýšením firmware	ANO, povýšením licence
Bezpečnostní funkce umožňující ochranu proti podvržení zdrojové MAC a IP adresy	ANO	ANO
Bezpečnostní funkce umožňující ochranu proti připojení neautorizovaného DHCP serveru	ANO	ANO
Bezpečnostní funkce umožňující inspekci provozu protokolu ARP	ANO	ANO
Ochrana proti nahrání modifikovaného software do zařízení prostřednictvím image signing a funkce secure boot, která ověřuje autentičnost a integritu jak bootloadeu, tak i samotného operačního systému zařízení prostřednictvím interních HW prostředků - tzv. trusted modulů	ANO	ANO
HW trusted modul využíván pro bezpečné uložení hesel a šifrovacích klíčů	ANO	ANO
Podpora SUDI (IEEE 802.1AR) autentizace	ANO	ANO
IEEE 802.3af	NE	ANO
IEEE 802.3at	NE	ANO
Schopnost poskytovat PoE napájení připojeným zřízením i během restartu přepínače	ANO	ANO
IEEE 802.3az	ANO	ANO
Automatická aplikace specifické konfigurace pro dané zařízení po detekci jeho připojení na portu	ANO	ANO
Multicast DNS (mDNS) gateway	ANO, i povýšením firmware	ANO, povýšením licence
Inteligentní PoE management - zajištění napájení připojeného zařízení podle konkrétních požadavků daného typu zařízení	ANO	ANO
Application Visibility - Pokročilá detekce a klasifikace jednotlivých přenášovaných aplikací (DPI na 7. vrstvě OSI modelu dle aplikačních signatur)	ANO, i povýšením firmware	ANO, povýšením licence
Application Visibility - Monitorování aplikačních toků (všech paketů) prostřednictvím technologie NetFlow nebo ekvivalentní	ANO	ANO
Application Visibility - Možnost definice klíčových atributů a parametrů monitorovaných toků včetně parametrů: zdrojová/cílová MAC adresa, zdrojová/cílová IP adresa, zdrojová/cílová VLAN, TCP flags, hodnota TTL, ICMP kód, IGMP type	ANO	ANO
Application Visibility – Schopnost detekce bezpečnostních hrozeb v šifrovaném provozu, např. v HTTPS	ANO, i povýšením firmware	ANO, povýšením licence
Export monitorovaných dat ve formátu NetFlow v9 nebo IPFIX	ANO	ANO
SSHv2	ANO	ANO
CLI rozhraní	ANO	ANO
Vzdálená identifikace zařízení pomocí "Blue Beacon" mechanismu	ANO	ANO
Model-driven programovatelnost prostřednictvím RESTCONF, NETCONF/YANG	ANO	ANO
Python scripting	ANO	ANO
Linux shell	ANO	ANO
Interpretace uživatelských skriptů a jejich aktivace asynchronní událostí v systému zařízení	ANO	ANO

Příloha č. 1 smlouvy

Application hosting	ANO, i povýšením firmware	ANO, povýšením licence
Aplikace softwarových záplat, nikoli povyšování celého firmware	ANO, i povýšením firmware	ANO, povýšením licence
Streaming telemetrie prostřednictvím NETCONF/XML	ANO	ANO
SNMPv2/v3	ANO	ANO
Podpora network boot (iPXE) přes IPv4 i IPv6	ANO	ANO
Inventarizovatelnost komponent integrovanou RFID identifikací	ANO	ANO
TACACS+ nebo RADIUS klient pro AAA (autentizace, autorizace, accounting)	ANO	ANO
Vzdálený port mirroring (ERSPAN)	ANO, i povýšením firmware	ANO, povýšením licence
NTPv3 server	ANO	ANO
Podpora 8x5xNBD	5 let	ANO, 5 let

**Tab. ST6** – požadovány 3 ks přepínačů s vlastnostmi:

Požadovaná funkcionality/vlastnost	Způsob splnění požadované funkcionality/vlastnosti	Splňuje
Typ přepínače	L2/L3 přepínač	ANO, L2/L3 přepínač
Formát přepínače	Stohovatelný	ANO, Stohovatelný
Počet dedikovaných stohovacích portů	2	ANO
Minimální počet zařízení ve stohu	8	ANO
Minimální kapacita sběrnice stohu	400 Gb/s	ANO
Sdílení výkonu napájecích zdrojů napříč celým stohem	ANO	ANO
Stateful Switch Over v rámci stohu	ANO	ANO
Non-stop Forwarding	ANO, i povýšením firmware	ANO, povýšením licence
Možnost instalovat interní redundantní napájecí zdroj	ANO	ANO
Interní redundantní napájecí zdroj požadován	ANO	ANO
Datový stohovací kabel požadován	ANO, min. 1 m	ANO
Napájecí stohovací kabel požadován	ANO, min. 1 m	ANO
Počet portů 10/100/1000 Base-TX	48	48
Počet portů 10/100/1000 Base-TX s PoE napájením	0	0
Počet portů 1/2.5/5/10 Gbase-T s PoE napájením	0	0
Počet portů 1/2.5 Gbase-T s PoE napájením	0	0
Minimální PoE budget	0W	ANO, přepínač bez PoE
Uplink porty	NE (neosazeno)	ANO, bez Uplink
Min. velikost sdíleného systémového bufferu	16MB	ANO
Velikost MAC address tabulky	30000	ANO
Min. počet IPv4 routes	600	ANO
Min. počet IPv6 routes	300	ANO
Min. počet konfigurovatelných security ACL	5000	ANO
IEEE 802.3ad (Link Aggregation)	ANO	ANO
IEEE 802.3ad přes více přepínačů ve stohu nebo více šasis	ANO	ANO
Minimálně 8 linek jako součást Link Aggregation Group trunku	ANO	ANO
Minimální počet konfigurovatelných Link Aggregation Group trunků	128	ANO
IEEE 802.1Q	ANO	ANO
Minimální počet aktivních VLAN	1000	ANO
IEEE 802.1x	ANO	ANO
Konfigurovatelná kombinace pořadí postupného ověřování zařízení na portu (IEEE 802.1x, MAC adresou, Web autentizací)	ANO	ANO
Integrace IEEE 802.1x s IP telefonním prostředím (802.1x Multi-domain authentication)	ANO	ANO
Možnost provozu 802.1x v tzv. audit módu bez omezování přístupu koncových uživatelů	ANO	ANO
RADIUS CoA	ANO	ANO
Podpora instance spanning-tree protokolu per VLAN	ANO	ANO
IEEE 802.1w - Rapid Spanning Tree Protocol	ANO	ANO
Protokol MVRP nebo VTP pro definici a správu VLAN sítí	ANO	ANO
Podpora jumbo rámců (min. 9198 bytes)	ANO	ANO

## Příloha č. 1 smlouvy

Detekce protilehlého zařízení (např. CDP nebo LLDP)	ANO	ANO
Směrování protokolů IPv4 a IPv6 v hardware	ANO	ANO
OSPFv2	ANO	ANO
OSPFv3	ANO	ANO
ISIS	ANO, i povýšením firmware	ANO, povýšením licence
BGPv4	ANO, i povýšením firmware	ANO, povýšením licence
Graceful Insertion and Removal	ANO, i povýšením firmware	ANO, povýšením licence
IP Multicast (PIM SSM, PIM SM)	ANO, i povýšením firmware	ANO, povýšením licence
Virtualizace směrovacích tabulek - např. Virtual Routing and Forwarding (VRF)	ANO, i povýšením firmware	ANO, povýšením licence
MPLS VPN	ANO, i povýšením firmware	ANO, povýšením licence
MPLS VPN - 6VPE	ANO, i povýšením firmware	ANO, povýšením licence
First Hop Redundancy Protokol (např. VRRP, HSRP)	ANO, i povýšením firmware	ANO, povýšením licence
Reverse path check (uRPF) pro IPv4 i IPv6	ANO, i povýšením firmware	ANO, povýšením licence
IGMPv2, IGMPv3	ANO	ANO
IGMP snooping	ANO	ANO
MLD snooping	ANO	ANO
DHCP relay	ANO, i povýšením firmware	ANO
Minimální počet HW QoS front	8	ANO
QoS classification – ACL, DSCP, CoS based	ANO	ANO
QoS marking - DSCP, CoS	ANO	ANO
QoS - Strict Priority Queue	ANO	ANO
Automatické nastavení QoS parametrů (AutoQoS nebo ekvivalentní)	ANO	ANO
QoS Policing	ANO	ANO
QoS-Per Flow policing	ANO	ANO
QoS-Hierarchical QoS	ANO, min. 2 úrovně	ANO
First Hop Redundancy Protokol pro IPv6 (HSRP nebo VRRP)	ANO	ANO
IPv6 services (Telnet, SSH, Syslog, DHCP)	ANO	ANO
IPv6 QoS	ANO	ANO
IPv6 First Hop Security (RA guard, DHCPv6 snooping, IPv6 source guard)	ANO	ANO
IPv6 Port ACL, VLAN ACL	ANO	ANO
Možnost definovat povolené MAC adresy na portu	ANO	ANO
PACL, VACL	ANO	ANO
Paketové filtry (ACL) jsou stále aplikovány a filtrují i v případě, že jsou na nich prováděny změny	ANO, i povýšením firmware	ANO

## Příloha č. 1 smlouvy

IEEE 802.1ae na uplink portech	ANO	ANO
IEEE 802.1ae (AES-GCM-256) na uplink portech	ANO, i povýšením firmware	ANO
Bezpečnostní funkce umožňující ochranu proti podvržení zdrojové MAC a IP adresy	ANO	ANO
Bezpečnostní funkce umožňující ochranu proti připojení neautorizovaného DHCP serveru	ANO	ANO
Bezpečnostní funkce umožňující inspekci provozu protokolu ARP	ANO	ANO
Ochrana proti nahrání modifikovaného software do zařízení prostřednictvím image signing a funkce secure boot, která ověřuje autentičnost a integritu jak bootloADERu, tak i samotného operačního systému zařízení prostřednictvím interních HW prostředků - tzv. trusted modulů	ANO	ANO
HW trusted modul využíván pro bezpečné uložení hesel a šifrovacích klíčů	ANO	ANO
Podpora SUDI (IEEE 802.1AR) autentizace	ANO	ANO
IEEE 802.3af	NE	ANO, přepínač bez PoE
IEEE 802.3at	NE	ANO, přepínač bez PoE
Schopnost poskytovat PoE napájení připojeným zřízením i během restartu přepínače	ANO	ANO
IEEE 802.3az	ANO	ANO
Automatická aplikace specifické konfigurace pro dané zařízení po detekci jeho připojení na portu	ANO	ANO
Multicast DNS (mDNS) gateway	ANO, i povýšením firmware	ANO, povýšením licence
Inteligentní PoE management - zajištění napájení připojeného zařízení podle konkrétních požadavků daného typu zařízení	ANO	ANO
Application Visibility - Pokročilá detekce a klasifikace jednotlivých přenášených aplikací (DPI na 7. vrstvě OSI modelu dle aplikačních signatur)	ANO, i povýšením firmware	ANO, povýšením licence
Application Visibility - Monitorování aplikačních toků (všech paketů) prostřednictvím technologie NetFlow nebo ekvivalentní	ANO	ANO
Application Visibility - Možnost definice klíčových atributů a parametrů monitorovaných toků včetně parametrů: zdrojová/cílová MAC adresa, zdrojová/cílová IP adresa, zdrojová/cílová VLAN, TCP flags, hodnota TTL, ICMP kód, IGMP type	ANO	ANO
Application Visibility – Schopnost detekce bezpečnostních hrozeb v šifrovaném provozu, např. v HTTPS	ANO, i povýšením firmware	ANO, povýšením licence
Export monitorovaných dat ve formátu NetFlow v9 nebo IPFIX	ANO	ANO
SSHv2	ANO	ANO
CLI rozhraní	ANO	ANO
Vzdálená identifikace zařízení pomocí "Blue Beacon" mechanismu	ANO	ANO
Model-driven programovatelnost prostřednictvím RESTCONF, NETCONF/YANG	ANO	ANO
Python scripting	ANO	ANO
Linux shell	ANO	ANO
Interpretace uživatelských skriptů a jejich aktivace asynchronní událostí v systému zařízení	ANO	ANO

## Příloha č. 1 smlouvy

Application hosting	ANO, i povýšením firmware	ANO, povýšením licence
Aplikace softwarových záplat, nikoli povyšování celého firmware	ANO, i povýšením firmware	ANO, povýšením licence
Streaming telemetrie prostřednictvím NETCONF/XML	ANO	ANO
SNMPv2/v3	ANO	ANO
Podpora network boot (iPXE) přes IPv4 i IPv6	ANO	ANO
Inventarizovatelnost komponent integrovanou RFID identifikací	ANO	ANO
TACACS+ nebo RADIUS klient pro AAA (autentizace, autorizace, accounting)	ANO	ANO
Vzdálený port mirroring (ERSPAN)	ANO, i povýšením firmware	ANO, povýšením licence
NTPv3 server	ANO	ANO
Podpora 8x5xNBD	5 let	ANO

**Tab. SP7** – příslušenství pro přepínače:

Název	Počet ks	Splňuje
100 GBASE-CR4 pasivní metalický kabel, 2m	2	ANO 2ks
10 GBASE-CU SFP+ kabel 1m (pro Keepalive link)	1	ANO 1ks
Dvourychlostní 10/25 GBASE-SR SFP modul s dosahem 25Gbit/s do vzdálenosti min. 400m po vícevidovém vlákně	28	ANO 28 ks
10 GBASE-SR SFP modul	26	ANO 26ks
8x10GE SFP+ síťový modul (náhradní pro přepínače dle Tab. SS2, SF3)	1	ANO 1ks

**Tab. WA8** – požadováno 10 ks WiFi access point s vlastnostmi:

Požadovaná funkcionality/vlastnost	Způsob splnění požadované funkcionality/vlastnosti	Splňuje
Access Point určený pro instalaci na strop/podhled	ANO	ANO
Typ antén	Integrované pro obě pásma	ANO, intergovaná
Dvě rádia pracující v režimu 2,4 a 5 GHz pro standardní prostředí nebo duální 5 GHz pro HD nasazení, možnost statické i dynamické volby režimu	ANO	ANO
Samostatné rádio pro monitorování 2,4 a 5 GHz RF spektra - detailní spektrální analýza, detekce útoků na bezdrátovou síť, lokalizace klientů	ANO	ANO
Podpora standardů 802.11a/b/g/n/ac a Wi-Fi6 (802.11ax)	ANO	ANO
Podpora minimálně 4x4 MIMO, MU-MIMO, UL/DL OFDMA, TWT, BSS Coloring a až 160 MHz kanál pro 802.11ax	ANO	ANO
Minimální počet inzerovaných SSID (BSSID) per radio	8	ANO
Podpora mechanismu pro optimalizaci fáze vysílaného bezdrátového signálu směrem k 802.11 n/ac/ax klientům (Tx Beam Forming)	ANO	ANO
Podpora mechanismu pro přepojení klientů z 2,4GHz do 5GHz pásma	ANO	ANO
Access Pointy obsahují X.509 certifikát s lokální platností pro nasazení PKI	ANO	ANO
Podpora autentizace Access Pointu do LAN sítě pomocí 802.1x, AP obsahují 802.1x suplikant	ANO	ANO
Podpora detekce a monitorování problémů WLAN odchytním provozu na AP a jeho zasláním do Ethernetového analyzátoru (např. Wireshark)	ANO	ANO
Podpora přímého přístupu na příkazovou řádku AP přes serial konzoli a přes IPv4 pomocí Telnet a SSH	ANO	ANO
Hardwarová podpora spektrální analýzy s podporou 160 MHz kanálů (detekce zdroje rušivého signálu - interference)	ANO	ANO
Podpora rozpoznání zdroje rušivého signálu podle signatur	ANO	ANO
Access Point obsahuje radio podporující BLE 5.0, ZigBee, Thread a USB 2.0 port	ANO	ANO
1 x 100/1000/2500 Mbit/s RJ45 ethernet rozhraní kompatibilní s 802.3bz	ANO	ANO
Možnost 802.3af/at PoE napájení AP z přepínače nebo injectoru - plná funkce AP při použití 802.3at, v případě 802.3af AP běží minimálně v režimu 1x1 MIMO pro obě rádiová pásma bez sníženého vysílacího výkonu	ANO	ANO
AP uzavřené konstrukce bez větracích otvorů a ventilátoru	ANO	ANO
Součástí AP je plechový úchyt pro instalaci na strop nebo stěnu	ANO	ANO
AP je fyzicky zabezpečitelné/zamknutelné k okolním pevným částem.	ANO	ANO
Důvěryhodný HW/SW - AP používá bezpečný zavaděč OS, ověřování podpisu OS, kontrolu autentičnosti HW a mechanismy pro ochranu SW a HW proti útokům	ANO	ANO
Součástí dodávky každého AP jsou licence pro kontroler bezdrátové sítě a poptávaný WLAN management. Všechny licence musí mít platnost minimálně 5 let.	ANO	ANO
Plná podpora AP na poptávaném kontroleru	ANO	ANO
Podpora 8x5xNBD	5 let	ANO, 5 let



**Tab. WC9** – požadovány 2 ks WiFi kontrolérů (primární a redundantní) s vlastnostmi:

Požadovaná funkcionality/vlastnost	Způsob splnění požadované funkcionality/vlastnosti	Splňuje
Požadovaný formát zařízení	Fyzické zařízení	ANO, Fyzické zařízení
Minimální počet Ethernet portů per kontroler. Aktivní 7m Twinax kabely pro všechny porty součástí dodávky	2x 1/10G SFP/SFP+ 4x 1/2,5 mGig	ANO
Minimální propustnost pro data Gb/s	5 Gb/s	ANO
Licence dle počtu nově pořizovaných AP, možnost upgradu až na minimálně 250 registrovaných AP	ANO	ANO
Minimální počet současně připojených klientů	5000	ANO
Redundance na úrovni kontrolerů a jejich portů, výpadek aktivního kontroleru v redundantním páru nemá žádný dopad na provoz již připojených klientů (tj. bez potřeby reautentizace)	ANO	ANO
Lokální síť - možnost tunelování uživatelských dat z AP až na kontroler, možnost šifrování těchto uživatelských dat bez výrazného vlivu na propustnost	ANO	ANO
Mesh síť - podpora mesh sítí, současné připojení normálních a mesh AP k jednomu kontroleru	ANO	ANO
Vzdálené lokality - možnost lokálního bridgování uživatelských dat per SSID přímo na příslušném AP	ANO	ANO
Šifrovaná řídicí komunikace AP-kontroler	ANO	ANO
Současná funkčnost AP pro přenos dat, analýzu spektra a detekci bezpečnostních incidentů	ANO	ANO
<b>Bezpečnost a Guest Access</b>		
Podpora 802.11i, respektive jeho implementace WPA2 včetně enterprise variant autentizace/šifrování	ANO	ANO
Podpora WPA3 – WPA3 Enterprise, WPA3 SAE, WPA3 OWE	ANO	ANO
PSK autentizace vč. možnosti různých PSK klíčů pro různé klienty v rámci jednoho SSID	ANO	ANO
Podpora standardu „802.11w“ pro ochranu řídicích rámců na AP a klientovi	ANO	ANO
Podpora standardu „802.11u“ pro výběr SSID a autentizaci klienta	ANO	ANO
Integrované řešení návštěvnického přístupu s možností webové autentizace (včetně nativních IPv6 klientů), bezpečné oddělení od zaměstnaneckého provozu, funkční i v módu lokálního bridgování uživatelských dat přímo na AP	ANO	ANO
Podpora řešení návštěvnického přístupu pro klienty bezdrátové i drátové sítě	ANO	ANO
Možnost omezit počet klientů per SSID	ANO	ANO
Lokální profilování zařízení – per uživatel a per zařízení	ANO	ANO
Integrovaný IDS systém pro detekci cizích AP (Rogue AP) a klientů v AdHoc režimu, možnost vynuceného odpojení klientů od cizích AP	ANO	ANO
Podpora Flexible NetFlow a exportu záznamů (dle RFC 3954) o datových tocích uživatelů (vč. zdrojové a cílové IP adresy, portů, WLAN ID, počtu paketů a objemu přenesených dat) směrem k externímu kolektoru	ANO	ANO
<b>Rychlý roaming</b>		
Podpora standardu „802.11r“ pro rychlý roaming klientů mezi AP, možnost selektivního využití 802.11r na sdíleném SSID pouze pro zařízení, které tento standard podporují	ANO	ANO

## Příloha č. 1 smlouvy

Podpora standardu „802.11k“ pro optimalizaci roamingu	ANO	ANO
Podpora standardu „802.11v“ pro optimalizaci připojení klienta	ANO	ANO
<b>QoS a řízení provozu v bezdrátové síti</b>		
Podpora 802.11e/WMM	ANO	ANO
Diferenciace úrovně QoS pro různé služby a skupiny uživatelů (zaměstnance a návštěvníky), možnost obousměrného omezení propustnosti per klient.	ANO	ANO
Mechanismy řízení přístupu (Call Admission Control) pro hasový i video provoz. Konfigurovatelné parametry max. zátěže a šířky pásma.	ANO	ANO
Podpora Video-streamingu se spolehlivým multicastem	ANO	ANO
Optimalizace multicast provozu v bezdrátové síti (IGMP snooping)	ANO	ANO
Aplikační inspekce přenášeného provozu (DPI na 7. vrstvě ISO/OSI na základě aplikačních signatur) umožňující rozpoznání jednotlivých aplikací, grafické zobrazení statistik a možnost řízení QoS per rozpoznaná aplikace	ANO	ANO
<b>Správa frekvenčního pásma, konfigurační profily</b>		
Automatizovaná centrální správa frekvenčního pásma	ANO	ANO
Monitoring rádiového spektra vč. 20/40/80/160 MHz kanálů, možnost okamžité automatické centralizovaně řízené reakce (změna kanálu nebo jeho šířky, změna vysílacího výkonu), grafické vyobrazení informací o kvalitě signálu	ANO	ANO
Automatické zvýšení vysílacího výkonu okolních AP při výpadku AP („self healing“)	ANO	ANO
Možnost detekce rušivých signálů (interference) a identifikace zdrojů interference na základě signatur	ANO	ANO
Mesh síť – automatický výběr vhodného kanálu pro backhaul, automatické sestavení optimálního mesh stromu, monitorování všech kanálů na pozadí s rychlou konvergencí v případě výpadku primárního nadřazeného AP	ANO	ANO
Troubleshooting rádiového signálu a automatické řešení problému rušivého signálu, generování alarmů na základě překročení prahových hodnot kvality signálu	ANO	ANO
Možnost definovat různé konfigurační profily a ty následně přiřadit vybraným AP (např. dle umístění AP, bezpečnostních pravidel atd.).	ANO	ANO
Možnost vytvořit různé rádiové profily (nastavení kanálů, rychlostí) a ty následně přiřadit vybraným AP.	ANO	ANO
<b>Podpora IPv6</b>		
Podpora IPv6 – management kontroleru (vč. Syslog, radius)	ANO	ANO
Podpora IPv6 – komunikace AP-kontroler	ANO	ANO
Podpora IPv6 – Guest Access i pro nativní klienty vč. webové autentizace pro IPv6 klienty	ANO	ANO
Podpora IPv6 – IPv6 multicast, MLD snooping	ANO	ANO
Podpora IPv6 – bezpečnost (RA Guard, IPv6 Source Guard, DHCPv6 Server Guard, ACL)	ANO	ANO
Podpora IPv6 – ND cache na kontroleru, optimalizace přenosu ND zpráv, rate-limiting pro RA	ANO	ANO
<b>Dohled a správa kontroleru, zabezpečení HW/SW</b>		
Centrální administrace správců s granularitou přístupových práv	ANO	ANO
Podpora správy přes serial CLI nebo přes IP pomocí SSH/telnet a https web GUI, SNMP	ANO	ANO
RJ45 konzolový port a/nebo USB konzolový port, dedikovaný ethernetový RJ45 management port	ANO	ANO

Příloha č. 1 smlouvy

Podpora API rozhraní pro plnou konfiguraci kontroleru pomocí NETCONF, RESTCONF za použití YANG data modelů. Podpora exportu provozních dat z kontroleru.	ANO	ANO
Důvěryhodný HW/SW – kontroler používá bezpečný zavaděč OS, ověřování podpisu SW komponent, kontrolu autentičnosti HW a mechanismy pro ochranu SW a HW proti útokům	ANO	ANO
Podpora 8x5xNBD	5 let	ANO, 5let

**Tab. SW10** – požadován systém správy síťové infrastruktury s vlastnostmi:

Požadovaná funkcionality/vlastnost	Způsob splnění požadované funkcionality/vlastnosti	Splňuje
<b>Provedení, parametry</b>		
Dostupné v provedení připraveného virtuálního stroje do virtualizovaného prostředí	Ano	ANO, virtuální
CPU	4 vCPU	ANO, dle zvoleného vzoru
Paměť	12 GB	ANO, dle zvoleného vzoru
Disková kapacita	300 GB	ANO, dle zvoleného vzoru
Disková propustnost (I/O Speed)	200 MBps	ANO, dle zvoleného vzoru, závisí na zdrojích zadavatele
Podpora VMWare	ESXi 6.5, 6.7	ANO
Podpora Windows 2016 server & Hyper-V 2016 server	2016	ANO
Podporovaných zařízení celkem	500	ANO
Podporovaných AP řízených řídicím systémem bezdrátové sítě	300	ANO
Podporovaných autonomně řízených AP	300	ANO
Podporovaných síťových zařízení - aktivních prvků (přepínače, směrovače)	300	ANO
Podporovaných síťových rozhraní	12000	ANO
Podporovaných systémů pro víceúrovňovou vizibilitu a analýzu síťového provozu	5	ANO
Podporovaných řídicích systémů bezdrátové sítě (kontrolérů)	5	ANO
Podporovaných aplikačních platform bezdrátové sítě	1	ANO
Podporovaných bezdrátově připojených klientů	4000	ANO
Podporovaných bezdrátových klientů roamujících nebo měnících asociaci k AP (5 minut)	1000	ANO
Podporovaných drátem připojených klientů	6000	ANO
Událostí zpracovaných za jednu sekundu celkem	100	ANO
Syslog zpráv zpracovaných za jednu sekundu	70	ANO
SNMP trapů zpracovaných za jednu sekundu	20	ANO
Systémových událostí zpracovaných za jednu sekundu	10	ANO
Zpracovaných toků Netflow - Netflow flow za sekundu	3000	ANO
Monitorovaných síťových rozhraní (polling)	2400	ANO
<b>Licence</b>		
Licence pro správu jednoho AP řízeného řídicím systémem bezdrátové sítě	10	ANO 10
Licence pro správu všech výše požadovaných přepínačů	Ano	ANO
<b>Platforma</b>		
Bezpečný přístup prostřednictvím webového grafického uživatelského rozhraní	Ano	ANO

## Příloha č. 1 smlouvy

Podpora autorizace a autentizace přístupu do systému vůči TACACS+	Ano	ANO
Podpora autorizace a autentizace přístupu do systému vůči RADIUS	Ano	ANO
Podpora řízení přístupu ke GUI pomocí identity (SSO - Single Sign On)	Ano	ANO
Podpora různých úrovní oprávnění pro přístup do systému (RBAC)	Ano	ANO
Podpora multiuživatelského prostředí GUI s možností využít jak předdefinované skupiny, tak s možností definovat vlastní přístupová oprávnění k funkcím GUI pro alespoň dvě uživatelské skupiny	Ano	ANO
Podpora přístupu ke GUI z mobilních zařízení, např. tabletů	Ano	ANO
Podpora logování aktivity uživatelů a logování systémových událostí	Ano	ANO
Podpora zálohování systému a obnovy ze zálohy	Ano	ANO
Možnost redundance pro zajištění vysoké dostupnosti, automatická synchronizace	Ano	ANO
Nastavitelnost doby ukládání historických a agregovaných dat	Ano	ANO
Omezování přístupu uživatelům pouze ke skupině zařízení, např. na základě lokality, typů zařízení apod.	Ano	ANO
Monitoring provozních parametrů aplikací	Ano	ANO
Zpracování informací o provozu v síti (NetFlow) včetně deduplikace dat z více zdrojů	Ano	ANO
Zobrazování informace o chování aplikací v síti (statistiky, identifikace případných problémů na síťové nebo aplikační úrovni, zhoršení uživatelské zkušenosti uživatelů)	Ano	ANO
Podpora protokolu IPv4	Ano	ANO
Podpora protokolu IPv6	Ano	ANO
Podpora protokolu SSH	Ano	ANO
Podpora protokolů SNMPv1, SNMPv2, SNMPv2c a SNMPv3	Ano	ANO
Podpora zpracování SYSLOG zpráv	Ano	ANO
Podpora zpracování SNMP zpráv	Ano	ANO
Úprava zpracování událostí a alarmů včetně např. potlačení vybraných alarmů	Ano	ANO
Kategorizace alarmů a událostí	Ano	ANO
Zasílání upozornění na vybrané události emailem	Ano	ANO
Podpora MIB třetích stran	Ano	ANO
Monitoring parametrů definovaných v MIB třetích stran	Ano	ANO
Definovatelnost vlastní události na základě SNMP nebo SYSLOG zpráv	Ano	ANO
Export zpráv a událostí	Ano	ANO
Generování zpráv pro nadřazený management systém	Ano	ANO
Posílání alarmů a událostí network management aplikacím třetích stran, které podporují FCAPS	Ano	ANO
Podpora API pro programatický přístup k funkcionalitě aplikace správy	Ano	ANO
Schopnost management systému nalézt automaticky zařízení v síti s využitím více různých metod pracujících s informacemi z druhé a třetí vrstvy	Ano	ANO

## Příloha č. 1 smlouvy

Schopnost management systému filtrovat nalezená zařízení – vyloučit resp zahrnout definované adresní rozsahy	Ano	ANO
Schopnost management systému připravit konfigurační a jiné změny formou úlohy včetně schvalovacích mechanismů	Ano	ANO
Podpora pro vyhledávání informací o síťových zařízeních, připojených koncových zařízeních, uživatelích, konfigurovaných parametrech, alarmech, událostech apod. napříč celým management systémem.	Ano	ANO
<b>Správa bezdrátové sítě</b>		
Požadavky na škálování - systém musí být schopen kromě bezdrátové sítě spravovat a monitorovat také LAN / WAN síť pouhým přidáním příslušných licencí	Ano	ANO
Kompletní správa životního cyklu bezdrátové sítě (plánování, nasazení, monitoring, troubleshooting, reporting)	Ano	ANO
Inventarizace HW zařízení bezdrátové sítě	Ano	ANO
Inventarizace firmware bezdrátové sítě	Ano	ANO
Generování reportů bezpečnostních problémů infrastruktury	Ano	ANO
Generování reportů inventory bezdrátové sítě	Ano	ANO
Centrální konfigurace bezdrátových sítí včetně bezpečnostních politik, QoS profilů	Ano	ANO
Konfigurace pomocí šablon pro zefektivnění konfiguračních úloh	Ano	ANO
Inventarizace, verzování, archivace a správa konfigurací bezdrátové sítě	Ano	ANO
Předpřipravené šablony dle doporučení výrobce - "best practice"	Ano	ANO
Tvorba vlastních konfiguračních šablon (sekvence příkazů)	Ano	ANO
Celkové konfigurační šablony sestavovány z dílčích šablon konfigurací jednotlivých funkcí nebo uživatelsky definovaných konfigurací jednotlivých funkcí	Ano	ANO
Podpora pro o automatizovanou konfiguraci nově připojovaných zařízení	Ano	ANO
Nástroje pro plánování bezdrátové sítě, rozšíření stávající a pro nové lokality	Ano	ANO
Nástroje pro plánování, nasazení, monitorování a optimalizaci hlasových služeb do bezdrátové sítě	Ano	ANO
Technologický dashboard pro zobrazování výsledků měření kvality signálu bezdrátové sítě	Ano	ANO
Zobrazování současných i historických hodnot a trendu kvality signálu bezdrátové sítě	Ano	ANO
Zobrazování alarmů týkajících se kvality signálu	Ano	ANO
Hierarchické mapy zobrazující umístění AP, šíření signálu a aktuální pozice wifi klientů (notebooků, PDA, WiFi telefonů, WiFi RFID tagů apod.)	Ano	ANO
Nástroje pro detekci a řešení problémů v bezdrátové síti (grafy obsazenosti kanálů, grafy odpovídající provozu klientů atd.)	Ano	ANO
Komplexní zobrazení veškerých relevantních údajů pro jednotlivé zařízení a jednotlivého uživatele v souhrnném pohledu (kontextově) pro rychlejší troubleshooting	Ano	ANO
Zobrazení informací o uživateli, koncovém či síťovém zařízení v kontextu informací souvisejících s jeho okolím a provozními parametry	Ano	ANO

## Příloha č. 1 smlouvy

Podpora pro troubleshooting problémů související s pokrytím RF signálem	Ano	ANO
Nástroj pro troubleshooting klientů s funkcí identifikace zdrojů interference, které ovlivňují klienty	Ano	ANO
Integrovaný nástroj pro sběr diagnostických dat o kontrolerech a AP v bezdrátové síti	Ano	ANO
Detailní monitoring WLAN sítě	Ano	ANO
Monitoring připojení koncových zařízení napříč pevnou i bezdrátovou sítí	Ano	ANO
Monitoring síťových rozhraní	Ano	ANO
Monitoring specifických (definovaných) skupin síťových rozhraní (uplink, WAN rozhraní apod.)	Ano	ANO
Monitorování výskytu koncových zařízení a uživatelů v síti	Ano	ANO
Monitoring a vyhodnocování přenosových parametrů z NetFlow	Ano	ANO
Monitoring funkčnosti (včetně odezev) přenášených aplikací	Ano	ANO
Monitoring parametrů zdraví prvků bezdrátové sítě a jejich přehledné zobrazení	Ano	ANO
Možnost nastavit prahové hodnoty pro monitoring parametrů zdraví access pointů	Ano	ANO
Monitoring IPv6 připojení koncových zařízení napříč pevnou i bezdrátovou sítí	Ano	ANO
Integrace mesh technologií – stav mesh linek, test prostupnosti linek	Ano	ANO
Centralizovaný sběr wifi událostí včetně bezpečnostních a přeposílání do nadřazeného dohledu	Ano	ANO
Pokročilé vyhledávání zdrojů interference v bezdrátové síti	Ano	ANO
Podpora lokalizace falešného access pointu	Ano	ANO
Podpora pro detekci falešného access pointu, generování souvisejících alarmů, reporting	Ano	ANO
Automatické dohledání portu pevné sítě s připojeným falešným access pointem	Ano	ANO
Podpora trasování lokalizace bezdrátového klienta	Ano	ANO
Možnost identifikovaný problém eskalovat prostředky management systému na podporu výrobce	Ano	ANO
Integrace s další aplikací pro zjišťování identity, typu, parametrů, stavu a stavu software koncových klientů pevné i bezdrátové sítě; pro monitoring bezpečnostních politik koncových klientů	Ano	ANO
Integrace s další aplikací pro práci s polohou koncových zařízení	Ano	ANO
Integrace se znalostní bází výrobce pro usnadnění řešení problémů a správy	Ano	ANO
Jednoduché GUI rozhraní pro vytváření dočasných uživatelských účtů	Ano	ANO
<b>Správa aktivních prvků</b>		
Požadavky na škálování - systém musí být schopen kromě LAN / WAN sítě spravovat a monitorovat také bezdrátovou síť pouhým přidáním příslušných licencí	Ano	ANO
Kompletní správa životního cyklu LAN / WAN sítě (plánování, nasazení, monitoring, troubleshooting, reporting)	Ano	ANO
Inventarizace HW síťových prvků	Ano	ANO

## Příloha č. 1 smlouvy

Inventarizace, nasazení a správa firmware aktivních prvků	Ano	ANO
Analýza vhodnosti firmware aktivních prvků pro nasazení	Ano	ANO
Generování reportů inventury aktivních prvků	Ano	ANO
Konfigurace pomocí šablon pro zefektivnění konfiguračních úloh	Ano	ANO
Inventarizace, verzování, archivace a správa konfigurací LAN/WAN sítě	Ano	ANO
Předpřipravené šablony dle doporučení výrobce - "best practice"	Ano	ANO
Tvorba vlastních konfiguračních šablon (sekvence příkazů)	Ano	ANO
Celkové konfigurační šablony sestavovány z dílčích šablon konfigurací jednotlivých funkcí nebo uživatelsky definovaných konfigurací jednotlivých funkcí	Ano	ANO
Podpora pro o automatizovanou konfiguraci nově připojovaných zařízení	Ano	ANO
Zobrazování alarmů a událostí z LAN / WAN sítě	Ano	ANO
Topologická mapa	Ano	ANO
Nástroje pro detekci a řešení problémů v LAN / WAN síti	Ano	ANO
Komplexní zobrazení veškerých relevantních údajů pro jednotlivé zařízení a jednotlivého uživatele v souhrnném pohledu (kontextově) pro rychlejší troubleshooting	Ano	ANO
Zobrazení informací o uživateli, koncovém či síťovém zařízení v kontextu informací souvisejících s jeho okolím a provozními parametry	Ano	ANO
Detailní monitoring LAN / WAN sítě	Ano	ANO
Monitoring připojení koncových zařízení napříč pevnou i bezdrátovou sítí	Ano	ANO
Monitorování výskytu koncových zařízení a uživatelů v síti	Ano	ANO
Monitoring a vyhodnocování přenosových parametrů z NetFlow	Ano	ANO
Monitoring funkčnosti (včetně odezev) přenášených aplikací	Ano	ANO
Monitoring parametrů zdraví aktivních prvků a jejich přehledné zobrazení	Ano	ANO
Možnost nastavit prahové hodnoty pro monitoring parametrů zdraví aktivních prvků	Ano	ANO
Monitoring IPv6 připojení koncových zařízení napříč pevnou i bezdrátovou sítí	Ano	ANO
Automatické dohledání portu pevné sítě s připojeným falešným access pointem	Ano	ANO
Možnost identifikovaný problém eskalovat prostředky management systému na podporu výrobce	Ano	ANO
Integrace s další aplikací pro zjišťování identity, typu, parametrů, stavu a stavu software koncových klientů pevné i bezdrátové sítě; pro monitoring bezpečnostních politik koncových klientů	Ano	ANO



**Tab. MS11** – požadován nástroj pro monitorování sítě s vlastnostmi:

Požadovaná funkcionality/vlastnost	Způsob splnění požadované funkcionality/vlastnosti	Splňuje
<b>Management</b>		
Min. počet spravovaných appliance pro sběr a analýzu dat distribuovaných v síti	5	ANO
Formát zařízení	virtuální (nebo fyzický)	ANO virtuální
Podpora VMWare	ESXi 6.5, 6.7	ANO
<b>Kolektor</b>		
Hranice (HW limit zařízení) zpracovaných toků za vteřinu (FPS, Flows per second)	30 000	ANO
Minimální licencování (počáteční v rámci dodávky) zpracovaných toků za vteřinu (FPS, Flows per second)	1 000	ANO
Minimální počet síťových zařízení exportujících do jedné appliance pro sběr dat	1 000	ANO
Formát zařízení	virtuální (nebo fyzický)	ANO, virtuální
Podpora VMWare	ESXi 6.5, 6.7	ANO
<b>Funkční část</b>		
Zastřešující správa appliance pro sběr a analýzu dat, případně dalších komponent systému, distribuovaných v síti	Ano	ANO
Možnost sběru dat/integrace s dalšími bezpečnostními prvky a systémy (firewall, web proxy, IDS/IPS, systémy řízení přístupu do sítě, ...)	Ano	ANO
Sběr dat a jejich prezentace z velkého množství rozdílných síťových segmentů současně (z distribuovaných appliance)	Ano	ANO
Vizibilita napříč pevným i virtuálním prostředím	Ano	ANO
Detekce a prioritizace bezpečnostních hrozeb	Ano	ANO
Detekce porušení požadovaných politik	Ano	ANO
Dostatečně pokročilé detekční techniky a detailní vzhled do komunikační infrastruktury, aby byl využitelný pro detekci a obranu proti "Advanced Persistent Threats", malware, virů, síťových červů, cílených útoků, detekci DDoS útoků	Ano	ANO
Různé skupiny oznámení (alarmů)	Ano	ANO
Přehledové zobrazení všech oznámení (alarmů) na hlavní monitorovací obrazovce	Ano	ANO
Seskupování a grafická reprezentace vztahů a toků mezi logickými skupinami (definovanými uživatelem) komunikační infrastruktury	Ano	ANO
Rozšiřující funkcionality centrálního managementu se instaluje pomocí individuálních aplikací do základní platformy, bez omezení provozu služby	Ano	ANO
Historický záznam všech síťových spojení pro pozdější audit a forenzní analýzu	Ano	ANO
Analýza šifrovaného provozu umožňující kryptografický audit v prostředí sítě organizace se znalostí využívaného šifrovacího algoritmu/metody	Ano	ANO

## Příloha č. 1 smlouvy

Pomocí síťové analýzy a strojového učení umožňuje v šifrovaném provozu, v reálném čase identifikovat potenciální hrozby bez nutnosti dešifrování	Ano	ANO
Využívá globální znalost hrozeb k identifikaci, detekci a korelaci škodlivého softwaru v šifrovaném provozu v místním prostředí a zároveň poskytuje důvěrnost mezi koncovými uživateli a udržuje integritu komunikace, protože nedochází k dešifrování.	Ano	ANO
Centrální správa umožňuje definici síťového prostředí dané organizace na grafické paletě pomocí drag and drop diagramů	Ano	ANO
Napojení na centrální databázi hrozeb poskytovanou výrobcem, která je neustále aktualizovaná	Ano	ANO
Centrální management umožňuje správu všech komponent řešení z jednoho místa ve web GUI rozhraní	Ano	ANO
Integrace se systémem řízení přístupu do sítě pro provádění automatizovaných nápravných akcí	Ano	ANO
Integrace se SIEM systémy	Ano	ANO
Funkcionality dostupné i pomocí REST API	Ano	ANO
Implementace rozhraní pro sdílení informací s jinými bezpečnostními systémy - pxGrid nebo draft-ietf-mile-xmpp-grid-02	Ano	ANO
Přístup administrátorů/uživatelů k systému podle uživatelských rolí/přístupových práv	Ano	ANO
Sběr dat o datových tocích přímo ze síťových zařízení, senzorů určených pro export síťových toků, nebo také přímo z koncových bodů	Ano	ANO
Baselining běžného provozu	Ano	ANO
Detekce anomálií oproti běžnému provozu i na L7	Ano	ANO
Detekce anomálií na základě toků v síti	Ano	ANO
Deduplikace záznamů o toku, pokud byl tentýž tok sebrán z více zařízení v síti	Ano	ANO
Spojení všech záznamů o toku, pokud se týkají té samé transakce mezi koncovými zařízeními, včetně zařízení z veřejného Internetu	Ano	ANO
Historický záznam všech síťových spojení pro pozdější audit a forenzní analýzu	Ano	ANO
Schopnost obohatit záznam toků o URL nebo uživatelskou aplikaci	Ano	ANO
Korelace datových toků s globální znalostí hrozeb v cloudu pro identifikaci moderních a zero day hrozeb	Ano	ANO
Detekce úniku dat z organizace (Data Hoarding, Data Exfiltration)	Ano	ANO
Detekce šíření Malware	Ano	ANO
Detekce Botnetů	Ano	ANO
Detekce DDoS	Ano	ANO
Detekce scanu sítě	Ano	ANO
Sběr dat o síťovém provozu a jejich export v typizovaném formátu zpracovatelném aplikací pro sběr a analýzu dat	Ano	ANO
Statistiky toků z úrovně paketů	Ano	ANO
Obohacení záznamů toků o informace aplikační vrstvy (L7)	Ano	ANO

Příloha č. 1 smlouvy

Poukázání na netypické využívání sítě a generování příslušného alarmu, včetně rozšiřujících kontextových informací anomálie	Ano	ANO
Senzor pro export síťových toků musí být kompatibilní s VxLAN	Ano	ANO
Senzor pro export síťových toků umožňuje zálohování konfigurace chráněné heslem	Ano	ANO
S využitím Netflow 9 umožňuje export datových toků určených pro analýzu šifrované komunikace	Ano	ANO



# Cisco Catalyst 9120 Series Access Points

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The Cisco® Catalyst® 9120 Series Access Points are the next generation of enterprise access points. They are resilient, secure, and intelligent.

We are more dependent on our wireless networks than ever before. Additional devices connect to the network every year and the Cisco Catalyst 9120 Series Access Points will provide a seamless experience anywhere for everyone. Going beyond the Wi-Fi 6 (802.11ax) standard, the Catalyst 9120 provides integrated security, resiliency and operational flexibility as well as increased network intelligence.

Extending Cisco's intent-based network and perfect for networks of all sizes, the Catalyst 9120 scales to the growing demands of IoT while fully supporting the latest innovations and new technologies. Not only that, but the Catalyst 9120 is the leaders in performance, security and analytics.

The Catalyst 9120 Series Access Points, paired with Cisco DNA, are enterprise-class products that will address your current and future needs. These access points are the first step in updating your network and are able to take better advantage of all of the features and benefits that Wi-Fi 6 provides.

Key features:

- Wi-Fi 6 certifiable
- Four radios: 5 GHz (4x4) Flexible radio with 2.4 or 5 GHz (4x4), Unified RF Engine, Zigbee, and other multiprotocol 802.15.4 devices
- IoT ready (BLE, Zigbee, and other multiprotocol 802.15.4 devices)\*\*
- OFDMA and MU-MIMO
- Multigigabit support
- Internal, external antenna and also external antenna for professional installations
- Available with optional embedded wireless controller

\*\* = Future Support

The Cisco Catalyst 9120 Series Access Points support both orthogonal frequency-division multiple access (OFDMA) and multiuser multiple-input, multiple-output (MU-MIMO), delivering more predictable performance for advanced applications and IoT. Additionally, with up to 2.5 Gbps with NBASE-T and IEEE 802.3bz Ethernet compatibility, the Cisco Catalyst 9120 Series can seamlessly offload network traffic without any bottlenecks. With Cisco's Multigigabit technology, you can use your existing Category 5e or 6 cabling to achieve speeds up to 2.5 Gbps, allowing for higher throughputs with minimum cost. And with different antenna choices, you're able to decide which option works best for you.

**Table 1.** Features and benefits

Feature	Benefits
<b>Wi-Fi 6 (802.11ax)</b>	The IEEE 802.11ax emerging standard, also known as High-Efficiency-Wireless (HEW) or Wi-Fi 6, builds on 802.11ac. It delivers a better experience in typical environments with more predictable performance for advanced applications such as 4K or 8K video, high-density, high-definition collaboration apps, all-wireless offices, and IoT. Wi-Fi 6 is designed to use both the 2.4-GHz and 5-GHz bands, unlike the 802.11ac standard.
<b>Cisco RF ASIC</b>	Cisco RF ASIC is a fully integrated Software Defined Radio (SDR) that can perform advanced RF spectrum analysis and delivers features like CleanAir, Wireless Intrusion Prevention System (WIPS), Fast Locate*, DFS detection. (* - Future)
<b>Uplink/downlink OFDMA</b>	OFDMA-based scheduling splits the bandwidth into smaller chunks called Resource Units (RUs), which can be allocated to individual clients in both the downlink and uplink directions to reduce overhead and latency.
<b>MU-MIMO technology</b>	Supporting four spatial streams, MU-MIMO enables access points to split spatial streams between client devices, to maximize throughput.
<b>BSS coloring</b>	Spatial reuse (also known as Basic Service Set [BSS] coloring) allows the access points and their clients to differentiate between BSSs, thus permitting more simultaneous transmissions.
<b>Target wake time</b>	A new power savings mode called Target Wake Time (TWT) allows the client to stay asleep and to wake up only at prescheduled (target) times to exchange data with the access point. This offers significant energy savings for battery-operated devices, up to 3x to 4x compared to 802.11n and 802.11ac.
<b>Intelligent Capture</b>	Intelligent Capture probes the network and provides Cisco DNA Center with deep analysis. The software can track over 240 anomalies and instantaneously review all packets on demand, emulating the onsite network administrator. Intelligent Capture allows for more informed decisions on your wireless networks.
<b>Flexible Radio Assignment</b>	Allows the access points to intelligently determine the operating mode of serving radios based on the RF environment. The access points can operate in the following modes: <ul style="list-style-type: none"> <li>• 2.4-GHz and 5-GHz mode: One radio will serve clients in 2.4-GHz mode, while the other serves clients in 5-GHz mode.</li> <li>• Dual 5-GHz mode: Both radios inside the access point operate on the 5-GHz band, maximizing the benefits of Wi-Fi 6 and increasing client device capacity.</li> </ul>
<b>Dual 5-GHz radio support</b>	Enables both radios to operate in 5-GHz client serving mode, allowing an industry-leading 5.2 Gbps (2 x 2.6 Gbps) over-the-air speeds while increasing client capacity.

Feature	Benefits
Smart antenna connector	An intelligent second physical antenna connector is included on Catalyst 9120 Access Points with an external antenna. This connector provides advanced network design flexibility for high-density and large open-area environments such as auditoriums, convention centers, libraries, cafeterias, and arenas/stadiums, allowing two sets of antennas to be connected and active on a single access point.
Cisco Embedded Wireless Controller	The Catalyst 9120 Wi-Fi 6 access points is available with a built-in controller. The Cisco Embedded Wireless Controller on Catalyst 9100 Access Points provides an easy-to-deploy and manage option that does not require a physical appliance. The control resides on the access point so there is no added footprint or complexity. And, because it uses Catalyst 9800 code, it's easy to migrate your network as your needs grow.
Multigigabit Ethernet support	Provides uplink speeds of 2.5 Gbps, in addition to 100 Mbps and 1 Gbps. All speeds are supported on Category 5e cabling for an industry first, as well as 10GBASE-T (IEEE 802.3bz) cabling.
Bluetooth 5	Integrated Bluetooth Low Energy (BLE) 5 radio to enable IoT use cases such as location tracking and wayfinding.
Container support for applications	Enables edge computing capabilities for IoT applications on the host access point.
Apple Features	<p>Apple and Cisco have partnered to create an optimal mobile experience for iOS devices on corporate networks based on Cisco technologies. Using new features in iOS 10, in combination with the latest software and hardware from Cisco, businesses can now more effectively use their network infrastructure to deliver an enhanced user experience across all business applications.</p> <p>At the center of the collaboration is a unique handshake between the Cisco WLAN and Apple devices. This handshake enables the Cisco WLAN to provide an optimal Wi-Fi roaming experience to Apple devices. Additionally, the Cisco WLAN trusts Apple devices and gives priority treatment for business-critical applications specified by the Apple device. This feature is also known as Fast Lane.</p>

**Note:** Features available in a future releases – Target Wake Time, BSS Coloring, Uplink/downlink OFDMA, Cisco Intelligent Capture

## Resilient - steady performance in demanding environments

Networks infrastructure that upgrade to Wi-Fi 6 enabled devices will get up to four times the capacity boost needed to support the additional devices connected to the network as well as the data that they generate. Wi-Fi 6 will offer multi-gigabit performance which will feature a seamless connectivity with higher throughput compared to the 802.11ac standard. This means you'll see your network performance run smoother. With support for BSS coloring, the new standard eases high device dense deployments by allowing simultaneous transmissions, ultimately increasing network capacity, customer interactions, and value-add services. BSS coloring allows the limited channels in the 2.4 GHz to have better spectral re-use benefiting IoT and 2.4 GHz clients.

Wi-Fi 6, with better coordination of transit time to and from devices, will also bring about a reduction in latency and a greater reliability allowing for hundreds of devices per access point. This allows for IoT devices to be reliably deployed at scale. And an overall improved user experience will be seen as well, as Wi-Fi 6 will improve device battery life of devices such as smartphones, tablets and IoT when compared to prior standards. For more details about Wi-Fi 6 please check [Cisco's Technical Whitepaper](#) on Wi-Fi 6.



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## Secure infrastructure

**Trustworthy systems built with Cisco Trust Anchor Technologies** provide a highly secure foundation for Cisco products. With the Catalyst 9100 Series, these technologies enable hardware and software authenticity assurance for supply chain trust and strong mitigation against man-in-the-middle attacks that compromise software and firmware. Trust Anchor capabilities include:

- **Image signing:** Cryptographically signed images provide assurance that the firmware, BIOS, and other software are authentic and unmodified. As the system boots, the system's software signatures are checked for integrity.
- **Secure Boot:** Cisco Secure Boot technology anchors the boot sequence chain of trust to immutable hardware, mitigating threats against a system's foundational state and the software that is to be loaded, regardless of a user's privilege level. It provides layered protection against the persistence of illicitly modified firmware.
- **Cisco Trust Anchor module:** A tamper-resistant, strong cryptographic, single-chip solution provides hardware authenticity assurance to uniquely identify the product so that its origin can be confirmed to Cisco. This provides assurance that the product is genuine.

## Aesthetically redesigned for next generation enterprise

The Catalyst 9100 series access points are built from the ground-up, with new aerodynamic look and smooth finish, integrating RF excellence and next generation technologies to provide the best-in-class wireless experience without compromise. While packing several high-performance features, the hardware is redesigned to deliver higher efficiencies in a more compact form-factor to make visually appealing Wi-Fi deployments commonplace.

## Cisco DNA Support

Pairing the Cisco Catalyst 9120 Series Access Points with the Cisco Digital Network Architecture (Cisco DNA) allows for a total network transformation. Cisco DNA allows you to truly understand your network with real-time analytics, quickly detect and contain security threats, and easily provide networkwide consistency through automation and virtualization.

Cisco DNA with Software-Defined Access (SD-Access) is the network fabric that powers business. It is an open and extensible, software-driven architecture that accelerates and simplifies your enterprise network operations. The programmable architecture frees your IT staff from time-consuming, repetitive network configuration tasks so they can focus instead on innovation that positively transforms your business. By decoupling network functions from the hardware, you can build and manage your entire wired and wireless network from a single user interface. SD-Access enables policy-based automation from edge to cloud with foundational capabilities. These include:

- Simplified device deployment
- Unified management of wired and wireless networks
- Network virtualization and segmentation
- Group-based policies
- Context-based analytics

The Cisco Catalyst 9120 Series Access Points support Software-Defined Access, Cisco's leading enterprise architecture.

Working together, the Cisco Catalyst 9120 Series and Cisco DNA offer such features as:

- Cisco DNA Spaces
- Cisco Identity Services Engine

- Cisco DNA Analytics and Assurance

The result? Your network stays relevant, becomes digital ready, and is the lifeblood of your organization.

## Product specifications

Item	Specification
Part numbers	<p><b>Cisco Catalyst 9120I Access Point: Indoor environments, with internal antennas</b></p> <ul style="list-style-type: none"> <li>• C9120AXI-x: Cisco Catalyst 9120 Series</li> </ul> <p><b>Cisco Catalyst 9120E Access Point: Indoor, challenging environments, with external antennas</b></p> <ul style="list-style-type: none"> <li>• C9120AXE-x: Cisco Catalyst 9120 Series</li> </ul> <p><b>Cisco Catalyst 9120P Access Point: Indoor, professional installations</b></p> <ul style="list-style-type: none"> <li>• C9120AXP-x: Cisco Catalyst 9120 Series</li> </ul> <p><b>Cisco Catalyst 9120I Access Point: Indoor environments, with internal antennas, with embedded wireless controller</b></p> <ul style="list-style-type: none"> <li>• C9120AXI-EWC-x: Cisco Catalyst 9120 Series</li> </ul> <p><b>Cisco Catalyst 9120E Access Point: Indoor, challenging environments, with external antennas, with embedded wireless controller</b></p> <ul style="list-style-type: none"> <li>• C9120AXE-EWC-x: Cisco Catalyst 9120 Series</li> </ul> <p><b>Cisco Catalyst 9120P Access Point: Indoor, professional installations, with embedded wireless controller</b></p> <ul style="list-style-type: none"> <li>• C9120AXP-EWC-x: Cisco Catalyst 9120 Series</li> </ul> <p><b>Regulatory domains: (x = regulatory domain)</b></p> <p>Customers are responsible for verifying approval for use in their individual countries. To verify approval and to identify the regulatory domain that corresponds to a particular country, visit <a href="https://www.cisco.com/go/aironet/compliance">https://www.cisco.com/go/aironet/compliance</a>.</p> <p>Not all regulatory domains have been approved. As they are approved, the part numbers will be available on the Global Price List.</p> <p><b>Cisco Wireless LAN Services</b></p> <ul style="list-style-type: none"> <li>• AS-WLAN-CNSLT: <a href="#">Cisco Wireless LAN Network Planning and Design Service</a></li> <li>• AS-WLAN-CNSLT: <a href="#">Cisco Wireless LAN 802.11n Migration Service</a></li> <li>• AS-WLAN-CNSLT: <a href="#">Cisco Wireless LAN Performance and Security Assessment Service</a></li> </ul>
Software	<ul style="list-style-type: none"> <li>• Cisco Unified Wireless Network Software Release 8.9.x or later</li> <li>• Cisco IOS® XE Software Release 16.11 with AP Device Pack, or later</li> </ul>
Supported wireless LAN controllers	<ul style="list-style-type: none"> <li>• Cisco Catalyst 9800 Series Wireless Controllers</li> <li>• Cisco 3500, 5520, and 8540 Series Wireless Controllers and Cisco Virtual Wireless Controller</li> </ul>

Item	Specification
802.11n version 2.0 (and related) capabilities	<ul style="list-style-type: none"> <li>• 4x4 MIMO with four spatial streams</li> <li>• Maximal Ratio Combining (MRC)</li> <li>• 802.11n and 802.11a/g beamforming</li> <li>• 20- and 40-MHz channels</li> <li>• PHY data rates up to 890 Mbps (40 MHz with 5 GHz and 20 MHz with 2.4 GHz)</li> <li>• Packet aggregation: A-MPDU (transmit and receive), A-MSDU (transmit and receive)</li> <li>• 802.11 Dynamic Frequency Selection (DFS)</li> <li>• Cyclic Shift Diversity (CSD) support</li> </ul>
802.11ac	<ul style="list-style-type: none"> <li>• 4x4 downlink MU-MIMO with four spatial streams</li> <li>• MRC</li> <li>• 802.11ac beamforming</li> <li>• 20-, 40-, 80-, and 160-MHz channels</li> <li>• PHY data rates up to 3.47 Gbps (160 MHz with 5 GHz)</li> <li>• Packet aggregation: A-MPDU (transmit and receive), A-MSDU (transmit and receive)</li> <li>• 802.11 DFS</li> <li>• CSD support</li> </ul>
802.11ax	<ul style="list-style-type: none"> <li>• 4x4 downlink MU-MIMO with four spatial streams</li> <li>• Uplink/downlink OFDMA</li> <li>• TWT</li> <li>• BSS coloring</li> <li>• MRC</li> <li>• 802.11ax beamforming</li> <li>• 20-, 40-, 80-, and 160-MHz channels</li> <li>• PHY data rates up to 5.38 Gbps (160 MHz with 5 GHz and 20 MHz with 2.4 GHz)</li> <li>• Packet aggregation: A-MPDU (transmit and receive), A-MSDU (transmit and receive)</li> <li>• 802.11 DFS</li> <li>• CSD support</li> </ul>
Integrated antenna	<p>Flexible radio (either on 2.4GHz or on 5GHz)</p> <ul style="list-style-type: none"> <li>• 2.4 GHz, peak gain 4 dBi, internal antenna, omnidirectional in azimuth</li> <li>• 5 GHz, peak gain 5 dBi, internal antenna, omnidirectional in azimuth</li> </ul> <p>Dedicated 5GHz radio</p> <ul style="list-style-type: none"> <li>• 5 GHz, peak gain 4 dBi, internal antenna, omnidirectional in azimuth</li> </ul>
External antenna (sold separately)	<ul style="list-style-type: none"> <li>• Cisco Catalyst 9120E Access Points are certified for use with antenna gains up to 6 dBi (2.4 GHz and 5 GHz)</li> <li>• Cisco Catalyst 9120P Access Points are certified for use with antenna gains up to 13 dBi (2.4 GHz and 5 GHz) with the AIR-ANT2513-P4M-N= antenna</li> <li>• Cisco offers the industry's broadest selection of <a href="#">antennas</a>, delivering optimal coverage for a variety of deployment scenarios</li> <li>• Supports Self-Identifiable Antennas (SIA) on one RP-TNC port</li> </ul>
Smart Antenna Connector	<ul style="list-style-type: none"> <li>• Available on the 9120E and on the 9120P only</li> <li>• Compact multi RF connector with DART interface</li> <li>• Requires the AIR-CAB002-DART-R= 2 ft smart antenna connector when used with antennas with RP-TNC connector</li> <li>• Required when running the flexible radio as either a second 5-GHz serving radio or a Wireless Security Monitoring radio</li> </ul>
Interfaces	<ul style="list-style-type: none"> <li>• 1x 100, 1000, 2500 Multigigabit Ethernet (RJ-45) – IEEE 802.3bz</li> <li>• Management console port (RJ-45)</li> </ul>

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	<ul style="list-style-type: none"> <li>• USB 2.0 @ 3.75W (enabled via future software)</li> </ul>																																																																													
<b>Indicators</b>	<ul style="list-style-type: none"> <li>• Status LED indicates boot loader status, association status, operating status, boot loader warnings, and boot loader errors</li> </ul>																																																																													
<b>Dimensions (W x L x H)</b>	<ul style="list-style-type: none"> <li>• Access point (without mounting brackets): C9120I: 8.5 x 8.5 x 1.7" (21.6 x 21.6 x 4.3 cm), C9120E and C9120P: 8.5 x 8.05 x 2.0 (21.6 x 21.6 x 5.1 cm)"</li> </ul>																																																																													
<b>Weight</b>	<p><b>Cisco Catalyst 9120I</b></p> <ul style="list-style-type: none"> <li>• 2.87 lbs (1.3 kg)</li> </ul> <p><b>Cisco Catalyst 9120E/P</b></p> <ul style="list-style-type: none"> <li>• 3 lbs (1.36 kg)</li> </ul>																																																																													
<b>Input power requirements</b>	<ul style="list-style-type: none"> <li>• 802.3at Power over Ethernet Plus (PoE+), 802.3bt Cisco Universal PoE (Cisco UPOE+, Cisco UPOE®)</li> <li>• Cisco power injector, AIR-PWRINJ6=</li> <li>• 802.3af PoE</li> <li>• Cisco power injector, AIR-PWRINJ5= (Note: This injector supports only 802.3af)</li> </ul>																																																																													
<b>Power draw</b>	<table border="1"> <thead> <tr> <th colspan="7">Catalyst 9120AXI</th> </tr> <tr> <th colspan="2">PoE Power Consumption</th> <th>2.4-GHz radio</th> <th>5-GHz radio</th> <th>Link speed</th> <th>USB</th> <th>LLDP</th> </tr> </thead> <tbody> <tr> <td>802.3at (PoE+)</td> <td></td> <td>4x4</td> <td>4x4</td> <td>2.5G</td> <td>Y</td> <td>25.5W</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="7">Catalyst 9120AXE / 9120AXP</th> </tr> <tr> <th colspan="2">PoE Power Consumption</th> <th>2.4-GHz radio</th> <th>5-GHz radio</th> <th>Link speed</th> <th>USB</th> <th>LLDP</th> </tr> </thead> <tbody> <tr> <td>802.3at (PoE+)</td> <td></td> <td>4x4</td> <td>4x4</td> <td>2.5G</td> <td>Y</td> <td>25.5W</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="7">Catalyst 9120AXI / 9120AXE / 9120AXP</th> </tr> <tr> <th colspan="2">PoE Power Consumption</th> <th>2.4-GHz radio</th> <th>5-GHz radio</th> <th>Link speed</th> <th>USB</th> <th>LLDP</th> </tr> </thead> <tbody> <tr> <td>802.3af</td> <td>PoE</td> <td>1x1</td> <td>1x1</td> <td>1G</td> <td>N</td> <td>13.4W</td> </tr> <tr> <td>802.3af</td> <td>PoE</td> <td>2x2</td> <td>N</td> <td>1G</td> <td>N</td> <td>13.4W</td> </tr> <tr> <td>802.3af</td> <td>PoE</td> <td>N</td> <td>2x2</td> <td>1G</td> <td>N</td> <td>13.4W</td> </tr> </tbody> </table>	Catalyst 9120AXI							PoE Power Consumption		2.4-GHz radio	5-GHz radio	Link speed	USB	LLDP	802.3at (PoE+)		4x4	4x4	2.5G	Y	25.5W	Catalyst 9120AXE / 9120AXP							PoE Power Consumption		2.4-GHz radio	5-GHz radio	Link speed	USB	LLDP	802.3at (PoE+)		4x4	4x4	2.5G	Y	25.5W	Catalyst 9120AXI / 9120AXE / 9120AXP							PoE Power Consumption		2.4-GHz radio	5-GHz radio	Link speed	USB	LLDP	802.3af	PoE	1x1	1x1	1G	N	13.4W	802.3af	PoE	2x2	N	1G	N	13.4W	802.3af	PoE	N	2x2	1G	N	13.4W
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<b>Environmental</b>	<p><b>Cisco Catalyst 9120AXI</b></p> <ul style="list-style-type: none"> <li>• Nonoperating (storage) temperature: -22° to 158°F (-30° to 70°C)</li> <li>• Nonoperating (storage) altitude test: 25°C, 15,000 ft.</li> <li>• Operating temperature: 32° to 122°F (0° to 50°C)</li> <li>• Operating humidity: 10% to 90% (noncondensing)</li> <li>• Operating altitude test: 40°C, 9843 ft.</li> </ul> <p><b>Note:</b> When the ambient operating temperature exceeds 40°C, the access point will shift from 4x4 to 2x2 on both the 2.4-GHz and 5-GHz radios, uplink Ethernet will downgrade to 1 Gigabit Ethernet; however, the USB interface will remain enabled</p> <p><b>Cisco Catalyst 9120AXE and 9120AXP</b></p> <ul style="list-style-type: none"> <li>• Nonoperating (storage) temperature: -22° to 158°F (-30° to 70°C)</li> <li>• Nonoperating (storage) altitude test: 25°C, 15,000 ft.</li> <li>• Operating temperature: -4° to 122°F (-20° to 50°C)</li> <li>• Operating humidity: 10% to 90% (noncondensing)</li> </ul>																																																																													

Item	Specification	
	<ul style="list-style-type: none"> <li>Operating altitude test: 40°C, 9843 ft.</li> </ul>	
System memory	<ul style="list-style-type: none"> <li>2048 MB DRAM</li> <li>1024 MB flash</li> </ul>	
Warranty	Limited lifetime hardware warranty	
Available transmit power settings	<b>2.4 GHz</b> <ul style="list-style-type: none"> <li>23 dBm (200 mW)</li> <li>20 dBm (100 mW)</li> <li>17 dBm (50 mW)</li> <li>14 dBm (25 mW)</li> <li>11 dBm (12.5 mW)</li> <li>8 dBm (6.25 mW)</li> <li>5 dBm (3.13 mW)</li> <li>2 dBm (1.56 mW)</li> <li>-1dBm (0.79mW)</li> <li>-4dBm(0.39mW)</li> </ul>	<b>5 GHz</b> <ul style="list-style-type: none"> <li>26 dBm (400 mW)</li> <li>23 dBm (200 mW)</li> <li>20 dBm (100 mW)</li> <li>17 dBm (50 mW)</li> <li>14 dBm (25 mW)</li> <li>11 dBm (12.5 mW)</li> <li>8 dBm (6.25 mW)</li> <li>5 dBm (3.13 mW)</li> <li>2 dBm (1.56 mW)</li> <li>-1dBm (0.79mW)</li> </ul>
Frequency band and 20-MHz operating channels	<b>A (A regulatory domain):</b> <ul style="list-style-type: none"> <li>2.412 to 2.462 GHz; 11 channels</li> <li>5.180 to 5.320 GHz; 8 channels</li> <li>5.500 to 5.700 GHz; 8 channels (excludes 5.600 to 5.640 GHz)</li> <li>5.745 to 5.825 GHz; 5 channels</li> </ul> <b>B (B regulatory domain):</b> <ul style="list-style-type: none"> <li>2.412 to 2.462 GHz; 11 channels</li> <li>5.180 to 5.320 GHz; 8 channels</li> <li>5.500 to 5.700 GHz; 11 channels</li> <li>5.745 to 5.865 GHz; 7 channels</li> </ul> <b>C (C regulatory domain):</b> <ul style="list-style-type: none"> <li>2.412 to 2.472 GHz; 13 channels</li> <li>5.745 to 5.825 GHz; 5 channels</li> </ul> <b>D (D regulatory domain):</b> <ul style="list-style-type: none"> <li>2.412 to 2.462 GHz; 11 channels</li> <li>5.180 to 5.320 GHz; 8 channels</li> <li>5.500 to 5.700 GHz; 11 channels</li> <li>5.745 to 5.865 GHz; 7 channels</li> </ul> <b>E (E regulatory domain):</b> <ul style="list-style-type: none"> <li>2.412 to 2.4835; 13 channels</li> <li>5.150 to 5.350 GHz; 8 channels</li> <li>5.470 to 5.725 GHz; 8 channels</li> </ul> <b>F (F regulatory domain):</b> <ul style="list-style-type: none"> <li>2.412 to 2.472 GHz; 13 channels</li> <li>5.745 to 5.805 GHz; 4 channels</li> </ul> <b>G (G regulatory domain):</b> <ul style="list-style-type: none"> <li>2.412 to 2.472 GHz; 13 channels</li> </ul>	<b>I (I regulatory domain):</b> <ul style="list-style-type: none"> <li>2.412 to 2.472 GHz; 13 channels</li> <li>5.180 to 5.320 GHz; 8 channels</li> </ul> <b>K (K regulatory domain):</b> <ul style="list-style-type: none"> <li>2.412 to 2.472 GHz; 13 channels</li> <li>5.180 to 5.320 GHz; 8 channels</li> <li>5.500 to 5.620 GHz; 7 channels</li> <li>5.745 to 5.805 GHz; 4 channels</li> </ul> <b>N (N regulatory domain):</b> <ul style="list-style-type: none"> <li>2.412 to 2.462 GHz; 11 channels</li> <li>5.180 to 5.320 GHz; 8 channels</li> <li>5.745 to 5.825 GHz; 5 channels</li> </ul> <b>Q (Q regulatory domain):</b> <ul style="list-style-type: none"> <li>2.412 to 2.472 GHz; 13 channels</li> <li>5.180 to 5.320 GHz; 8 channels</li> <li>5.500 to 5.700 GHz; 11 channels</li> </ul> <b>R (R regulatory domain):</b> <ul style="list-style-type: none"> <li>2.412 to 2.472 GHz; 13 channels</li> <li>5.180 to 5.320 GHz; 8 channels</li> <li>5.660 to 5.850 GHz; 11 channels (excludes 5.480 to 5.640 GHz)</li> </ul> <b>S (S regulatory domain):</b> <ul style="list-style-type: none"> <li>2.412 to 2.472 GHz; 13 channels</li> <li>5.180 to 5.320 GHz; 8 channels</li> <li>5.500 to 5.700 GHz; 11 channels</li> <li>5.745 to 5.825 GHz; 5 channels</li> </ul> <b>T (T regulatory domain):</b> <ul style="list-style-type: none"> <li>2.412 to 2.462 GHz; 11 channels</li> </ul>

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Note: Customers are responsible for verifying approval for use in their individual countries. To verify approval and to identify the regulatory domain that corresponds to a particular country, visit <https://www.cisco.com/go/aironet/compliance>

Maximum number of nonoverlapping channels	2.4 GHz	5 GHz
	<ul style="list-style-type: none"> <li>802.11b/g: <ul style="list-style-type: none"> <li>20 MHz: 3</li> </ul> </li> <li>802.11n: <ul style="list-style-type: none"> <li>20 MHz: 3</li> </ul> </li> <li>802.11ax: <ul style="list-style-type: none"> <li>20MHz:3</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>802.11a: <ul style="list-style-type: none"> <li>20 MHz: 26 FCC, 16 EU</li> </ul> </li> <li>802.11n: <ul style="list-style-type: none"> <li>20 MHz: 26 FCC, 16 EU</li> <li>40 MHz: 12 FCC, 7 EU</li> </ul> </li> <li>802.11ac/ax: <ul style="list-style-type: none"> <li>20 MHz: 26 FCC, 16 EU</li> <li>40 MHz: 12 FCC, 7 EU</li> <li>80 MHz: 5 FCC, 3 EU</li> <li>160 MHz 2 FCC, 1 EU</li> </ul> </li> </ul>

Note: This varies by regulatory domain. Refer to the product documentation for specific details for each regulatory domain.

Compliance standards	
	<ul style="list-style-type: none"> <li><b>Safety:</b> <ul style="list-style-type: none"> <li>IEC 60950-1</li> <li>EN 60950-1</li> <li>UL 60950-1</li> <li>CAN/CSA-C22.2 No. 60950-1</li> <li>AS/NZS 60950-1</li> <li>UL 2043</li> <li>Class III equipment</li> </ul> </li> <li><b>Emissions:</b> <ul style="list-style-type: none"> <li>CISPR 32 (rev. 2015)</li> <li>EN 55032 (rev. 2012/AC:2013)</li> <li>EN 55032 (rev. 2015)</li> <li>EN 55035 2010</li> <li>EN61000-3-2 (rev. 2014)</li> <li>EN61000-3-3 (rev. 2013)</li> <li>KN61000-3-2</li> <li>KN61000-3-3</li> <li>AS/NZS CISPR 32 Class B (rev. 2015)</li> <li>47 CFR FCC Part 15B</li> <li>ICES-003 (rev. 2016 Issue 6, Class B)</li> <li>VCCI-CISPR 32:2016</li> <li>VCCI (V3)</li> <li>CNS (rev. 13438)</li> </ul> </li> </ul>

Item	Specification
	<ul style="list-style-type: none"> <li>◦ KN-32</li> <li>◦ KN-35</li> <li>◦ KN 301 489-17</li> <li>◦ TCVN 7189 (rev. 2009)</li> <li>● <b>Immunity:</b> <ul style="list-style-type: none"> <li>◦ CISPR 24 (rev. 2010)</li> <li>◦ EN 55024 / EN 55035 (rev. 2010)</li> </ul> </li> <li>● <b>Emissions and immunity:</b> <ul style="list-style-type: none"> <li>◦ EN 301 489-1 (v2.1.1 2017-02)</li> <li>◦ EN 301 489-17 (v3.1.1 2017-02)</li> <li>◦ QCVN (18:2014)</li> <li>◦ KN 489-1</li> <li>◦ KN 489-17</li> <li>◦ EN 60601 (1-1:2015)</li> </ul> </li> <li>● <b>Radio:</b> <ul style="list-style-type: none"> <li>◦ EN 300 328 (v2.1.1)</li> <li>◦ EN 301 893 (v2.1.1)</li> <li>◦ AS/NZS 4268 (rev. 2017)</li> <li>◦ 47 CFR FCC Part 15C, 15.247, 15.407</li> <li>◦ RSP-100</li> <li>◦ RSS-GEN</li> <li>◦ RSS-247</li> <li>◦ China regulations SRRC</li> <li>◦ LP0002 (rev 2018.1.10)</li> <li>◦ Japan Std. 33a, Std. 66, and Std. 71</li> </ul> </li> <li>● <b>RF safety:</b> <ul style="list-style-type: none"> <li>◦ EN 50385 (rev. Aug 2002)</li> <li>◦ ARPANSA</li> <li>◦ AS/NZS 2772 (rev. 2016)</li> <li>◦ EN 62209-1 (rev. 2016)</li> <li>◦ EN 62209-2 (rev. 2010)</li> <li>◦ 47 CFR Part 1.1310 and 2.1091</li> <li>◦ RSS-102</li> </ul> </li> <li>● <b>IEEE standards:</b> <ul style="list-style-type: none"> <li>◦ IEEE 802.3</li> <li>◦ IEEE 802.3ab</li> <li>◦ IEEE 802.3af/at</li> <li>◦ IEEE 802.11 a/b/g/n/ac/ax</li> <li>◦ IEEE 802.11h, 802.11d</li> </ul> </li> <li>● <b>Security:</b> <ul style="list-style-type: none"> <li>◦ 802.11i, Wi-Fi Protected Access 2 (WPA2), WPA</li> <li>◦ 802.1X</li> <li>◦ Advanced Encryption Standard (AES)</li> </ul> </li> <li>● <b>Extensible Authentication Protocol (EAP) types:</b> <ul style="list-style-type: none"> <li>◦ EAP-Transport Layer Security (TLS)</li> <li>◦ EAP-Tunneled TLS (TTLS) or Microsoft Challenge Handshake Authentication Protocol Version 2 (MSCHAPv2)</li> </ul> </li> </ul>

Item	Specification				
	<ul style="list-style-type: none"> <li>◦ Protected EAP (PEAP) v0 or EAP-MSCHAPv2</li> <li>◦ EAP-Flexible Authentication via Secure Tunneling (EAP-FAST)</li> <li>◦ PEAP v1 or EAP-Generic Token Card (GTC)</li> <li>◦ EAP-Subscriber Identity Module (SIM)</li> </ul>				
<b>Data rates supported</b>	802.11b: 1, 2, 5.5, and 11 Mbps				
	802.11a/g: 6, 9, 12, 18, 24, 36, 48, and 54 Mbps				
	802.11n data rates on 2.4 GHz (only 20 MHz and MCS 0 to MCS 31): and 5 GHz				
	MCS Index <sup>1</sup>	GI <sup>2</sup> = 800 ns	GI = 800 ns	GI = 400 ns	GI = 400 ns
		20-MHz rate (Mbps)	40-MHz rate (Mbps)	20-MHz rate (Mbps)	40-MHz rate (Mbps)
	0	6.5	13.5	7.2	15
	1	13	27	14.4	30
	2	19.5	40.5	21.7	45
	3	26	54	28.9	60
	4	39	81	43.3	90
	5	52	108	57.8	120
	6	58.5	121.5	65	135
	7	65	135	72.2	150
	8	13	27	14.4	30
	9	26	54	28.9	60
	10	39	81	43.3	90
	11	52	108	57.8	120
	12	78	162	86.7	180
	13	104	216	115.6	240
	14	117	243	130	270
	15	130	270	144.4	300
	16	19.5	40.5	21.7	45
17	39	81	43.4	90	
18	58.5	121.5	65	135	
19	78	162	86.7	180	
20	117	243	130	270	
21	156	324	173.3	360	

<sup>1</sup> MCS Index: The Modulation and Coding Scheme (MCS) index determines the number of spatial streams, the modulation, the coding rate, and data rate values.

<sup>2</sup> GI: A Guard Interval (GI) between symbols helps receivers overcome the effects of multipath delay spreads.



Item	Specification									
	22	175.5	364.5	195	405					
	23	195	405	216.7	450					
	24	26	54	28.9	60					
	25	52	108	57.8	120					
	26	78	162	86.7	180					
	27	104	216	115.6	240					
	28	156	324	173.3	360					
	29	208	432	231.1	480					
	30	234	486	260	540					
	31	260	540	288.9	600					
<b>802.11ac data rates (5 GHz):</b>										
	<b>MCS Index</b>	<b>Spatial streams</b>	<b>GI = 800 ns</b>				<b>GI = 400 ns</b>			
			<b>20-MHz rate (Mbps)</b>	<b>40-MHz rate (Mbps)</b>	<b>80-MHz rate (Mbps)</b>	<b>160-MHz rate (Mbps)</b>	<b>20-MHz rate (Mbps)</b>	<b>40-MHz rate (Mbps)</b>	<b>80-MHz rate (Mbps)</b>	<b>160-MHz rate (Mbps)</b>
	0	1	6.5	13.5	29.3	58.5	7.2	15	32.5	65
	1	1	13	27	58.5	117	14.4	30	65	130
	2	1	19.5	40.5	87.8	175.5	21.7	45	97.5	195
	3	1	26	54	117	234	28.9	60	130	260
	4	1	39	81	175.5	351	43.3	90	195	390
	5	1	52	108	234	468	57.8	120	260	520
	6	1	58.5	121.5	263.3	526.5	65	135	292.5	585
	7	1	65	135	292.5	585	72.2	150	325	650
	8	1	78	162	351	702	86.7	180	390	780
	9	1	-	180	390	780	-	200	433.3	866.7
	<b>MCS Index</b>	<b>Spatial streams</b>	<b>GI = 800 ns</b>				<b>GI = 400 ns</b>			
			<b>20-MHz rate (Mbps)</b>	<b>40-MHz rate (Mbps)</b>	<b>80-MHz rate (Mbps)</b>	<b>160-MHz rate (Mbps)</b>	<b>20-MHz rate (Mbps)</b>	<b>40-MHz rate (Mbps)</b>	<b>80-MHz rate (Mbps)</b>	<b>160-MHz rate (Mbps)</b>
	0	2	13	27	58.5	117	14.4	30	65	130
	1	2	26	54	117	234	28.9	60	130	260
	2	2	39	81	175.5	351	43.3	90	195	390
	3	2	52	108	234	468	57.8	120	260	520
	4	2	78	162	351	702	86.7	180	390	780
	5	2	104	216	468	936	115.6	240	520	1040

Item	Specification									
	6	2	117	243	526.5	1053	130	270	585	1170
	7	2	130	270	585	1170	144.4	300	650	1300
	8	2	156	324	702	1404	173.3	360	780	1560
	9	2	-	360	780	1560	-	400	866.7	1733.4
	<b>MCS Index</b>	<b>Spatial streams</b>	<b>GI = 800 ns</b>				<b>GI = 400 ns</b>			
			<b>20-MHz rate (Mbps)</b>	<b>40-MHz rate (Mbps)</b>	<b>80-MHz rate (Mbps)</b>	<b>160-MHz rate (Mbps)</b>	<b>20-MHz rate (Mbps)</b>	<b>40-MHz rate (Mbps)</b>	<b>80-MHz rate (Mbps)</b>	<b>160-MHz rate (Mbps)</b>
	0	3	19.5	40.5	87.8	175.5	21.7	45	97.5	195
	1	3	39	81	175.5	351	43.3	90	195	390
	2	3	58.5	121.5	263.3	526.5	65	135	292.5	585
	3	3	78	162	351	702	86.7	180	390	780
	4	3	117	243	526.5	1053	130	270	585	1170
	5	3	156	324	702	1404	173.3	360	780	1560
	6	3	175.5	364.5	789.9	1579.5	195	405	877.5	1755
	7	3	195	405	877.5	1755	216.7	450	975	1950
	8	3	234	486	1053	2106	260	540	1170	2340
	9	3	260	540	1170	2340	288.9	600	1300	2600.1
	<b>MCS Index</b>	<b>Spatial streams</b>	<b>GI = 800 ns</b>				<b>GI = 400 ns</b>			
			<b>20-MHz rate (Mbps)</b>	<b>40-MHz rate (Mbps)</b>	<b>80-MHz rate (Mbps)</b>	<b>160-MHz rate (Mbps)</b>	<b>20-MHz rate (Mbps)</b>	<b>40-MHz rate (Mbps)</b>	<b>80-MHz rate (Mbps)</b>	<b>160-MHz rate (Mbps)</b>
	0	4	26	54	117	234	28.8	60	130	260
	1	4	52	108	234	468	57.8	120	260	520
	2	4	78	162	351	702	86.6	180	390	780
	3	4	104	216	468	936	115.6	240	520	1040
	4	4	156	324	702	1404	173.4	360	780	1560
	5	4	208	432	936	1872	231.2	480	1040	2080
	6	4	234	486	1053	2106	260	540	1170	2340
	7	4	260	540	1170	2340	288.8	600	1300	2600
	8	4	312	648	1404	2808	346.6	720	1560	3120
	9	4	-	720	1560	3120	-	800	1733	3466.8
	<b>802.11ax data rates (20 MHz on both 2.4- and 5-GHz bands and 40, 80, and 160 MHz only on 5-GHz band):</b>									
	<b>MCS Index</b>	<b>Spatial streams</b>	<b>GI = 1600 ns</b>				<b>GI = 800 ns</b>			

Item	Specification									
			20-MHz rate (Mbps)	40-MHz rate (Mbps)	80-MHz rate (Mbps)	160-MHz rate (Mbps)	20-MHz rate (Mbps)	40-MHz rate (Mbps)	80-MHz rate (Mbps)	160-MHz rate (Mbps)
0	1	4.3	8	17	34	4.3	9	18	36	
1	1	16	33	68	136	17	34	72	144	
2	1	24	49	102	204	26	52	108	216	
3	1	33	65	136	272	34	69	144	282	
4	1	49	98	204	408	52	103	216	432	
5	1	65	130	272	544	69	138	288	576	
6	1	73	146	306	613	77	155	324	649	
7	1	81	163	340	681	86	172	360	721	
8	1	98	195	408	817	103	207	432	865	
9	1	108	217	453	907	115	229	480	961	
10	1	122	244	510	1021	129	258	540	1081	
11	1	135	271	567	1134	143	287	600	1201	
0	2	8.6	16	34	68	8.6	18	36	72	
1	2	32	66	136	272	34	68	144	288	
2	2	48	98	204	408	52	104	216	432	
3	2	66	130	272	544	68	138	288	564	
4	2	98	196	408	816	104	206	432	864	
5	2	130	260	544	1088	138	276	576	1152	
6	2	146	292	612	1226	154	310	648	1298	
7	2	162	326	680	1362	172	344	720	1442	
8	2	196	390	816	1634	206	414	864	1730	
9	2	216	434	906	1814	230	458	960	1922	
10	2	244	488	1020	2042	258	516	1080	2162	
11	2	270	542	1134	2268	286	574	1200	2402	
0	3	12.9	24	51	102	12.9	27	54	108	
1	3	48	99	204	408	51	102	216	432	
2	3	72	147	306	612	78	156	324	648	
3	3	99	195	408	816	102	207	432	846	
4	3	147	294	612	1224	156	309	648	1296	
5	3	195	390	816	1632	207	414	864	1728	
6	3	219	438	918	1839	231	465	972	1947	
7	3	243	489	1020	2043	258	516	1080	2163	
8	3	294	585	1224	2451	309	621	1296	2595	

Item	Specification										
	9	3	324	651	1359	2721	345	687	1440	2883	
	10	3	366	732	1530	3063	387	774	1620	3243	
	11	3	405	813	1701	3402	429	861	1800	3603	
	0	4	17.2	32	68	136	17.2	36	72	144	
	1	4	64	132	272	544	68	136	288	576	
	2	4	96	196	408	816	104	208	432	864	
	3	4	132	260	544	1088	136	276	576	1128	
	4	4	196	392	816	1632	208	412	864	1728	
	5	4	260	520	1088	2176	276	552	1152	2304	
	6	4	292	584	1224	2452	308	620	1296	2596	
	7	4	324	652	1360	2724	344	688	1440	2884	
	8	4	392	780	1632	3268	412	828	1728	3460	
	9	4	432	868	1812	3628	460	916	1920	3844	
	10	4	488	976	2040	4084	516	1032	2160	4324	
	11	4	540	1084	2268	4536	572	1148	2400	4804	
	<b>MCS Index</b>	<b>Spatial streams</b>	<b>GI = 3200 ns</b>								
			<b>20-MHz rate (Mbps)</b>	<b>40-MHz rate (Mbps)</b>	<b>80-MHz rate (Mbps)</b>	<b>160-MHz rate (Mbps)</b>					
	0	1	3.9	7.2	15.3	30.6					
	1	1	14.4	29.7	61.2	122.4					
	2	1	21.6	44.1	91.8	183.6					
	3	1	29.7	58.5	122.4	244.8					
	4	1	44.1	88.2	183.6	367.2					
	5	1	58.5	117.0	244.8	489.6					
	6	1	65.7	131.4	275.4	551.7					
	7	1	72.9	146.7	306.0	612.9					
	8	1	88.2	175.5	367.2	735.3					
	9	1	97.2	195.3	407.7	816.3					
	10	1	109.8	219.6	459.0	918.9					
	11	1	121.5	243.9	510.3	1020.6					
	0	2	7.7	14.4	30.6	61.2					
	1	2	28.8	59.4	122.4	244.8					
	2	2	43.2	88.2	183.6	367.2					
	3	2	59.4	117.0	244.8	489.6					

Item	Specification									
	4	2	88.2	176.4	367.2	734.4				
	5	2	117.0	234.0	489.6	979.2				
	6	2	131.4	262.8	550.8	1103.4				
	7	2	145.8	293.4	612.0	1225.8				
	8	2	176.4	351.0	734.4	1470.6				
	9	2	194.4	390.6	815.4	1632.6				
	10	2	219.6	439.2	918.0	1837.8				
	11	2	243.0	487.8	1020.6	2041.2				
	0	3	11.6	21.6	45.9	91.8				
	1	3	43.2	89.1	183.6	367.2				
	2	3	64.8	132.3	275.4	550.8				
	3	3	89.1	175.5	367.2	734.4				
	4	3	132.3	264.6	550.8	1101.6				
	5	3	175.5	351.0	734.4	1468.8				
	6	3	197.1	394.2	826.2	1655.1				
	7	3	218.7	440.1	918.0	1838.7				
	8	3	264.6	526.5	1101.6	2205.9				
	9	3	291.6	585.9	1223.1	2448.9				
	10	3	329.4	658.8	1377.0	2756.7				
	11	3	364.5	731.7	1530.9	3061.8				
	0	4	15.5	28.8	61.2	122.4				
	1	4	57.6	118.8	244.8	489.6				
	2	4	86.4	176.4	367.2	734.4				
	3	4	118.8	234.0	489.6	979.2				
	4	4	176.4	352.8	734.4	1468.8				
	5	4	234.0	468.0	979.2	1958.4				
	6	4	262.8	525.6	1101.6	2206.8				
	7	4	291.6	586.8	1224.0	2451.6				
	8	4	352.8	702.0	1468.8	2941.2				
	9	4	388.8	781.2	1630.8	3265.2				
	10	4	439.2	878.4	1836.0	3675.6				
	11	4	486.0	975.6	2041.2	4082.4				

Transmit power and receive sensitivity							
		5-GHz radio		2.4-GHz radio flexible radio		5-GHz radio flexible radio	
	Spatial	Total transmit	Receive	Total transmit	Receive sensitivity	Total transmit	Receive sensitivity

Item	Specification						
	streams	power (dBm)	sensitivity (dBm)	power (dBm)	(dBm)	power (dBm)	(dBm)
<b>802.11/11b</b>							
1 Mbps	1	-	-	23	-98	-	-
11 Mbps	1	-	-	23	-90	-	-
<b>802.11a/g</b>							
6 Mbps	1	23	-96	23	-95	23	-96
24 Mbps	1	23	-86	23	-86	23	-86
54 Mbps	1	23	-77	23	-77	23	-77
<b>802.11n HT20</b>							
MCS0	1	23	-96	23	-96	23	-96
MCS4	1	23	-85	23	-85	23	-85
MCS7	1	23	-78	23	-77	23	-78
MCS8	2	23	-93	23	-93	23	-94
MCS12	2	23	-81	23	-82	23	-82
MCS15	2	23	-74	23	-74	23	-75
MCS16	3	23	-92	23	-92	23	-92
MCS20	3	23	-80	23	-80	23	-81
MCS23	3	23	-73	23	-73	23	-73
MCS24	4	23	-91	23	-91	23	-91
MCS28	4	23	-74	23	-74	23	-74
MCS31	4	23	-72	23	-71	23	-72

Item	Specification						
802.11n HT40							
MCS0	1	23	-95	-	-	23	-95
MCS4	1	23	-83	-	-	23	-83
MCS7	1	23	-75	-	-	23	-75
MCS8	2	23	-90	-	-	23	-91
MCS12	2	23	-79	-	-	23	-80
MCS15	2	23	-72	-	-	23	-72
MCS16	3	23	-89	-	-	23	-90
MCS20	3	23	-78	-	-	23	-78
MCS23	3	23	-70	-	-	23	-71
MCS24	4	23	-88	-	-	23	-88
MCS30	4	23	-71	-	-	23	-71
MCS31	4	23	-69	-	-	23	-69
802.11ac VHT20							
MCS0	1	23	-96	-	-	23	-96
MCS4	1	23	-85	-	-	23	-85
MCS7	1	23	-77	-	-	23	-77
MCS8	1	23	-73	-	-	23	-74
MCS9	1	-	-	-	-	-	-
MCS0	2	23	-94	-	-	23	-94
MCS4	2	23	-81	-	-	23	-82
MCS7	2	23	-75	-	-	23	-75
MCS8	2	23	-71	-	-	23	-71
MCS9	2	-	-	-	-	-	-
MCS0	3	23	-92	-	-	23	-92
MCS4	3	23	-80	-	-	23	-80
MCS7	3	23	-74	-	-	23	-73

Item	Specification						
MCS8	3	23	-70	-	-	23	-70
MCS9	3	-	-	-	-	-	-
MCS0	4	23	-91	-	-	23	-91
MCS4	4	23	-79	-	-	23	-79
MCS7	4	23	-72	-	-	23	-72
MCS8	4	23	-68	-	-	23	-68
MCS9	4	-	-	-	-	-	-
802.11ac VHT40							
MCS0	1	23	-95	-	-	23	-95
MCS4	1	23	-82	-	-	23	-82
MCS7	1	23	-75	-	-	23	-75
MCS8	1	23	-71	-	-	23	-71
MCS9	1	22	-70	-	-	22	-68
MCS0	2	23	-91	-	-	23	-91
MCS4	2	23	-79	-	-	23	-79
MCS7	2	23	-72	-	-	23	-72
MCS8	2	23	-68	-	-	23	-69
MCS9	2	22	-66	-	-	22	-68
MCS0	3	23	-90	-	-	23	-90
MCS4	3	23	-78	-	-	23	-78
MCS7	3	23	-70	-	-	23	-70
MCS8	3	23	-67	-	-	23	-67
MCS9	3	22	-65	-	-	22	-65
MCS0	4	23	-88	-	-	23	-88
MCS4	4	23	-77	-	-	23	-77
MCS7	4	23	-69	-	-	23	-69
MCS8	4	23	-65	-	-	23	-66



Item	Specification						
MCS9	4	22	-63	-	-	22	-64
<b>802.11ac VHT80</b>							
MCS0	1	23	-91	-	-	23	-91
MCS4	1	23	-79	-	-	23	-79
MCS7	1	23	-72	-	-	23	-72
MCS8	1	23	-68	-	-	23	-68
MCS9	1	22	-66	-	-	22	-66
MCS0	2	23	-88	-	-	23	-88
MCS4	2	23	-76	-	-	23	-76
MCS7	2	23	-68	-	-	23	-69
MCS8	2	23	-65	-	-	23	-65
MCS9	2	22	-63	-	-	22	-64
MCS0	3	23	-86	-	-	23	-86
MCS4	3	23	-74	-	-	23	-74
MCS7	3	23	-67	-	-	23	-67
MCS8	3	23	-64	-	-	23	-64
MCS9	3	22	-62	-	-	22	-62
MCS0	4	23	-85	-	-	23	-85
MCS4	4	23	-73	-	-	23	-73
MCS7	4	23	-66	-	-	23	-66
MCS8	4	23	-62	-	-	23	-62
MCS9	4	22	-60	-	-	22	-61
<b>802.11ac VHT160</b>							
MCS0	1	23	-85			23	-85
MCS4	1	23	-73			23	-73
MCS7	1	23	-66			23	-66
MCS8	1	23	-62			23	-62

Item	Specification						
MCS9	1	22	-60			22	-60
MCS0	2	23	-82			23	-82
MCS4	2	23	-70			23	-70
MCS7	2	23	-63			23	-63
MCS8	2	23	-59			23	-59
MCS9	2	22	-57			22	-57
MCS0	3	23	-80			23	-80
MCS4	3	23	-69			23	-69
MCS7	3	23	-62			23	-62
MCS8	3	23	-58			23	-58
MCS9	3	-	-				
MCS0	4	23	-78			23	-78
MCS4	4	23	-67			23	-67
MCS7	4	23	-59			23	-60
MCS8	4	23	-56			23	-56
MCS9	4	22	-54			22	-54
<b>802.11ax HE20</b>							
MCS0	1	23	-95	23	-94	23	-95
MCS4	1	23	-83	23	-82	23	-82
MCS7	1	23	-76	21	-76	23	-76
MCS8	1	23	-72	21	-71	23	-72
MCS9	1	22	-70	21	-70	22	-71
MCS10	1	20	-67	19	-66	20	-66
MCS11	1	20	-64	19	-63	20	-64
MCS0	2	23	-92	23	-91	23	-92
MCS4	2	23	-80	23	-80	23	-80
MCS7	2	23	-74	21	-73	23	-74

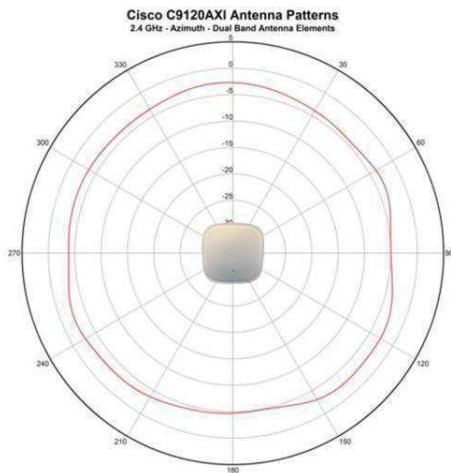
Item	Specification						
MCS8	2	23	-69	21	-69	23	-70
MCS9	2	22	-68	21	-68	22	-68
MCS10	2	20	-64	19	-63	20	-65
MCS11	2	20	-61	19	-61	20	-61
MCS0	3	23	-90	23	-89	23	-90
MCS4	3	23	-79	23	-78	23	-79
MCS7	3	23	-72	21	-71	23	-72
MCS8	3	23	-68	21	-67	23	-68
MCS9	3	22	-67	21	-66	22	-67
MCS10	3	20	-63	19	-62	20	-63
MCS11	3	20	-60	19	-59	20	-60
MCS0	4	23	-88	23	-87	23	-88
MCS4	4	23	-77	23	-77	23	-77
MCS7	4	23	-70	21	-70	23	-70
MCS8	4	23	-66	21	-66	23	-67
MCS9	4	22	-64	21	-65	22	-65
MCS10	4	20	-62	19	-61	20	-62
MCS11	4	20	-59	19	-58	20	-59
<b>802.11ax HE40</b>							
MCS0	1	23	-92	-	-	23	-93
MCS4	1	23	-80	-	-	23	-80
MCS7	1	23	-74	-	-	23	-74
MCS8	1	23	-70	-	-	23	-69
MCS9	1	22	-68	-	-	22	-68
MCS10	1	20	-65	-	-	20	-65
MCS11	1	20	-61	-	-	20	-61
MCS0	2	23	-89	-	-	23	-89

Item	Specification						
MCS4	2	23	-77	-	-	23	-78
MCS7	2	23	-70	-	-	23	-71
MCS8	2	23	-66	-	-	23	-67
MCS9	2	22	-65	-	-	22	-65
MCS10	2	20	-62	-	-	20	-62
MCS11	2	20	-59	-	-	20	-59
MCS0	3	23	-87	-	-	23	-87
MCS4	3	23	-76	-	-	23	-76
MCS7	3	23	-69	-	-	23	-69
MCS8	3	23	-65	-	-	23	-65
MCS9	3	22	-63	-	-	22	-63
MCS10	3	20	-60	-	-	20	-60
MCS11	3	20	-57	-	-	20	-57
MCS0	4	23	-85	-	-	23	-85
MCS4	4	23	-74	-	-	23	-74
MCS7	4	23	-67	-	-	23	-67
MCS8	4	23	-63	-	-	23	-64
MCS9	4	22	-61	-	-	22	-62
MCS10	4	20	-58	-	-	20	-58
MCS11	4	20	-55	-	-	20	-55
<b>802.11ax HE80</b>							
MCS0	1	23	-88	-	-	23	-89
MCS4	1	23	-78	-	-	23	-78
MCS7	1	23	-70	-	-	23	-71
MCS8	1	23	-67	-	-	23	-67
MCS9	1	22	-65	-	-	22	-65
MCS10	1	20	-61	-	-	20	-61

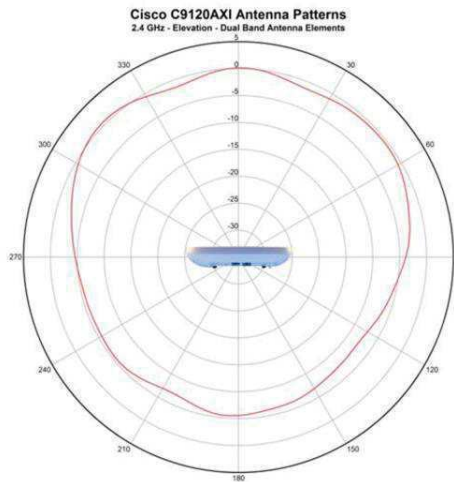
Item	Specification						
MCS11	1	20	-59	-	-	20	-59
MCS0	2	23	-86	-	-	23	-86
MCS4	2	23	-74	-	-	23	-75
MCS7	2	23	-67	-	-	23	-67
MCS8	2	23	-64	-	-	23	-63
MCS9	2	22	-61	-	-	22	-62
MCS10	2	20	-58	-	-	20	-58
MCS11	2	20	-55	-	-	20	-55
MCS0	3	23	-84	-	-	23	-84
MCS4	3	23	-74	-	-	23	-73
MCS7	3	23	-66	-	-	23	-66
MCS8	3	23	-62	-	-	23	-62
MCS9	3	22	-60	-	-	22	-60
MCS10	3	20	-57	-	-	20	-56
MCS11	3	20	-54	-	-	20	-54
MCS0	4	23	-82	-	-	23	-82
MCS4	4	23	-71	-	-	23	-71
MCS7	4	23	-64	-	-	23	-64
MCS8	4	23	-60	-	-	23	-60
MCS9	4	22	-58	-	-	22	-58
MCS10	4	20	-55	-	-	20	-55
MCS11	4	20	-52	-	-	20	-52
<b>802.11ax HE160</b>							
MCS0	1	23	-86	-	-	23	-86
MCS4	1	23	-75	-	-	23	-75
MCS7	1	23	-67	-	-	23	-68
MCS8	1	23	-64	-	-	23	-64

Item	Specification						
MCS9	1	22	-62	-	-	22	-62
MCS10	1	20	-58	-	-	20	-58
MCS11	1	20	-56	-	-	20	-56
MCS0	2	23	-83	-	-	23	-83
MCS4	2	23	-71	-	-	23	-72
MCS7	2	23	-64	-	-	23	-64
MCS8	2	23	-60	-	-	23	-61
MCS9	2	22	-58	-	-	22	-59
MCS10	2	20	-54	-	-	20	-55
MCS11	2	20	-52	-	-	20	-53
MCS0	3	23	-81	-	-	23	-81
MCS4	3	23	-70	-	-	23	-70
MCS7	3	23	-62	-	-	23	-62
MCS8	3	23	-59	-	-	23	-59
MCS9	3	22	-58	-	-	22	-57
MCS10	3	20	-53	-	-	20	-53
MCS11	3	20	-51	-	-	20	-51
MCS0	4	23	-79	-	-	23	-79
MCS4	4	23	-68	-	-	23	-68
MCS7	4	23	-61	-	-	23	-61
MCS8	4	23	-59	-	-	23	-57
MCS9	4	22	-55	-	-	22	-56
MCS10	4	20	-51	-	-	20	-52
MCS11	4	20	-49	-	-	20	-49

## Cisco Catalyst 9120i - 2.4 GHz Antenna Patterns

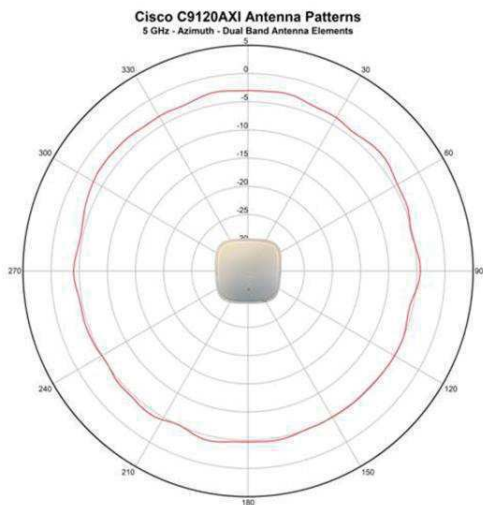


**2.4 GHz Azimuth**

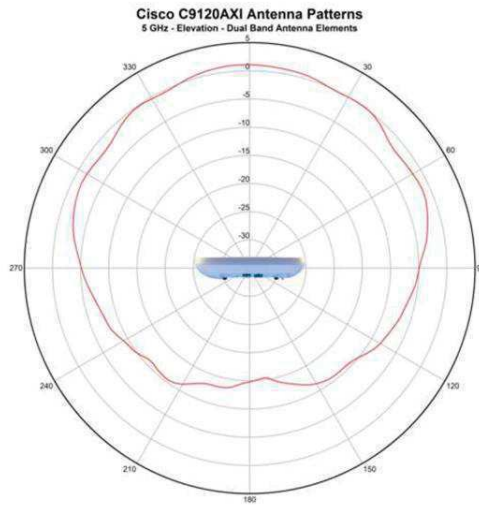


**2.4 GHz Elevation**

## Cisco Catalyst 9120i - 5 GHz Antenna Patterns



**5 GHz Azimuth**

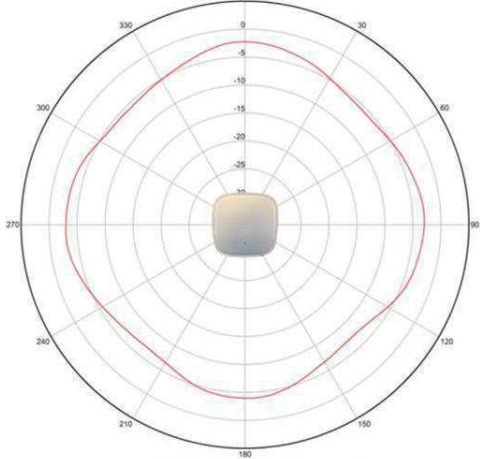


**5 GHz Elevation**

# Cisco Catalyst 9120i – 5 GHz Antenna Patterns

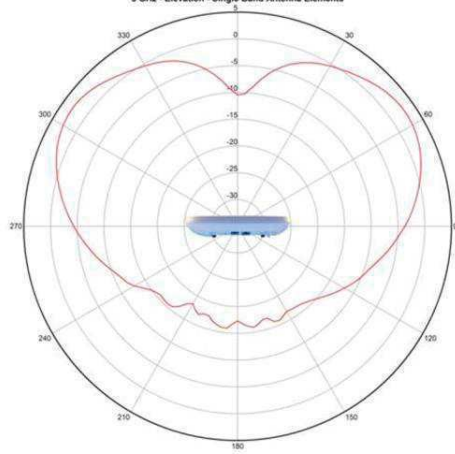
Single Band - Single Radiating Element (SRE) antennas

Cisco C9120AXI Antenna Patterns  
5 GHz - Azimuth - Single Band Antenna Elements



5 GHz Azimuth

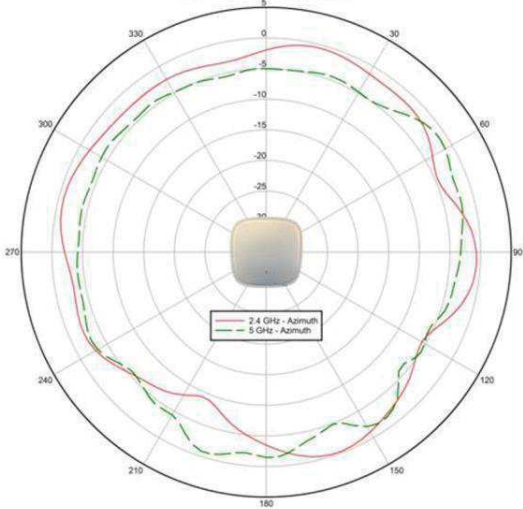
Cisco C9120AXI Antenna Patterns  
5 GHz - Elevation - Single Band Antenna Elements



5 GHz Elevation

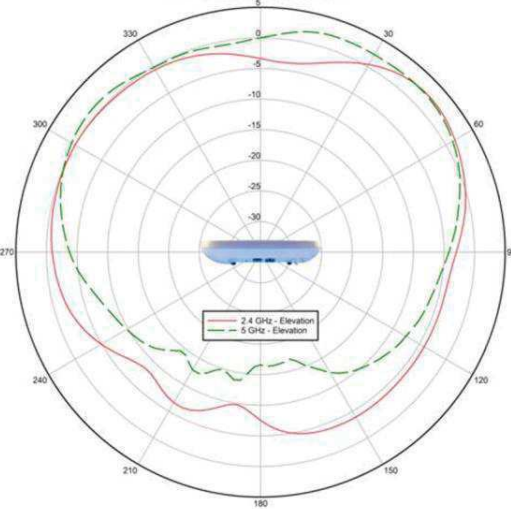
# Cisco Catalyst 9120i – RF ASIC Antenna

Cisco C9120AXI Antenna Patterns  
Azimuth - Dual Band AUX Antenna



Azimuth

Cisco C9120AXI Antenna Patterns  
Elevation - Dual Band AUX Antenna



Elevation



# Cisco Catalyst 9120i – BLE Antenna Patterns

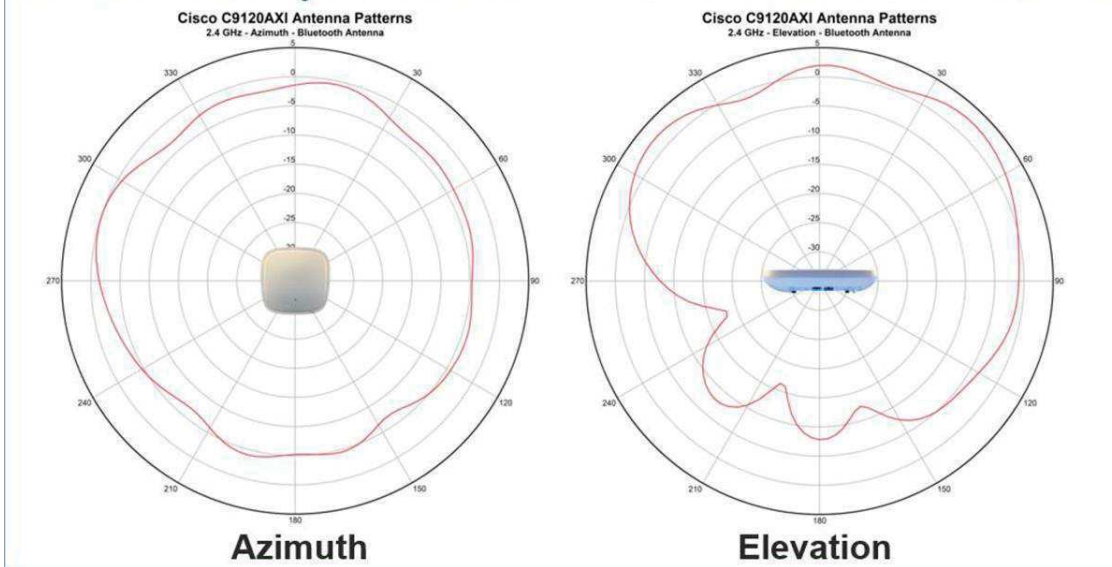


Figure 1.  
Antenna radiation patterns

## Packaging

The Cisco Catalyst 9100 Series requires mandatory Smart Licensing. This provides ease of use for Cisco DNA license management, consumption, and tracking. The Cisco Catalyst 9100 Series uses packaging that includes vastly simplified base network packages (Network Essentials and Network Advantage) and term-based software packages (Cisco DNA Essentials, Cisco DNA Advantage) as add-ons. The Cisco DNA packages, in addition to on-box capabilities, also unlock additional functionality in Cisco DNA Center, enabling controller-based software-defined automation and assurance in your network.

The Cisco Catalyst 9100 Series can support 3 types of Cisco DNA license: Cisco DNA Essentials, Cisco DNA Advantage and Cisco DNA Premier. The Cisco DNA licenses provide Cisco innovations on the AP. The Cisco DNA license also includes the Network Essentials and Network Advantage licensing options which cover wireless fundamentals such as 802.1x authentication, QoS, PnP etc, telemetry and visibility, SSO, as well as security controls. These Network essentials and Network advantage components are perpetual and is valid till the life of the AP. Cisco DNA subscription licenses have to be purchased for a 3-, 5-, or 7-year subscription term. However, upon expiry of Cisco DNA license, Cisco DNA features will expire, whereas network essentials and network advantage features will remain.

Note that it is not required to deploy Cisco DNA Center just to use one of the above packages. Refer to <https://www.cisco.com/c/dam/en/us/products/collateral/software/one-wireless-subscription/q-and-a-c67-739601.pdf> for additional details about the Essentials and Advantage packages.

For information about feature support please refer to the Cisco Catalyst 9100 Series Release Notes.

## Managing Licenses with Smart Accounts

Creating Smart Accounts by using the Cisco Smart Software Manager (CSSM) enables you to order devices and licensing packages and also manage your software licenses from a centralized website. You can set up the Smart Account to receive daily email alerts and to be notified of expiring add-on licenses that you want to renew. A Smart Account is mandatory for Catalyst 9100 access points. For more information on Smart Account refer to <https://www.cisco.com/go/smartaccounts>.

## Warranty information

The Cisco Catalyst 9120 Series Access Points come with a limited lifetime warranty that provides full warranty coverage of the hardware for as long as the original end user continues to own or use the product. The warranty includes 10-day advance hardware replacement and ensures that software media are defect-free for 90 days. For more details, visit <https://www.cisco.com/go/warranty>.

## Cisco environmental sustainability

Information about Cisco's environmental sustainability policies and initiatives for our products, solutions, operations, and extended operations or supply chain is provided in the "Environment Sustainability" section of Cisco's [Corporate Social Responsibility](#) (CSR) Report.

Reference links to information about key environmental sustainability topics (mentioned in the "Environment Sustainability" section of the CSR Report) are provided in the following table:

Sustainability topic	Reference
Information on product material content laws and regulations	<a href="#">Materials</a>
Information on electronic waste laws and regulations, including products, batteries, and packaging	<a href="#">WEEE compliance</a>

Cisco makes the packaging data available for informational purposes only. It may not reflect the most current legal developments, and Cisco does not represent, warrant, or guarantee that it is complete, accurate, or up to date. This information is subject to change without notice.

## Cisco Services

With Cisco Services, you can achieve infrastructure excellence faster with less risk. From initial WLAN readiness assessment to implementation, full solution support and in-depth training, our services for the Cisco Catalyst 9120 Access Points provide expert guidance to help you successfully plan, deploy, manage, and support your new access points. With unmatched networking expertise, best practices, and innovative tools, Cisco Services can help you reduce overall upgrade, refresh, and migration costs as you introduce new hardware, software, and protocols into the network. With a comprehensive lifecycle of services, Cisco experts will help you minimize disruption and improve operational efficiency to extract maximum value from your Cisco DNA ready infrastructure.

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## Cisco Capital

### Flexible payment solutions to help you achieve your objectives

Cisco Capital makes it easier to get the right technology to achieve your objectives, enable business transformation and help you stay competitive. We can help you reduce the total cost of ownership, conserve capital, and accelerate growth. In more than 100 countries, our flexible payment solutions can help you acquire hardware, software, services and complementary third-party equipment in easy, predictable payments. [Learn more.](#)

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# Cisco Catalyst 9500 Series Switches

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## Built for Security, IoT, and Cloud

The Cisco® Catalyst® 9500 Series switches are the next generation of enterprise-class core and aggregation layer switches, supporting full programmability and serviceability. Based on an x86 CPU, the Cisco Catalyst 9500 Series is Cisco's lead purpose-built fixed core and aggregation enterprise switching platform, built for security, IoT, and cloud. The switches come with a 4-core x86, 2.4-GHz CPU, 16-GB DDR4 memory, and 16-GB internal storage.

The Cisco Catalyst 9500 Series is the industry's first purpose-built 25, 40 and 100 Gigabit Ethernet line of switches targeted for the enterprise campus. These switches deliver unmatched table scale (MAC/route/ACL) and buffering for enterprise applications. The Cisco Catalyst 9500 Series includes nonblocking 40 and 100 Gigabit Ethernet Quad Small Form-Factor Pluggable (QSFP+, QSFP28) and 1, 10 and 25 Gigabit Ethernet Small Form-Factor Pluggable Plus (SFP/SFP+/SFP28) switches with granular port densities that fit diverse campus needs. The switches support advanced routing and infrastructure services (such as Multiprotocol Label Switching [MPLS] Layer 2 and Layer 3 VPNs, Multicast VPN [MVPN], and Network Address Translation [NAT]); Cisco Software-Defined Access capabilities (such as a host tracking database, cross-domain connectivity, and VPN Routing and Forwarding [VRF]-aware Locator/ID Separation Protocol [LISP]); and network system virtualization with Cisco StackWise® virtual technology that are critical for their placement in the campus core. The Cisco Catalyst 9500 Series also supports foundational high-availability capabilities such as patching, Graceful Insertion and Removal (GIR), [Cisco Nonstop Forwarding with Stateful Switchover](#) (NSF/SSO), redundant platinum-rated power supplies, and fans.

### The foundation of Software-Defined Access

Advanced persistent security threats. The exponential growth of Internet of Things (IoT) devices. Mobility everywhere. Cloud adoption. All of these require a network fabric that integrates advanced hardware and software innovations to automate, secure, and simplify customer networks. The goal of this network fabric is to enable customer revenue growth by accelerating the rollout of business services.

The Cisco [Digital Network Architecture](#) (Cisco DNA) with Software-Defined Access (SD-Access) is the network fabric that powers business. It is an open and extensible, software-driven architecture that accelerates and simplifies your enterprise network operations. The programmable architecture frees your IT staff from time-consuming, repetitive network configuration tasks so they can focus instead on innovation that positively transforms your business. SD-Access enables policy-based automation from edge to cloud with foundational capabilities. These include:

- Simplified device deployment
- Unified management of wired and wireless networks
- Network virtualization and segmentation
- Group-based policies
- Context-based analytics

The Cisco Catalyst 9500 Series switches form the foundational building block for Software-Defined Access—Cisco's leading enterprise architecture.

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## Product overview

### Product highlights

- Cisco Unified Access™ Data Plane (UADP) Application-Specific Integrated Circuit (ASIC) ready for next-generation technologies with its programmable pipeline, microengine capabilities, and template-based, configurable allocation of Layer 2 and Layer 3 forwarding, Access Control Lists (ACLs), and Quality-of-Service (QoS) entries
- Intel® 2.4-GHz x86 CPU with up to 120 GB of USB 3.0 or up to 960 GB of SATA SSD storage for container-based application hosting
- Up to 6.4-Tbps switching capacity with up to 2 Bpps of forwarding performance
- Up to 32 nonblocking 100 Gigabit Ethernet QSFP28 ports
- Up to 32 nonblocking 40 Gigabit Ethernet QSFP+ ports
- Up to 48 nonblocking 25 Gigabit Ethernet SFP28 ports
- Up to 48 nonblocking 10 Gigabit Ethernet SFP+ ports
- Platinum-rated AC/DC power supplies
- Up to 512,000 Flexible NetFlow (FNF) entries in hardware
- Up to 36 MB of unified buffer per ASIC
- Up to 212,000 routing entries (IPv4/IPv6) for high-end campus core and aggregation deployments
- IPv6 support in hardware, providing wire-rate forwarding for IPv6 networks
- IEEE 802.1ba AV Bridging (AVB) built in to provide a better AV experience through improved time synchronization and QoS
- Precision Time Protocol (PTP; IEEE 1588v2) provides accurate clock synchronization with sub-microsecond accuracy, making it suitable for distribution and synchronization of time and frequency over the network
- Dual-stack support for IPv4/IPv6 and dynamic hardware forwarding table allocations, for ease of IPv4-to-IPv6 migration
- Support for both static and dynamic NAT and Port Address Translation (PAT)
- Scalable routing (IPv4, IPv6, and multicast) tables and Layer 2 tables
- Cisco IOS® XE Software, a modern operating system for the enterprise with support for model-driven programmability, on-box Python scripting, streaming telemetry, container-based application hosting, and patching for critical bug fixes. The OS also has built-in defenses to protect against runtime attacks
- Cisco StackWise® Virtual technology, a network system virtualization technology that increases operational efficiency and boosts nonstop communications and scaled system bandwidth
- Highest wireless scale for Wi-Fi 6 and 802.11ac Wave 2 access points supported on a single switch
- **SD-Access:** With the Cisco Catalyst 9500 Series, you can be part of the future of networking with features that include:
  - Policy-based automation from edge to cloud
  - Segmentation and micro-segmentation made easy, with predictable performance and scalability

- Automation and network assurance through the Cisco DNA Center Appliance
- Faster launch of new business services and significantly improved issue resolution time
- SD-Access Embedded Wireless: The Cisco Catalyst 9800 embedded wireless controller software package can be installed on Cisco Catalyst 9500 Series Switches to enable wireless controller functionality for distributed branches and small campuses. Once installed, the embedded wireless controller running on a Cisco Catalyst 9500 Series Switch can support up to 200 APs and 4000 clients. A maximum of two wireless controllers can be enabled per site on two different Cisco Catalyst 9500 Series Switches, which will increase the scale up to 400 APs and 8000 wireless clients per site.
- The Cisco Catalyst 9800 embedded wireless controller software package will enable wireless functionality only for SD-Access deployments, with two supported topologies:
  - It can be enabled on Cisco Catalyst 9500 Series Switches functioning as a co-located border and control plane.
  - It can be enabled on Cisco Catalyst 9500 Series Switches functioning as fabric in a box.
- **Cisco Plug and Play (PnP) enabled:** A simple, secure, unified, and integrated offering to ease new branch or campus device rollouts or updates to an existing network
- **Advanced security:**
  - Encrypted Traffic Analytics (ETA): You benefit from the power of machine learning to identify and take actions toward threats or anomalies in your network, including malware detection in encrypted traffic and distributed anomaly detection. Additionally, ETA is able to detect vulnerable implementations in encrypted traffic
  - Support for AES-256 with the powerful MACsec 256-bit encryption algorithm available on all models
  - Trustworthy solutions: Secure Unique Device Identification (SUDI) support for Plug and Play, enabling tamper-proof device identity capability, which secures zero-touch provisioning by allowing your device to show a certificate to the server to be able to get onto your network

## Platform details

### Switch models and configurations

All switches ship with the 650W/950W/1600W AC power supply as default

Figures 1 through 8 show the Cisco Catalyst 9500 Series Switches



**Figure 1.**  
C9500-32C: Cisco Catalyst 9500 Series high-performance switch with 32x 100 Gigabit Ethernet



**Figure 2.**  
C9500-32QC: Cisco Catalyst 9500 Series high-performance switch with 32x 40 or 16x100 Gigabit Ethernet





**Figure 3.**  
C9500-48Y4C: Cisco Catalyst 9500 Series high-performance switch with 48x 1/10/25G Gigabit Ethernet + 4x 40/100G Uplink



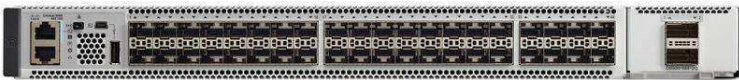
**Figure 4.**  
C9500-24Y4C: Cisco Catalyst 9500 Series high-performance switch with 24x 1/10/25G Gigabit Ethernet + 4x 40/100G Uplink



**Figure 5.**  
C9500-24Q: Cisco Catalyst 9500 Series switch with 24x 40G Gigabit Ethernet



**Figure 6.**  
C9500-12Q: Cisco Catalyst 9500 Series switch with 12x 40G Gigabit Ethernet



**Figure 7.**  
C9500-40X: Cisco Catalyst 9500 Series switch with 40x 1/10G Gigabit Ethernet



**Figure 8.**  
C9500-16X: Cisco Catalyst 9500 Series switch with 16x 1/10G Gigabit Ethernet

Table 1 shows the Cisco Catalyst 9500 Series configurations

**Table 1.** Cisco Catalyst 9500 Series configurations and port density

Model	Description	1G port density	10G port density	25G port density	40G port density	100G Port density	10G port density with breakout cable	25G port density with breakout cable
C9500-32C	Cisco Catalyst 9500 Series high-performance 32-port 100 Gigabit Ethernet switch with QSFP28	-	-	-	32 (64)	32 (64)	96	96
C9500-32QC	Cisco Catalyst 9500 Series high-performance 32-port 40 Gigabit Ethernet switch with QSFP+	-	-	-	32 (64)	16 (32)	-	-
C9500-48Y4C	Cisco Catalyst 9500 Series high-performance 48-port 1/10/25G Gigabit Ethernet switch with SFP28	48 (96)	48 (96)	48 (96)	4 (8)	4 (8)	-	-
C9500-24Y4C	Cisco Catalyst 9500 Series high-performance 24-port 1/10/25G Gigabit Ethernet switch with SFP28	24 (48)	24 (48)	24 (48)	4 (8)	4 (8)	-	-
C9500-24Q	Cisco Catalyst 9500 Series 24-port 40 Gigabit Ethernet switch with QSFP+	-	-	-	24 (48)	-	96	-
C9500-12Q	Cisco Catalyst 9500 Series 12-port 40 Gigabit Ethernet switch with QSFP+	-	-	-	12 (24)	-	48	-
C9500-40X	Cisco Catalyst 9500 Series 40-port 1/10 Gigabit Ethernet Switch with SFP/SFP+	48 (96)	48 (96)	-	2 (4)	-	8	-
C9500-16X	Cisco Catalyst 9500 Series 16-port 1/10 Gigabit Ethernet switch with SFP/SFP+	24 (48)	24 (48)	-	2 (4)	-	8	-

All numbers in the above table are for the standalone switch, except where indicated in parentheses () for StackWise Virtual:  
 \*\*with uplink module.

## Network modules

The Cisco Catalyst 9500 Series Switches support optional network modules for uplink ports on some of the configurations.

The default switch configuration does not include the network module. When you purchase the switch, you can choose from the network modules described in Tables 2 and 3.

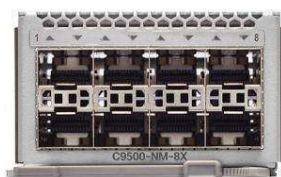
**Table 2.** Network module numbers and descriptions

Network module	Description
<b>C9500-NM-8X</b>	Cisco Catalyst 9500 Series Network Module 8-port 1/10 Gigabit Ethernet with SFP/SFP+
<b>C9500-NM-2Q</b>	Cisco Catalyst 9500 Series Network Module 2-port 40 Gigabit Ethernet with QSFP+

**Table 3.** Network module matrix

Model	C9500-NM-8X	C9500-NM-2Q
<b>C9500-32C</b>	No	No
<b>C9500-32QC</b>	No	No
<b>C9500-48Y4C</b>	No	No
<b>C9500-24Y4C</b>	No	No
<b>C9500-24Q</b>	No	No
<b>C9500-12Q</b>	No	No
<b>C9500-40X</b>	Yes	Yes
<b>C9500-16X</b>	Yes	Yes

Figures 9 and 10 show the available network modules



**Figure 9.** Cisco Catalyst 9500 Series network module 8-port 1/10 Gigabit Ethernet with SFP/SFP+



**Figure 10.** Cisco Catalyst 9500 Series network module 2-port 40 Gigabit Ethernet with QSFP+

## Accessories

The Cisco Catalyst 9500 Series Switches support optional accessories.

The default switch configuration does not include the accessories - these need to be selected during configuration.

**Table 4.** Accessories and descriptions

Product number	Description
<b>C9500-ACCKITH-19I=</b>	Accessory Kit for Cisco Catalyst 9500 Series - High-End - 19" rack mount
<b>C9500-ACCKITH-23I=</b>	Accessory Kit for Cisco Catalyst 9500 Series - High-End - 23" rack mount
<b>C9500-4PTH-KIT=</b>	Extension rails and brackets for four-point mounting for Cisco Catalyst 9500 Series - High-End
<b>C9500-ACC-KIT-19I=</b>	Accessory Kit for Cisco Catalyst 9500 Series - 19" rack mount
<b>C9500-ACC-KIT-23I=</b>	Accessory Kit for Cisco Catalyst 9500 Series - 23" rack mount
<b>C9500-4PT-KIT=</b>	Extension rails and brackets for four-point mounting for Cisco Catalyst 9500 Series
<b>SSD-120G</b>	Cisco pluggable USB3.0 SSD storage - 120 GB
<b>C9K-F1-SSD-240G</b>	Cisco pluggable SSD storage - 240 GB
<b>C9K-F1-SSD-480G</b>	Cisco pluggable SSD storage - 480 GB
<b>C9K-F1-SSD-960G</b>	Cisco pluggable SSD storage - 960 GB

**Table 5.** Accessory matrix

Model	C9500-ACCKITH-19I=	C9500-ACCKITH-23I=	C9500-4PTH-KIT=	C9K-F1-SSD-240G	C9500-ACC-KIT-19I=	C9500-ACC-KIT-23I=	C9500-4PT-KIT=	SSD-120G	C9K-F1-SSD-240G	C9K-F1-SSD-480G	C9K-F1-SSD-960G
<b>C9500-32C</b>	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
<b>C9500-32QC</b>	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
<b>C9500-48Y4C</b>	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
<b>C9500-24Y4C</b>	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
<b>C9500-24Q</b>	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No
<b>C9500-12Q</b>	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No
<b>C9500-40X</b>	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No
<b>C9500-16X</b>	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No

Figure 11 shows the 240-GB SSD storage.



**Figure 11.**  
240-GB SSD storage

### Power supplies and fan tray

The Cisco Catalyst 9500 Series Switches support dual 1+1 redundant power supplies. The switches ship with one power supply by default. The second power supply can be purchased at the time the switch is ordered or at a later time. If only one power supply is installed, it should always be in power supply bay #1.

The switches also ship with up to five field-replaceable variable-speed fans. These have front-to-back airflow and can operate with up to one individual fan failure. The fan trays support fan-tray Online Insertion and Removal (OIR) and can support a maximum fan speed of up to 24,000 rpm.

Table 6 shows the maximum fans and fan trays for each configuration.

**Table 6.** Fan and fan tray matrix

Model	FAN-T4-R (Max # of fans)	C9K-T1-FANTRAY (Max # of fans)
C9500-32C	Yes (5)	No
C9500-32QC	No	Yes (4)
C9500-48Y4C	No	Yes (4)
C9500-24Y4C	No	Yes (4)
C9500-24Q	Yes (5)	No
C9500-12Q	Yes (5)	No
C9500-40X	Yes (5)	No
C9500-16X	Yes (5)	No

Figures 12 through 14 show the power supplies available for the Cisco Catalyst 9500 Series



**Figure 12.**  
950W AC power supply



**Figure 13.**  
650W AC power supply



**Figure 14.**  
1600W AC power supply

Tables 7 and 8 provides more details on the Cisco Catalyst 9500 Series power supplies

**Table 7.** Power supply specifications

Power supply feature	PWR-C4-950WAC-R	PWR-C4-950WDC-R	C9K-PWR-650WAC-R	C9K-PWR-930WDC-R	C9K-PWR-1600WAC-R	C9K-PWR-1600WDC-R
<b>Power max rating</b>	950W	950W	650W	930W	1600W	1600W
<b>Input-voltage range and frequency</b>	AC 90 to 264 VAC, 47 to 63 Hz	-36Vdc~ -72Vdc	AC 90VAC to 264VAC, 47 to 63 Hz	DC -40VDC to -72VDC	AC 90VAC to 140VAC and 180VAC to 264VAC 47 to 63 Hz	DC -40VDC to -72VDC
<b>Power supply efficiency</b>	94%	91% at 48Vin, 50% load	94% (Typ)	92% (Typ)	94% (Typ)	92% (Typ)
<b>Input current</b>	AC 10A at 115VAC, 5 A at 230VAC	22.6A @ 48Vin, 950W	AC 6.8A Max at 115VAC, 3.4 A Max at 230VAC (when full loading)	DC 23A max at -48VDC (when full loading)	AC 10.5A Max at 115VAC (1050W), 7.8 A Max at 230VAC (1600W)	DC 40A max at -48VDC (when full loading)
<b>Output ratings</b>	12V at 79A, 12V at 3A	950W	12Vmain at 54A, 12Vsb at 3A	12Vmain at 54A, 12Vsb at 3A	12Vmain at 133A, 12Vsb at 3A	12Vmain at 133A, 12Vsb at 3A
<b>Output holdup time</b>	AC = 10 ms at maximum load	1ms	AC = 20 ms minimum for system	AC = 8 ms minimum for system	AC = 20 ms minimum for system	AC = 5 ms minimum for system

Power supply feature	PWR-C4-950WAC-R	PWR-C4-950WDC-R	C9K-PWR-650WAC-R	C9K-PWR-930WDC-R	C9K-PWR-1600WAC-R	C9K-PWR-1600WDC-R
Power-supply input receptacles	AC IEC 60320 C16		AC IEC 60320 C14	Molex Minifit 44540-1001	AC IEC 60320 C16	Amphenol C10-638976-000
Power cord rating	AC 15A	DC 40A	AC 10A	DC 40A	AC 15A	DC 70A

**Table 8.** BTU Details for 9500 Power Supplies

Total output BTU (Note: 1000 BTU/hr = 293W) - Model	C9K-PWR-1600WAC-R	C9K-PWR-1600WDC-R	C9K-PWR-650WAC-R	C9K-PWR-930WDC-R	PWR-C4-950WAC-R	PWR-C4-950WDC-R
C9500-32C	1064	1087	N/A	N/A	N/A	N/A
C9500-32QC	N/A	N/A	532	544	N/A	N/A
C9500-48Y4C	N/A	N/A	544	544	N/A	N/A
C9500-24Y4C	N/A	N/A	426	435	N/A	N/A
C9500-24Q	N/A	N/A	N/A	N/A	2900	2976
C9500-12Q	N/A	N/A	N/A	N/A	1536	1562
C9500-40X with 10G NM	N/A	N/A	N/A	N/A	1467	1451
C9500-40X with 40G NM	N/A	N/A	N/A	N/A	1365	1376
C9500-16X with 10G NM	N/A	N/A	N/A	N/A	941	967
C9500-16X with 40G NM	N/A	N/A	N/A	N/A	904	930

Table 9 shows the power supplies supported in the Cisco Catalyst 9500 Series Switches

**Table 9.** Power supply matrix

Model	C9K-PWR-1600WAC-R	C9K-PWR-1600WDC-R	C9K-PWR-650WAC-R	C9K-PWR-930WDC-R	PWR-C4-950WAC-R	PWR-C4-950WDC-R
C9500-32C	Yes	Yes	No	No	No	No
C9500-32QC	No	No	Yes	Yes	No	No
C9500-48Y4C	No	No	Yes	Yes	No	No
C9500-24Y4C	No	No	Yes	Yes	No	No
C9500-24Q	No	No	No	No	Yes	Yes
C9500-12Q	No	No	No	No	Yes	Yes

Model	C9K-PWR-1600WAC-R	C9K-PWR-1600WDC-R	C9K-PWR-650WAC-R	C9K-PWR-930WDC-R	PWR-C4-950WAC-R	PWR-C4-950WDC-R
C9500-40X	No	No	No	No	Yes	Yes
C9500-16X	No	No	No	No	Yes	Yes

## Switch performance

Table 10 shows performance specifications for the Cisco Catalyst 9500 Series Switches

**Table 10.** Performance specifications

Performance numbers for all switch models	C9500-24Q	C9500-12Q	C9500-40X	C9500-16X	C9500-32C	C9500-32QC	C9500-48Y4C	C9500-24Y4C
<b>ASIC</b>	<b>UADP 2.0</b>				<b>UADP 3.0</b>			
<b>Switching capacity</b>	Up to 1920 Gbps	Up to 960 Gbps	Up to 960 Gbps	Up to 480 Gbps	Up to 6.4 Tbps**	Up to 3.2 Tbps**	Up to 3.2 Tbps**	Up to 2.0Tbps**
<b>Forwarding rate</b>	Up to 1440 Mpps	Up to 720 Mpps	Up to 720 Mpps	Up to 360 Mpps	Up to 2 Bpps	Up to 1 Bpps	Up to 1 Bpps	Up to 1 Bpps
<b>Total number of MAC addresses</b>	Up to 64,000*				Up to 82,000*			
<b>Total number of IPv4 routes (Address Resolution Protocol [ARP] plus learned routes)</b>	Up to 64,000 indirect* Up to 80,000 host*				Up to 212,000 indirect + direct* Up to 90,000 host/ARP*			
<b>Total number of IPv6 routes</b>	Up to 32,000 indirect* Up to 40,000 host*				Up to 212,000 indirect + direct* Up to 90,000 host*			
<b>Total number of IPv4 Multicast routes</b>	Up to 32,000*				Up to 32,000*			
<b>Total number of IPv6 Multicast routes</b>	Up to 16,000*				Up to 32,000*			
<b>QoS ACL scale</b>	Up to 18000*				Up to 16000*			
<b>Security ACL scale</b>	Up to 18000*				Up to 27000*			
<b>FNF entries</b>	Up to 512,000*				Up to 98,000*			
<b>DRAM</b>	16 GB				16 GB			
<b>Flash</b>	16 GB				16 GB			
<b>VLAN IDs</b>	4094				4094			



Performance numbers for all switch models	C9500-24Q	C9500-12Q	C9500-40X	C9500-16X	C9500-32C	C9500-32QC	C9500-48Y4C	C9500-24Y4C
Total Switched Virtual Interfaces (SVIs)	1000				1000			
Jumbo frame	9198 bytes				9216 bytes			

\*Varies based on selected flexible ASIC template.

\*\* Line rate for 187byte packet size and above.

By host routes, it means any /32 routes, including those are learned indirectly (such as over OSPF or other routing protocols).

This does not mean that it can install 80,000 directly connected clients (/32) for attached VLANs/SVIs. In other words, directly connected routes in engineering term means, any /32 prefix (that includes clients attached to switch's own VLAN/SVI and those /32 prefixes learned over any routing protocols as well).

An indirectly connected route is a route with a prefix other than /32.

### Important note

UADP 2.0 based C9500-12Q, C9500-24Q, C9500-40X, and C9500-16X support 32,000 adjacency in hardware. So essentially, they can support up to ~32,000 directly attached clients (including all adjacency) in their own VLAN/SVI.

UADP 3.0 based C9500-32C, 32QC, 24Y4C, and 48Y4C support 80,000 adjacency for SVI, with SDM template of distribution and 90,000 direct routes for all supported templates when a Layer 3 routed port is used.

### Flexible ASIC templates

Flexible ASIC templates enable universal deployments by leveraging the UADP's ability to create resources to optimize table sizes for different places in the network. Based on how the switch is used in the network, an appropriate flexible ASIC template may be selected to configure the switch for specific features.

The following flexible ASIC templates are supported on the Cisco Catalyst 9500 Series.

- Distribution: Maximizes system resources for MAC and security
- Core: Maximizes system resources for unicast and multicast routing
- SDA: Maximizes system resources to support fabric deployment
- NAT: Maximizes system resources for Layer 3 and NAT to support collapsed core WAN deployments

Table 11 describes the ASIC templates

**Table 11.** ASIC template descriptions

Template numbers for models C9500-32C, C9500-32QC, C9500-24Y4C, C9500-48Y4C	Distribution template	Core template	NAT template	SDA template
IPv4/IPv6(LPM/Host)	114,000	212,000	212,000	212,000
Multicast route(IPv4/IPv6)	16,000	32,000	32,000	32,000
IGMP/MLD snooping	2,000	2,000	2,000	2,000
MAC address	82,000	32,000	32,000	32,000
SGT label	32,000	32,000	32,000	32,000
NetFlow/ASIC	98,000	64,000	64,000	64,000
Security ACL	27,000*	27,000*	20,000*	27,000*
QoS ACL	16,000*	16,000*	8,000*	16,000*
PBR/NAT	3,000	3,000	15,500	2000
Tunnel/MACsec	3000	3000	2000	3000
LISP	1000	1000	1000	2000
SPAN	1000	1000	1000	1000
STP Instances	1000	1000	1000	1000
Control Plane Policing (CoPP)	1000	1000	1000	1000
NetFlow ACL	1000 ingress, 1000 egress	1000 ingress, 1000 egress	1000 ingress, 1000 egress	1000 ingress, 1000 egress

\*ACL allocation is configurable between ingress, egress, IPv4, non IPv4

Template numbers for models C9500-12Q, C9500-24Q, C9500-40X, C9500-16X	Distribution template	Core template	SDA template	NAT template
IPv4/IPv6 LPM	64,000 / 32,000	64,000 / 32,000	64,000 / 32,000	64,000 / 32,000
IPv4/IPv6 host	48,000 / 24,000	32,000 / 16,000	80,000 / 40,000	48,000 / 24,000
IPv4/ IPv6 Multicast route	16,000 / 8,000	32,000 / 16,000	16,000 / 8,000	32,000 / 16,000
IGMP/MLD snooping	16,000	16,000	16,000	16,000
MAC address	64,000	16,000	16,000	16,000
SGT label	8000	8000	8000	8000

Template numbers for models C9500-12Q, C9500-24Q, C9500-40X, C9500-16X	Distribution template	Core template	SDA template	NAT template
NetFlow/ASIC	128,000	128,000	128,000	128,000
Security ACL	18,000	18,000	18,000	18,000
QoS ACL	18,000	18,000	18,000	3000
PBR/NAT	2000	2000	2000	16,000
Tunnel/MACsec	1000	1000	1000	1000
LISP	1000	1000	1000	1000
SPAN	1000	1000	1000	1000
STP instances	256	256	256	256
CoPP	1000	1000	1000	1000
NetFlow ACL	1000 ingress, 2000 egress	1000 ingress, 2000 egress	1000 ingress, 2000 egress	1000 ingress, 2000 egress

## Cisco SD-Access architecture

Enterprises are in search of ways to transform their operations to add digital capabilities that enhance service delivery and asset management. Cisco SD-Access provides this transformational shift in building and managing networks. It provides faster, easier, and improved business efficiency with investment protection for enhanced business outcomes. By decoupling network functions from hardware, SD-Access helps ensure policy compliance, allows you to launch new business services faster, and improves issue resolution times significantly. At the same time, it is open and extensible and can significantly reduce your operational expenses.

Cisco SD-Access enables policy-based automation from edge to cloud with foundational capabilities. These include simplified device deployment, unified management of wired and wireless networks, network virtualization and segmentation, group-based policies, and context-based analytics. With these fundamental features in place, key use cases can now be orchestrated. These use cases include user mobility, secure segmentation, user onboarding and policies, IoT integration, guest access, context-based troubleshooting, and data center and cloud integration.

## Cisco StackWise Virtual

StackWise Virtual is an advanced stacking technology that supports both core and distribution deployments through multiple topologies. It provides higher scale for system virtualization at the network layer. The Cisco Catalyst 9500 Series with Network Advantage License supports StackWise Virtual with a 2-node topology.

StackWise Virtual in the distribution layer of the network interacts with the access and core layer switches as if it were a single logical switch. An access/core switch connects to both switches of the StackWise Virtual switch using one logical port channel called a Multichassis EtherChannel (MEC). The MEC enables the StackWise Virtual switches to provide redundancy and load balancing on the port channel.

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This capability enables a loop-free Layer 2 network topology, since the StackWise Virtual switches are treated as one logical switch for both access and core switches. The StackWise Virtual switch also simplifies the Layer 3 network topology by presenting itself as one logical switch, thus reducing the number of routing peers in the network.

## Platform benefits

### Cisco IOS XE

The Cisco Catalyst 9500 Series opens a completely new paradigm in network configuration, operation, and monitoring through network automation. Cisco's automation solution is open, standards-based, and extensible across the entire lifecycle of a network device. The various mechanisms that bring about network automation are outlined below, based on a device lifecycle.

- **Automated device provisioning:** This is the ability to automate the process of upgrading software images and installing configuration files on Cisco Catalyst switches when they are being deployed in the network for the first time. Cisco provides both turnkey solutions such as Plug and Play and off-the-shelf tools such as Zero-Touch Provisioning (ZTP) and Preboot Execution Environment (PXE) that enable an effortless and automated deployment.
- **API-driven configuration:** Modern network switches such the Cisco Catalyst 9500 Series support a wide range of automation features and provide robust open APIs over Network Configuration Protocol (NETCONF) and RESTCONF using YANG data models for external tools, both off-the-shelf and custom built, to automatically provision network resources.
- **Granular visibility:** Model-driven telemetry provides a mechanism to stream data from a switch to a destination. The data to be streamed is driven through subscription to a data set in a YANG model. The subscribed data set is streamed out to the destination at configured intervals. Additionally, Cisco IOS XE enables the push model, which provides near-real-time monitoring of the network, leading to quick detection and rectification of failures.
- **Seamless software upgrades and patching:** To enhance OS resilience, Cisco IOS XE supports patching, which provides fixes for critical bugs and security vulnerabilities between regular maintenance releases. This support allows customers to add patches without having to wait for the next maintenance release.

### Security

- **Encrypted Traffic Analytics (ETA):** ETA is a unique capability for identifying malware in encrypted traffic coming from the access layer. Since more and more traffic is becoming encrypted, the visibility this feature provides related to threat detection is critical for keeping your network secure at different layers.
- **Advanced Encryption Standard (AES)-256 MACsec encryption:** AES is the IEEE 802.1AE standard for authenticating and encrypting packets between switches and endpoints. The Cisco Catalyst 9500 Series Switches support 256-bit and 128-bit AES on all ports at all speeds, providing the most secure link encryption (switch to switch).
- **Trustworthy solutions:** Cisco Trust Anchor Technologies provide a highly secure foundation for Cisco products. In the Cisco Catalyst 9500 Series, these trustworthy solutions enable hardware and software authenticity assurance for supply chain trust and strong mitigation against man-in-the-middle attacks on software and firmware.

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- **Image signing:** Cryptographically signed images provide assurance that the firmware, BIOS, and other software are authentic and unmodified. As the system boots, the system's software signatures are checked for integrity.
  - **Object group ACLs (ipv4 and ipv6):** Object groups for ACLs allow the classification of users, devices, or protocols into groups and apply those groups to ACLs to create access control policies for those groups. This feature allows the use of object groups instead of individual IP addresses, protocols, and ports, which are used in conventional ACLs.
  - **Secure Boot:** Cisco Secure Boot technology anchors the boot sequence chain of trust to immutable hardware, mitigating threats against a system's foundational state and the software that is to be loaded, regardless of a user's privilege level. It provides layered protection against the persistence of illicitly modified firmware.
  - **Cisco Trust Anchor module:** A tamper-resistant, strong cryptographic, single-chip solution provides hardware authenticity assurance to uniquely identify the product so that its origin can be confirmed to Cisco, providing assurance that the product is genuine.

## Resiliency and high availability

- **Cisco StackWise Virtual:** StackWise Virtual is an advanced stacking technology that supports both core and distribution deployments. It provides higher scale for system virtualization at the network layer. The Cisco Catalyst 9500 Series with Network Advantage License supports StackWise Virtual with a 2-node topology.
- **Software Maintenance Upgrades (SMUs):** The SMU is a package that can be installed on a system to provide a patch fix or security resolution to a released image. SMUs allow you to address the network issue quickly while reducing the time and scope of the testing required. The Cisco IOS XE platform internally validates the SMU compatibility and does not allow you to install noncompatible SMUs. All SMUs are integrated into the subsequent Cisco IOS XE Software maintenance releases.
- **Graceful Insertion and Removal (GIR):** GIR isolates a switch from the network in order to perform debugging or an upgrade operation. By using the switch maintenance mode, GIR can systematically eject a Cisco Catalyst 9500 Series Switch from the network with zero or minimal disruption to the network service. When a switch is in maintenance mode, it is isolated from the active forwarding paths in the network. Maintenance tasks, such as real-time debugging, hardware replacement, or software upgrade/downgrade, can be performed without affecting the production traffic. When maintenance tasks are completed, the GIR function places the switch back into the network without impact.
- **Flexlink+:** Flexlink+ allows the setting up of active and backup interfaces or port channels, which can provide Layer 2 failover redundancy without the use of Spanning Tree Protocol (STP). Flexlink+ is currently supported on the C9500-12Q, C9500-24Q, C9500-40X, and C9500-16X models.
- **MKA High Availability:** MKA sessions are now SSO-aware. In the event of failure of the active switch, the standby switch takes over the existing MKA sessions in a minimally disruptive switchover.

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## Flexible NetFlow

- **Flexible NetFlow (FNF):** Cisco IOS® Software FNF is the next generation in flow visibility technology, allowing optimization of the network infrastructure, reducing operation costs, and improving capacity planning and security incident detection with increased flexibility and scalability. The Cisco Catalyst 9500 Series is capable of up to 512,000 flow entries.

## Application visibility and control

- **Next-Generation Network Based Application Recognition (NBAR2):** NBAR2 enables advanced application classification techniques, accuracy with up to 1400 predefined and well-known application signatures and up to 150 encrypted applications on the Cisco Catalyst 9000 Series. Some of the most popular applications included are Skype, Office 365, Microsoft Lync, Cisco WebEx®, and Facebook. Many others are already predefined and easy to configure. NBAR2 provides the network administrator with an important tool to identify, control, and monitor end-user application usage while helping ensure a quality user experience and securing the network from malicious attacks. It uses FNF to report application performance and activities within the network to any supported NetFlow collector, such as Cisco Prime®, Cisco Stealthwatch®, or any compliant third-party tool. NBAR2 is currently supported on the C9500-12Q, C9500-24Q, C9500-40X, and C9500-16X models.

## Audio video bridging

- **Audio Video Bridging (AVB):** With Cisco IOS XE Software Release 16.8, selected models of the Cisco Catalyst 9500 Series now support the IEEE 802.1 AVB standard. This standard enables 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 inflexible digital one to one, the network transport enables many-to-many transparent plug-and-play connections for multiple AV endpoints. AVB is currently supported on the C9500-12Q, C9500-24Q, C9500-40X, and C9500-16X models.

## Benefits

- Improves quality of experience by lowering jitter and latency for time-synchronized delivery of high-quality AV.
- Provides scalability of applications across networked deployments, including expansive and complex AV infrastructure.
- Lowers Total Cost of Ownership (TCO) with reduced cabling (lowers CapEx) and no license fees (lowers OpEx).

\* AVB is supported on the C9500-12Q, C9500-24Q, C9500-40X, and C9500-16X models. For more details about AVB, refer to <https://www.cisco.com/go/avb>.

## Superior QoS

QoS technologies are a set of tools and techniques for managing network resources and are considered the key enabling technologies for the transparent convergence of voice, video, and data networks. QoS on the Cisco Catalyst 9500 Series consists of classification and marking, policing and markdown, scheduling, shaping, and queuing functions. A modular QoS command-line framework provides consistent platform-independent and flexible configuration behavior. The 9500 Series also supports 2-level hierarchical or nested policies.

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## Subinterfaces

Layer 3 interfaces forward IPv4 and IPv6 packets to another device using static or dynamic routing protocols. You can use Layer 3 interfaces for IP routing and inter-VLAN routing of Layer 2 traffic. Subinterfaces can also be created on Layer 3 port channels.

MPLS is supported on Layer 3 subinterfaces.

## BGP EVPN with VXLAN

### Virtual Extensible LAN (VXLAN) Border Gateway Protocol (BGP) Ethernet VPN (EVPN)

VXLAN is a network overlay that allows layer 2 segments to be stretched across an IP core. All the benefits of layer 3 topologies are thereby available with VXLAN. The overlay protocol is VXLAN and BGP uses EVPN as the address family for communicating end host MAC and IP addresses.

## Service discovery

- **Multicast DNS (mDNS) gateway:** This service discovery gateway capability facilitates the sharing of services advertised using the Apple mDNS (Bonjour) protocol (such as printers, Apple TVs and file services across the network). Additionally, the administrator can create policies defining which services can be seen and accessed by the users in the network. This capability facilitates a Bring-Your-Own-Device (BYOD) rollout.

## Smart operation

- **Bluetooth ready:** The Cisco Catalyst 9500 Series has hardware support to connect a Bluetooth dongle to your switch, enabling you to use this wireless interface as a management port. This port functions as an IP management interface and can be used for configuration and troubleshooting using the WebUI or the Command-Line Interface (CLI), and to transfer images and configurations.
- **WebUI:** WebUI is an embedded GUI-based device-management tool that provides the ability to provision the device, to simplify device deployment and manageability and to enhance the user experience. WebUI comes with the default image. There is no need to enable anything or install any license on the device. You can use WebUI to build a day-1 configuration and from then on monitor and troubleshoot the device without having to know how to use the CLI.
- **RFID tags:** The Cisco Catalyst 9500 Series switches have an embedded RFID tag that facilitates easy asset and inventory management using commercial RFID readers.
- **Blue beacon:** The Cisco Catalyst 9500 Series Switches support a blue beacon LED for easy identification of the switch being accessed.

## High-performance IP routing

- IP routing protocols provide the fundamental infrastructure for the delivery of advanced IP services across the Cisco Catalyst 9500 Series. Whether based on Internet Engineering Task Force (IETF) standards or Cisco innovations, these protocols enable Cisco to offer the broadest portfolio of IP routing technologies. All share industry-leading scalability, availability, manageability, fast convergence, and high-performance capabilities.
- IP unicast routing protocols (including static; Routing Information Protocol version 1 [RIPv1], version 2 [RIPv2], and next generation [RIPng]; and Open Shortest Path First [OSPF] routed access) are supported for small network routing applications with the Network Essentials stack.

- Advanced IP unicast routing protocols (such as OSPF, Enhanced Interior Gateway Routing Protocol [EIGRP], Border Gateway Protocol Version 4 [BGPv4], and Intermediate System-to-Intermediate System Version 4 [IS-ISv4]) are supported for load balancing and for constructing scalable LANs. IPv6 routing (using OSPFv3 and EIGRPv6) is supported in hardware for maximum performance.
- Protocol-Independent Multicast (PIM) for IP multicast routing is supported, including PIM Sparse Mode (PIM SM), bidirectional PIM, and Source-Specific Multicast (SSM).
- IPv6 addressing is supported on interfaces with appropriate show commands for monitoring and troubleshooting.
- Seamless MPLS integrates multiple networks into a single MPLS domain. This removes the need for service-specific configurations in network transport nodes.

## Software requirements

- The Cisco Catalyst 9500 Series Switches run on Cisco IOS XE Software version 16.5.1a or later. This software release includes all the features listed earlier in the Platform Benefits section. Table 12 lists the minimum software requirements for the switch models.

**Table 12.** Minimum software requirements

Model	Description	Minimum software requirement
<b>C9500-32C</b>	Cisco Catalyst 9500 Series 32-port 40/100 Gigabit Ethernet with QSFP+/QSFP28	Cisco IOS XE Software Release 16.8.1a
<b>C9500-32QC</b>	Cisco Catalyst 9500 Series 32-port 40 Gigabit Ethernet with QSFP+ / 16-port 100 Gigabit Ethernet with QSFP28	Cisco IOS XE Software Release 16.8.1a
<b>C9500-48Y4C</b>	Cisco Catalyst 9500 Series high-performance 48-port 1/10/25G Gigabit Ethernet switch with SFP/SFP+/SFP28	Cisco IOS XE Software Release 16.8.1a
<b>C9500-24Y4C</b>	Cisco Catalyst 9500 Series high-performance 24-port 1/10/25G Gigabit Ethernet switch with SFP/SFP+/SFP28	Cisco IOS XE Software Release 16.8.1a
<b>C9500-24Q</b>	Cisco Catalyst 9500 Series 24-port 40 Gigabit Ethernet with QSFP+	Open Cisco IOS XE Software Release 16.5.1a
<b>C9500-12Q</b>	Cisco Catalyst 9500 Series 12-port 40 Gigabit Ethernet with QSFP+	Open Cisco IOS XE Software Release 16.6.1
<b>C9500-40X</b>	Cisco Catalyst 9500 Series 40-port 1/10 Gigabit Ethernet with SFP/SFP+	Open Cisco IOS-XE Software Release 16.6.1
<b>C9500-16X</b>	Cisco Catalyst 9500 Series 16-port 1/10 Gigabit Ethernet with SFP/SFP+	Open Cisco IOS-XE Software Release 16.8.1

## Licensing

### Packaging

The Cisco Catalyst 9000 family introduced new packaging that includes vastly simplified base network packages (Network Essentials and Network Advantage) and term-based software packages (Cisco DNA Premier, Cisco DNA Advantage and Cisco DNA Essentials). The Cisco DNA packages, in addition to on-box capabilities, also unlock additional functionality in Cisco DNA Center, enabling controller-based software-defined automation in your network.



For information about feature support on specific models, please refer to the Cisco Feature Navigator (<https://cfn.cloudapps.cisco.com/ITDIT/CFN/jsp/index.jsp>) and the Cisco Catalyst 9500 Series Release Notes.

License consumption is further simplified to following two combinations:

**Essentials:** This consists of Perpetual Network Essentials and a term-based (3-, 5-, or 7-year) Cisco DNA Essentials package.

**Advantage:** This consists of Perpetual Network Advantage and a term-based (3-, 5-, or 7-year) Cisco DNA Advantage package.

Note that it is not required to deploy Cisco DNA Center just to use one of the above packages. Refer to <https://www.cisco.com/c/dam/en/us/products/collateral/software/one-wireless-subscription/q-and-a-c67-739601.pdf> for additional details about the Essentials and Advantage packages.

**Table 13.** Network Essentials and Advantage package features

Features	Network Essentials	Network Advantage
<b>Switch fundamentals</b> Layer 2, Routed Access (RIP, EIGRP Stub, OSPF – Up to 1000 routes), PBR, PIM Stub Multicast (up to 1000 routes), PVLAN, VRRP, PBR, CDP, QoS, FHS, 802.1x, Macsec-128, CoPP, SXP, IP SLA Responder, SSO	✓	✓
<b>Advanced switch capabilities and scale</b> BGP, EIGRP, HSRP, IS-IS, BSR, MSDP, PIM SM, PIM SSM, PIM-BIDIR*, IP SLA, OSPF	X	✓
<b>Network segmentation</b> VRF, VXLAN, LISP, SGT, MPLS, mVPN	X	✓
<b>Automation</b> NETCONF, RESTCONF, gRPC, YANG, PnP Agent, ZTP/Open PnP, GuestShell (On-Box Python)	✓	✓
<b>Telemetry and visibility</b> Model-driven telemetry, sampled NetFlow, SPAN, RSPAN	✓	✓
<b>High availability and resiliency</b> NSF, GIR, * ISSU, StackWise Virtual	X	✓
<b>IoT integration</b> AVB, * PTP, Constrained Application Protocol (CoAP)*	X	✓
<b>Security</b> MACsec-256	X	✓

**Table 14.** Cisco DNA Essentials and Advantage package features

Features	Cisco DNA Essentials	Cisco DNA Advantage	Cisco DNA Premier
<b>Switch features</b>			
<b>Optimized network deployments</b> Cisco DNA Service for Bonjour	X	✓	✓
<b>Advanced telemetry and visibility</b> Full Flexible NetFlow, EEM	✓	✓	✓
<b>Optimized telemetry a visibility</b> ERSPAN, AVC (NBAR2), App Hosting (in Containers/VMs), Wireshark	X	✓	✓
<b>Advanced security</b> Encrypted Traffic Analytics (ETA)*	X	✓	✓
<b>Cisco DNA Center features</b>			
<b>Day 0 network bring-up automation</b> Cisco Network Plug-n-Play application, network settings, device credentials, LAN Automation, Host onboarding	✓	✓	✓
<b>Element management</b> Discovery, inventory, topology, software image, licensing, and configuration management	✓	✓	✓
<b>Element management</b> Patch Management	X	✓	✓
<b>Basic Assurance</b> Health Dashboards – Network, Client, Application; Switch and Wired Client Health Monitoring	✓	✓	✓
<b>SD-Access</b> Policy-based Automation and Assurance for Wired and Wireless	X	✓	✓
<b>SD-Access Embedded Wireless</b> Cisco Catalyst 9800 wireless software package to enable wireless controller functionality**	X	✓	✓
<b>Network assurance and analytics</b> Global Insights, Trends, Compliance, Custom Reports; Switch 360, Wired Client 360; Fabric and Non-Fabric Insights; App Health, App 360, App Performance (Loss, Latency, Jitter)	X	✓	✓

\*Feature will be available in future software releases

\*\*Note: A purchase of Cisco DNA Advantage or Cisco DNA Premier per access point is required in order to enable the wireless controller functionality on Cisco Catalyst switches.

## Specifications

### Dimensions, physical specifications, weight, and mean time between failures (MTBF)

Table 15 lists the dimensions, physical specifications, weight, and MTBF for the Cisco Catalyst 9500 Series Switches

**Table 15.** Dimensions, physical specifications, weight, and MTBF

Description	Specifications							
SKU	C9500-32C	C9500-32QC	C9500-48YC	C9500-24YC	C9500-12Q	C9500-24Q	C9500-40X	C9500-16X
<b>Dimensions (H x W x D)</b>	1.73 x 17.5 x 21.2 in	1.73 x 17.5 x 18.0 in			1.73 x 17.5 x 21.52 in			
<b>Rack Units (RU)</b>	1 RU							
<b>Chassis with 2 power supplies and built-in fan</b>	25.64 lb (11.63 kg)	21.85 lb (9.91 kg)	21.96 lb (9.96 kg)	20.99 lb (9.52 kg)	25.75 lb (11.68 kg)			23.6 lb (10.7 kg)
<b>Input voltage</b>	90 to 264 VAC*				90 to 264 VAC*			
<b>Operating temperature</b>	32° to 104°F (0° to 40°C)				32° to 104°F (0° to 40°C)			
<b>Storage temperature</b>	-4° to 149°F (-20° to 65°C)				-4° to 149°F (-20° to 65°C)			
<b>Relative humidity operating and nonoperating noncondensing</b>	Ambient (noncondensing) operating: 5% to 90% Ambient (noncondensing) nonoperating and storage: 5% to 95%							
<b>NEBS criteria levels</b>	NEBS: <ul style="list-style-type: none"> <li>• Normal operating temperature range: 5C to 40C (up to 1829 meters (6000 ft))</li> <li>• Short term operating temperature range: -5C to 55C</li> <li>• Normal Relative Humidity range: 5% to 85%</li> <li>• Short term Relative Humidity range: 5% to 93%</li> <li>• Operating Altitude: up to 1829 m (6000 ft) at 55C</li> <li>• ETSI 300-019 Requirements are covered under GR-63-CORE with some deviations.</li> <li>• SR-3580 NEBS level 3 (GR-63-CORE, to current issue, GR-1089-CORE, to current issue)</li> </ul>							
<b>Altitude</b>	Operation up to 13,000 feet at 40° C				Operation up to 6000 feet at 55° C and 13,000 feet at 45° C			
<b>MTBF (hours)</b>	212,820	307,200	316,960	336,780	276,430	230,770	277,310	315,790

\* Minimum input voltage is 90VAC, and maximum input voltage is 264VAC.

## Optics/transceivers modules

The link below has the matrix of supported optics/transceivers for the Cisco Catalyst 9500 Series.

For the latest Cisco Optics/transceivers modules compatibility information, refer to <https://tmgmatrix.cisco.com/>

## Management and standards support

Table 16 shows management and standards support for the Cisco Catalyst 9500 Series

**Table 16.** Management and standards support

Description	Cisco Catalyst 9500	Cisco Catalyst 9500 High Performance
<b>Management</b>	BRIDGE-MIB	BGP4-MIB
	CISCO-BRIDGE-EXT-MIB	BRIDGE-MIB
	CISCO-BULK-FILE-MIB	CISCO-ACCESS-ENVMON-MIB
	CISCO-CABLE-DIAG-MIB	CISCO-AUTH-FRAMEWORK-MIB
	CISCO-CALLHOME-MIB	CISCO-BGP4-MIB
	CISCO-CEF-MIB	CISCO-BRIDGE-EXT-MIB
	CISCO-CIRCUIT-INTERFACE-MIB	CISCO-BULK-FILE-MIB
	CISCO-DEVICE-LOCATION-MIB	CISCO-CABLE-DIAG-MIB
	CISCO-DHCP-SNOOPING-MIB	CISCO-CALLHOME-MIB
	ENTITY-VENDORTYPE-OID-MIB	CISCO-CDP-MIB
	CISCO-EIGRP-MIB	CISCO-CEF-MIB
	CISCO-EMBEDDED-EVENT-MGR-MIB	CISCO-CLASS-BASED-QOS-MIB
	CISCO-ENTITY-FRU-CONTROL-MIB	CISCO-CONFIG-COPY-MIB
	CISCO-ENTITY-SENSOR-MIB	CISCO-CONFIG-MAN-MIB
	CISCO-RTTMON-ICMP-MIB	CISCO-CONTEXT-MAPPING-MIB
	CISCO-802-TAP-MIB	CISCO-DATA-COLLECTION-MIB
	CISCO-ACCESS-ENVMON-MIB	CISCO-DHCP-SNOOPING-MIB
	CISCO-DATA-COLLECTION-MIB	CISCO-EIGRP-MIB
	CISCO-DYNAMIC-ARP-INSPECTION-MIB	CISCO-EMBEDDED-EVENT-MGR-MIB
	CISCO-ENERGYWISE-MIB	CISCO-ENHANCED-IMAGE-MIB
	CISCO-ENHANCED-IMAGE-MIB	CISCO-ENHANCED-MEMPOOL-MIB
	CISCO-ENHANCED-MEMPOOL-MIB	CISCO-ENTITY-ASSET-MIB
	CISCO-ENTITY-ASSET-MIB	CISCO-ENTITY-EXT-MIB
	CISCO-ENTITY-DIAG-MIB	CISCO-ENTITY-FRU-CONTROL-MIB
	CISCO-ENTITY-EXT-MIB	CISCO-ENTITY-SENSOR-MIB
	CISCO-ENTITY-PERFORMANCE-MIB	CISCO-ENTITY-VENDORTYPE-OID-MIB
	CISCO-ENTITY-QFP-MIB	CISCO-ENVMON-MIB
	CISCO-ENVMON-MIB	CISCO-ERR-DISABLE-MIB
	CISCO-ETHER-CFM-MIB	CISCO-FLASH-MIB
	ENTITY-MIB	CISCO-FTP-CLIENT-MIB
	CISCO-ERR-DISABLE-MIB	CISCO-HSRP-EXT-MIB
	CISCO-CONFIG-COPY-MIB	CISCO-HSRP-MIB
	CISCO-FLOW-MONITOR-MIB	CISCO-IETF-BFD-MIB
	CISCO-FTP-CLIENT-MIB	CISCO-IETF-DHCP-SERVER-EXT-MIB
	CISCO-HSRP-EXT-MIB	CISCO-IETF-DHCP-SERVER-MIB
	CISCO-HSRP-MIB	CISCO-IETF-ISIS-MIB
	CISCO-IETF-BFD-MIB	CISCO-IETF-PPVPN-MPLS-VPN-MIB
	CISCO-IETF-PPVPN-MPLS-VPN-MIB	CISCO-IF-EXTENSION-MIB

Description	Cisco Catalyst 9500	Cisco Catalyst 9500 High Performance
	CISCO-IETF-PW-MPLS-MIB	CISCO-IGMP-FILTER-MIB
	CISCO-IF-EXTENSION-MIB	CISCO-IMAGE-LICENSE-MGMT-MIB
	CISCO-IGMP-FILTER-MIB	CISCO-IMAGE-MIB
	CISCO-IMAGE-LICENSE-MGMT-MIB	CISCO-IP-CBR-METRICS-MIB
	CISCO-IP-TAP-MIB	CISCO-IP-STAT-MIB
	CISCO-CONFIG-MAN-MIB	CISCO-IP-URPF-MIB
	CISCO-IP-CBR-METRICS-MIB	CISCO-IPMROUTE-MIB
	CISCO-IP-STAT-MIB	CISCO-IPSLA-AUTOMEASURE-MIB
	CISCO-IP-URPF-MIB	CISCO-IPSLA-ECHO-MIB
	CISCO-L2L3-INTERFACE-CONFIG-MIB	CISCO-IPSLA-JITTER-MIB
	CISCO-LAG-MIB	CISCO-L2-CONTROL-MIB
	CISCO-LICENSE-MGMT-MIB	CISCO-L2L3-INTERFACE-CONFIG-MIB
	CISCO-LOCAL-AUTH-USER-MIB	CISCO-LAG-MIB
	CISCO-MEDIA-METRICS-MIB	CISCO-LICENSE-MGMT-MIB
	CISCO-MAC-AUTH-BYPASS-MIB	CISCO-LISP-EXT-MIB
	CISCO-MAC-NOTIFICATION-MIB	CISCO-LOCAL-AUTH-USER-MIB
	CISCO-MDI-METRICS-MIB	CISCO-MAC-AUTH-BYPASS-MIB
	CISCO-FLASH-MIB	CISCO-MAC-NOTIFICATION-MIB
	CISCO-OSPF-MIB	CISCO-MEMORY-POOL-MIB
	CISCO-MEMORY-POOL-MIB	CISCO-MPLS-LSR-EXT-STD-MIB
	CISCO-MPLS-LSR-EXT-STD-MIB	CISCO-NHRP-EXT-MIB
	CISCO-NBAR-PROTOCOL-DISCOVERY-MIB	CISCO-NTP-MIB
	CISCO-NHRP-EXT-MIB	CISCO-OSPF-MIB
	CISCO-NTP-MIB	CISCO-OSPF-TRAP-MIB
	CISCO-PAGP-MIB	CISCO-PAE-MIB
	CISCO-PORT-SECURITY-MIB	CISCO-PAGP-MIB
	CISCO-PORT-STORM-CONTROL-MIB	CISCO-PIM-MIB
	CISCO-POWER-ETHERNET-EXT-MIB	CISCO-PING-MIB
	CISCO-PRIVATE-VLAN-MIB	CISCO-PKI-MIB
	CISCO-PROCESS-MIB	CISCO-PORT-SECURITY-MIB
	CISCO-PRODUCTS-MIB	CISCO-PORT-STORM-CONTROL-MIB
	CISCO-RF-MIB	CISCO-PRIVATE-VLAN-MIB
	CISCO-RTP-METRICS-MIB	CISCO-PROCESS-MIB
	CISCO-STP-EXTENSIONS-MIB	CISCO-PRODUCTS-MIB
	CISCO-SYSLOG-MIB	CISCO-RESILIENT-ETHERNET-PROTOCOL-MIB
	CISCO-TCP-MIB	CISCO-RTTMON-ICMP-MIB
	CISCO-UDLDP-MIB	CISCO-RTTMON-IP-EXT-MIB
	CISCO-VLAN-IFTABLE-RELATIONSHIP-MIB	CISCO-RTTMON-MIB
	HC-RMON-MIB	CISCO-RTTMON-RTP-MIB
	IF-MIB	CISCO-SNMP-TARGET-EXT-MIB
	CISCO-HC-RMON-MIB	CISCO-STP-EXTENSIONS-MIB
	IEEE8021-LAG-MIB	CISCO-SYSLOG-MIB
	LLDP-EXT-MED-MIB	CISCO-TCP-METRICS-MIB

Description	Cisco Catalyst 9500	Cisco Catalyst 9500 High Performance
	IP-FORWARD-MIB	CISCO-TCP-MIB
	IP-MIB	CISCO-TRUSTSEC-INTERFACE-MIB
	HC-ALARM-MIB	CISCO-TRUSTSEC-MIB
	RFC1213-MIB	CISCO-TRUSTSEC-POLICY-MIB
	LLDP-MIB	CISCO-TRUSTSEC-SERVER-MIB
	MAU-MIB	CISCO-TRUSTSEC-SXP-MIB
	MPLS-L3VPN-STD-MIB	CISCO-UDLD-MIB
	MPLS-LSR-STD-MIB	CISCO-VLAN-IFTABLE-RELATIONSHIP-MIB
	MPLS-VPN-MIB	CISCO-VLAN-MEMBERSHIP-MIB
	OLD-CISCO-CHASSIS-MIB	CISCO-VRF-MIB
	OLD-CISCO-CPU-MIB	CISCO-VTP-MIB
	OLD-CISCO-INTERFACES-MIB	ENTITY-MIB
	OLD-CISCO-IP-MIB	ENTITY-STATE-MIB
	OLD-CISCO-SYS-MIB	EtherLike-MIB
	OLD-CISCO-TCP-MIB	HC-ALARM-MIB
	OLD-CISCO-TS-MIB	HC-RMON-MIB
	OLD-CISCO-MEMORY-MIB	IEEE8021-PAE-MIB
	CISCO-POWER-ETHERNET-MIB	IEEE8023-LAG-MIB
	CISCO-RMON2-MIB	IF-MIB
	CISCO-RMON-MIB	IGMP-STD-MIB
	SNMPv2-MIB	IP-FORWARD-MIB
	UDP-MIB	IP-MIB
	CISCO-IMAGE-MIB	IPMROUTE-STD-MIB
	CISCO-STACKWISE-MIB	LISP-MIB
	SMON-MIB	LLDP-EXT-MED-MIB
	SONET-MIB	LLDP-MIB
	TCP-MIB	MAU-MIB
	CISCO-IPSEC-FLOW-MONITOR-MIB	MPLS-L3VPN-STD-MIB
	CISCO-IPSEC-MIB	MPLS-LDP-GENERIC-STD-MIB
	CISCO-IPSEC-PROVISIONING-MIB	MPLS-LDP-MIB
	CISCO-IPSLA-AUTOMEASURE-MIB	MPLS-LSR-STD-MIB
	CISCO-IPSLA-ECHO-MIB	MPLS-VPN-MIB
	CISCO-IPSLA-JITTER-MIB	MSDP-MIB
	CISCO-L2-CONTROL-MIB	NHRP-MIB
		NOTIFICATION-LOG-MIB
		NTPv4-MIB
		OLD-CISCO-CHASSIS-MIB
		OLD-CISCO-CPU-MIB
		OLD-CISCO-INTERFACES-MIB
		OLD-CISCO-IP-MIB
		OLD-CISCO-MEMORY-MIB
		OLD-CISCO-SYS-MIB

Description	Cisco Catalyst 9500	Cisco Catalyst 9500 High Performance
		OLD-CISCO-SYSTEM-MIB OLD-CISCO-TCP-MIB OLD-CISCO-TS-MIB OSPF-MIB OSPF-TRAP-MIB OSPFV3-MIB PIM-MIB RFC1213-MIB RMON-MIB RMON2-MIB SNMP-COMMUNITY-MIB SNMP-FRAMEWORK-MIB SNMP-MPD-MIB SNMP-NOTIFICATION-MIB SNMP-PROXY-MIB SNMP-TARGET-MIB SNMP-USM-MIB SNMP-VIEW-BASED-ACM-MIB SNMPv2-MIB TCP-MIB UDP-MIB CISCO-802-TAP-MIB CISCO-TAP2-MIB CISCO-IP-TAP-MIB
<b>Standards</b>	IEEE 802.1s IEEE 802.1w IEEE 802.1x IEEE 802.3ae for 10G SKU IEEE 802.3ae, IEEE 802.3ba on the 40G SKU IEEE 802.1x-Rev IEEE 802.3ad IEEE 802.3x full duplex on 10BASE-T, 100BASE-TX, and 1000BASE-T ports IEEE 802.1D Spanning Tree Protocol IEEE 802.1p Class-of-service (CoS) prioritization IEEE 802.1Q VLAN IEEE 802.3 10BASE-T specification IEEE 802.3u 100BASE-TX specification IEEE 802.3ab 1000BASE-T specification IEEE 802.3z 1000BASE-X specification RMON I and II standards SNMPv1, SNMPv2c, and SNMPv3	

## Safety and compliance

Table 17 lists the safety and compliance information for the Cisco Catalyst 9500 Series

**Table 17.** Safety and compliance information

Description	Specification
<b>Safety certifications</b>	<p>C9500-12Q, C9500-24Q, C9500-40X, C9500-16X</p> <ul style="list-style-type: none"> <li>• UL 60950-1</li> <li>• CAN/CSA-C22.2 No. 60950-1</li> <li>• EN 60950-1</li> <li>• IEC 60950-1</li> <li>• AS/NZS 60950-1</li> <li>• GB4943</li> </ul> <p>C9500-32C, C9500-32QC, C9500-24Y4C, C9500-48Y4C</p> <ul style="list-style-type: none"> <li>• IEC 60950-1 plus Am1, Am2 Am9, Am10, Am11, Am12 and all deviations and differences</li> <li>• AS/NZS 60950.1.2011</li> <li>• CAN/CSA-C22.2 No. 60950-1-07</li> <li>• GB 4943-95</li> <li>• EN 60950-1; 2006 plus Am1, Am 2, Am9, Am10, Am11, Am12 and all deviations and differences</li> <li>• NOM-019-SCFI-1998</li> <li>• UL 60950-1, Second Edition</li> </ul>
<b>EMI and EMC compliance</b>	<p>47 CFR Part 15 Class A            CNS13438: 2006 Class A            EN 300 386 V1.6.1            EN61000-3-2: 2014            EN61000-3-3: 2013            ICES-003 Issue 6: 2016 Class A            KN 32: 2015 Class A            TCVN 7189: 2009 Class A            EN 55032:2012/ AC:2013 Class A            EN 55032:2015 Class A            CISPR 32 Edition 2 Class A            V-2/2015.04 Class A            V-3/2015.04 Class A            CISPR24: 2010 + A1: 2015            EN 300 386 V1.6.1            EN55024: 2010 + A1: 2015            KN35: 2015            TCVN 7317: 2003</p>



## Warranty

### Cisco Enhanced Limited Lifetime Hardware Warranty

The Cisco Catalyst 9500 Series Switches come with an Enhanced Limited Lifetime Warranty (E-LLW) that includes Next-Business-Day (NBD) delivery of replacement hardware where available and 90 days of 8x5 Cisco Technical Assistance Center (TAC) support. Your formal warranty statement, including the warranty applicable to Cisco software, appears in the information packet that accompanies your Cisco product. We encourage you to carefully review the warranty statement shipped with your specific product before use. Cisco reserves the right to refund the purchase price as its exclusive warranty remedy. For further information about warranty terms, visit <https://www.cisco.com/go/warranty>.

Table 18 provides information about the E-LLW

**Table 18.** E-LLW details

	Cisco E-LLW
<b>Devices covered</b>	Applies to Cisco Catalyst 9500 Series Switches.
<b>Warranty duration</b>	As long as the original customer owns the product.
<b>End-of-life policy</b>	In the event of discontinuance of product manufacture, Cisco warranty support is limited to 5 years from the announcement of discontinuance.
<b>Hardware replacement</b>	Cisco or its service center will use commercially reasonable efforts to ship a replacement for NBD delivery, where available. Otherwise, a replacement will be shipped within 10 working days after receipt of the Return Materials Authorization (RMA) request. Actual delivery times might vary depending on customer location.
<b>Effective date</b>	Hardware warranty commences from the date of shipment to customer (and in case of resale by a Cisco reseller, not more than 90 days after original shipment by Cisco).
<b>TAC support</b>	Cisco will provide during business hours, 8 hours per day, 5 days per week, basic configuration, diagnosis, and troubleshooting of device-level problems for up to a 90-day period from the date of shipment of the originally purchased Cisco Catalyst 9500 Series product. This support does not include solution or network-level support beyond the specific device under consideration.
<b>Cisco.com access</b>	Warranty allows guest access only to Cisco.com.

### Cisco environmental sustainability

Information about Cisco’s environmental sustainability policies and initiatives for our products, solutions, operations, and extended operations or supply chain is provided in the “Environment Sustainability” section of Cisco’s [Corporate Social Responsibility](#) (CSR) Report.

Reference links to information about key environmental sustainability topics (mentioned in the “Environment Sustainability” section of the CSR Report) are provided in the following table:

Sustainability topic	Reference
Information on product material content laws and regulations	<a href="#">Materials</a>
Information on electronic waste laws and regulations, including products, batteries, and packaging	<a href="#">WEEE compliance</a>

Cisco makes the packaging data available for informational purposes only. It may not reflect the most current legal developments, and Cisco does not represent, warrant, or guarantee that it is complete, accurate, or up to date. This information is subject to change without notice.

## Cisco and partner services

Cisco and partner services offer various personalized services to enable IoT, cloud and secure networks. You can purchase advanced services designed to meet your business needs and help you maintain high-quality network performance while controlling operational costs. Please refer to Table 19 for more information on Cisco's Technical Services available for the Cisco Catalyst 9500 Series Switches.

**Table 19.** Technical Services

Cisco Technical Services
<p><b>Cisco Smart Net Total Care® Service</b></p> <ul style="list-style-type: none"> <li>• Around-the-clock, global access to the Cisco TAC</li> <li>• Unrestricted access to the extensive Cisco.com knowledge base and tools</li> <li>• NBD, 8x5x4, 24x7x4, and 24x7x2 advance hardware replacement and onsite parts replacement and installation available</li> <li>• Ongoing operating system software updates within the licensed feature set<sup>1</sup></li> <li>• Proactive diagnostics and real-time alerts on Smart Call Home-enabled devices</li> </ul>
<p><b>Cisco Smart Foundation Service</b></p> <ul style="list-style-type: none"> <li>• NBD advance hardware replacement as available</li> <li>• Access during business hours to Small and Medium-sized Business (SMB) TAC (access levels vary by region)</li> <li>• Access to Cisco.com SMB knowledge base</li> <li>• Online technical resources through Smart Foundation portal</li> <li>• Operating system software bug fixes and patches</li> </ul>
<p><b>Cisco SP Base Service</b></p> <ul style="list-style-type: none"> <li>• Around-the-clock, global access to the Cisco TAC</li> <li>• Registered access to Cisco.com</li> <li>• NBD, 8x5x4, 24x7x4, and 24x7x2 advance hardware replacement; return to factory option available<sup>2</sup></li> <li>• Ongoing operating system software updates<sup>1</sup></li> </ul>
<p><b>Cisco Focused Technical Support Services</b></p> <ul style="list-style-type: none"> <li>• Three levels of premium, high-touch services are available: <ul style="list-style-type: none"> <li>◦ Cisco High-Touch Operations Management Service</li> <li>◦ Cisco High-Touch Technical Support Service</li> <li>◦ Cisco High-Touch Engineering Service</li> </ul> </li> <li>• Valid Cisco Smart Net Total Care or SP Base contracts are required on all network equipment</li> </ul>

<sup>1</sup> Cisco operating system updates include the following: maintenance releases, minor updates, and major updates within the licensed feature set.

<sup>2</sup> Advance hardware replacement is available in various service-level combinations. For example, 8x5xNBD indicates that shipment will be initiated during the standard 8-hour business day, 5 days a week (the generally accepted business days within the relevant region), with NBD delivery. Where NBD is not available, same-day shipping is provided. Restrictions apply. For details, review the appropriate service descriptions.

[Learn more about available services.](#)

## Software policy for Cisco Catalyst 9500 Series Switches

### **Cisco DNA Software for Access Switching is available for the Cisco Catalyst 9500.**

Cisco DNA Software for Access Switching offers comprehensive solutions for the enterprise campus and branch offices. Cisco DNA for Access Switching introduces a simpler and more economical way to deploy access, aggregation, and core switches across enterprise campus and branch locations.

The Cisco DNA Subscription for Switching offer delivers an unbound network on an open and extensible architecture to help you navigate the digital journey. This subscription offer simplifies the buying process and includes lower initiation costs and flexible terms. It includes: Cisco DNA Premier with full Cisco Digital Network Architecture (Cisco DNA) capabilities and Cisco Software-Defined Access (SD-Access).

For ordering information for Cisco DNA Software for the Cisco Catalyst 9500 Series, go to <https://www.cisco.com/c/en/us/products/software/one-access/switching-part-numbers.html>.

### **Software policy for network stack components**

Customers with the Network Essential Stack and Network Advantage Stack software feature sets will be provided with maintenance updates and bug fixes. These are designed to maintain compliance of the software with published specifications, release notes, and industry standards as long as the original end user continues to own or use the product or for up to one year from the end-of-sale date for the product, whichever occurs earlier.

### **Cisco Embedded Support for Cisco DNA term components**

Cisco Embedded Support delivers the right support for Cisco software products and suites. It will keep your business applications performing as expected and protect your investment. Cisco Embedded Support for the Cisco DNA Essentials and Cisco DNA Advantage term components is included as part of the switch value. Embedded Support provides access to TAC support, major software updates, maintenance and minor software releases, and the Cisco Software Support site, for increased productivity with anytime access.

**Table 20.** Cisco DNA Term Support on the 9500 Series

<b>Model</b>	<b>C9500-DNA-A-3Y/5Y/7Y or C9500-DNA-E-3Y/5Y/7Y</b>	<b>C9500-DNA-L-A-3Y/5Y/7Y or C9500-DNA-L-E-3Y/5Y/7Y</b>
<b>C9500-32C</b>	Yes	No
<b>C9500-32QC</b>	Yes	No
<b>C9500-48Y4C</b>	Yes	No
<b>C9500-24Y4C</b>	No	Yes
<b>C9500-24Q</b>	Yes	No
<b>C9500-12Q</b>	No	Yes
<b>C9500-40X</b>	Yes	No
<b>C9500-16X</b>	No	Yes

## Ordering information

To place an order, visit the Cisco Ordering home page at:

[https://www.cisco.com/en/US/ordering/or13/or8/order\\_customer\\_help\\_how\\_to\\_order\\_listing.html](https://www.cisco.com/en/US/ordering/or13/or8/order_customer_help_how_to_order_listing.html).

Table 21 lists ordering information for the Cisco Catalyst 9500 Series

**Table 21.** Ordering information

Product number	Product description
<b>C9500-32C-E</b>	Cisco Catalyst 9500 Series high performance 32-port 100G switch, NW Ess. License
<b>C9500-32C-A</b>	Cisco Catalyst 9500 Series high performance 32-port 100G switch, NW Adv. License
<b>C9500-32QC-E</b>	Cisco Catalyst 9500 Series high performance 32-port 40G switch, NW Ess. License
<b>C9500-32QC-A</b>	Cisco Catalyst 9500 Series high performance 32-port 40G switch, NW Adv. License
<b>C9500-48Y4C-E</b>	Cisco Catalyst 9500 Series high performance 48-port 25G switch, NW Ess. License
<b>C9500-48Y4C-A</b>	Cisco Catalyst 9500 Series high performance 48-port 25G switch, NW Adv. License
<b>C9500-24Y4C-E</b>	Cisco Catalyst 9500 Series high performance 24-port 1/10/25G switch, NW Ess. License
<b>C9500-24Y4C-A</b>	Cisco Catalyst 9500 Series high performance 24-port 1/10/25G switch, NW Adv. License
<b>C9500-24Q-E</b>	Cisco Catalyst 9500 24-port 40G switch, NW Ess. License
<b>C9500-24Q-A</b>	Cisco Catalyst 9500 24-port 40G switch, NW Adv. License
<b>C9500-12Q-E</b>	Cisco Catalyst 9500 12-port 40G switch, NW Ess. License
<b>C9500-12Q-A</b>	Cisco Catalyst 9500 12-port 40G switch, NW Adv. License
<b>C9500-40X-E</b>	Cisco Catalyst 9500 40-port 10G switch, NW Ess. License
<b>C9500-40X-A</b>	Cisco Catalyst 9500 40-port 10G switch, NW Adv. License
<b>C9500-16X-E</b>	Cisco Catalyst 9500 16-port 10G switch, NW Ess. License
<b>C9500-16X-A</b>	Cisco Catalyst 9500 16-port 10G switch, NW Adv. License
<b>C9500-NM-2Q</b>	Cisco Catalyst 9500 2 x 40GE Network Module
<b>C9500-NM-8X</b>	Cisco Catalyst 9500 8 x 10GE Network Module
<b>C9500-NM-2Q=</b>	Cisco Catalyst 9500 2 x 40GE Network Module Spare
<b>C9500-NM-8X=</b>	Cisco Catalyst 9500 8 x 10GE Network Module Spare
<b>C9500-48X-A</b>	Cisco Catalyst 9500 40-port 10G switch, 8 x 10GE Network Module, NW Adv. License
<b>C9500-48X-E</b>	Cisco Catalyst 9500 40-port 10G switch, 8 x 10GE Network Module, NW Ess. License
<b>C9500-24X-A</b>	Cisco Catalyst 9500 16-port 10G switch, 8 x 10GE Network Module, NW Adv. License

Product number	Product description
<b>C9500-24X-E</b>	Cisco Catalyst 9500 16-port 10G switch, 8 x 10GE Network Module, NW Ess. License
<b>C9500-16X-2Q-A</b>	Cisco Catalyst 9500 16-port 10G switch, 2 x 40GE Network Module, NW Adv. License
<b>C9500-16X-2Q-E</b>	Cisco Catalyst 9500 16-port 10G switch, 2 x 40GE Network Module, NW Ess. License
<b>C9500-40X-2Q-A</b>	Cisco Catalyst 9500 40-port 10G switch, 2 x 40GE Network Module, NW Adv. License
<b>C9500-40X-2Q-E</b>	Cisco Catalyst 9500 40-port 10G switch, 2 x 40GE Network Module, NW Ess. License
<b>Cisco DNA License Upgrade</b>	Upgrade from Essentials to Advantage
<b>C9500-LIC=</b>	Electronic SW License for C9500 Switches
<b>Cisco DNA Term Licenses</b>	
<b>C9500-DNA-P*</b>	C9500 C1 Advantage Term, High-port density: Includes Term Licenses for Cisco DNA Advantage, 25 ISE Base & 25 ISE Plus Endpoints, 25 Stealthwatch Flows (including Virtual Flow Collector & Management Console). Requires separate purchase of ISE appliance/ISE VM and Cisco DNA Center appliance
<b>C9500-DNA-P-3Y</b>	C9500 C1 Advantage, High-port density, 3Y Term - DNA, 25 ISE PLS and ISE BASE, 25 SWATCH
<b>C9500-DNA-P-5Y</b>	C9500 Cisco DNA Premier, High-port density, 5Y Term - DNA, 25 ISE PLS and ISE BASE, 25 SWATCH
<b>C9500-DNA-P-7Y</b>	C9500 Cisco DNA Premier, High-port density, 7Y Term - DNA, 25 ISE PLS and ISE BASE, 25 SWATCH
<b>C9500-DNA-L-P*</b>	C9500 Cisco DNA Premier Term, Low-port density: Includes Term Licenses for Cisco DNA Advantage, 25 ISE Base & 25 ISE Plus Endpoints, 25 Stealthwatch Flows (including Virtual Flow Collector & Management Console). Requires separate purchase of ISE appliance/ISE VM and Cisco DNA Center appliance
<b>C9500-DNA-L-P-3Y</b>	C9500 Cisco DNA Premier, Low-port density, 3Y Term - DNA, 25 ISE PLS and ISE BASE, 25 SWATCH
<b>C9500-DNA-L-P-5Y</b>	C9500 Cisco DNA Premier, Low-port density, 5Y Term - DNA, 25 ISE PLS and ISE BASE, 25 SWATCH
<b>C9500-DNA-L-P-7Y</b>	C9500 Cisco DNA Premier, Low-port density, 7Y Term - DNA, 25 ISE PLS and ISE BASE, 25 SWATCH
<b>C9500-DNA-P-L*</b>	C9500 Cisco DNA Premier Add-On Term: Includes Term Licenses for 25 ISE Base & 25 ISE Plus Endpoints, 25 Stealthwatch Flows (including Virtual Flow Collector & Management Console). Requires separate purchase of ISE appliance/ISE VM and Cisco DNA Center appliance
<b>C9500-DNA-P-AA</b>	C9500 Cisco DNA Premier Add-On 3Y Term - 25 ISE PLS and ISE BASE, 25 SWATCH
<b>C9500-DNA-P-AA</b>	C9500 Cisco DNA Premier Add-On 5Y Term - 25 ISE PLS and ISE BASE, 25 SWATCH
<b>C9500-DNA-P-AA</b>	C9500 Cisco DNA Premier Add-On 7Y Term - 25 ISE PLS and ISE BASE, 25 SWATCH
<b>C9500-DNA-E-3Y</b>	Catalyst 9500 NW & Cisco DNA Essentials. license (3Y) for 24Q, 40X, 32C, 32QC, 48Y4C SKU

Product number	Product description
<b>C9500-DNA-E-5Y</b>	Catalyst 9500 NW & Cisco DNA Essentials. license (5Y) for 24Q, 40X, 32C, 32QC, 48Y4C SKU
<b>C9500-DNA-E-7Y</b>	Catalyst 9500 NW & Cisco DNA Essentials. license (7Y) for 24Q, 40X, 32C, 32QC, 48Y4C SKU
<b>C9500-DNA-A-3Y</b>	Catalyst 9500 NW & Cisco DNA Advantage license (3Y) for 24Q, 40X, 32C, 32QC, 48Y4C SKU
<b>C9500-DNA-A-5Y</b>	Catalyst 9500 NW & Cisco DNA Advantage license (5Y) for 24Q, 40X, 32C, 32QC, 48Y4C SKU
<b>C9500-DNA-A-7Y</b>	Catalyst 9500 NW & Cisco DNA Advantage license (7Y)
<b>C9500-DNA-L-E-3Y</b>	Catalyst 9500 NW & Cisco DNA Essentials. low port density license (3Y) for 12Q, 16X, 24Y4C SKU
<b>C9500-DNA-L-E-5Y</b>	Catalyst 9500 NW & Cisco DNA Essentials. low port density license (5Y) for 12Q, 16X, 24Y4C SKU
<b>C9500-DNA-L-E-7Y</b>	Catalyst 9500 NW & Cisco DNA Essentials. low port density license (7Y) for 12Q, 16X, 24Y4C SKU
<b>C9500-DNA-L-A-3Y</b>	Catalyst 9500 NW & Cisco DNA Advantage low port density license (3Y) for 12Q, 16X, 24Y4C SKU
<b>C9500-DNA-L-A-5Y</b>	Catalyst 9500 NW & Cisco DNA Advantage low port density license (5Y) for 12Q, 16X, 24Y4C SKU
<b>C9500-DNA-L-A-7Y</b>	Catalyst 9500 NW & Cisco DNA Advantage low port density license (7Y) for 12Q, 16X, 24Y4C SKU
<b>Power supplies, cables, and fan for the Cisco Catalyst 9500 Series</b>	
<b>C9K-PWR-1600WAC-R</b>	1600W AC Power Supply
<b>C9K-PWR-650WAC-R</b>	650W AC Power Supply
<b>C9K-PWR-1600WDC-R</b>	1600W DC Power Supply
<b>C9K-PWR-930WDC-R</b>	930W DC Power Supply
<b>C9K-PWR-1600WACR/2</b>	1600W AC Power Supply, Redundant
<b>C9K-PWR-650WAC-R/2</b>	650W AC Power Supply, Redundant
<b>C9K-PWR-1600WDCR/2</b>	1600W DC Power Supply, Redundant
<b>C9K-PWR-930WDC-R/2</b>	930W DC Power Supply, Redundant
<b>C9K-PWR-C4-BLANK</b>	Catalyst 9500 power supply blank cover
<b>C9K-PWR-C5-BLANK</b>	Catalyst 9500 power supply blank cover
<b>C9K-T1-FANTRAY</b>	Catalyst 9500 fan tray
<b>FAN-T4-R</b>	Catalyst 9500 Type 4 front to back cooling Fan
<b>PWR-C4-950WAC-R</b>	950W AC Config 4 Power Supply front to back cooling
<b>PWR-C4-950WAC-R/2</b>	950W AC Config 4 Power Supply front to back cooling, Redundant

Product number	Product description
<b>PWR-C4-BLANK</b>	Catalyst 9500 power supply blank cover
<b>CAB-C15-CBN-JP</b>	Japan Cabinet Jumper Power Cord, 250 VAC 12A, C14-C15
<b>CAB-TA-250V-JP</b>	Japan 250V AC Type A Power Cable
<b>CAB-TA-AP</b>	Australia AC Type A Power Cable
<b>CAB-TA-AR</b>	Argentina AC Type A Power Cable
<b>CAB-TA-DN</b>	Denmark AC Type A Power Cable
<b>CAB-TA-EU</b>	Europe AC Type A Power Cable
<b>CAB-TA-IN</b>	India AC Type A Power Cable
<b>CAB-TA-IS</b>	Israel AC Type A Power Cable
<b>CAB-TA-IT</b>	Italy AC Type A Power Cable
<b>CAB-TA-SW</b>	Switzerland AC Type A Power Cable
<b>CAB-TA-UK</b>	United Kingdom AC Type A Power Cable
<b>CAB-TA-NA</b>	North America AC Type A Power Cable
<b>CAB-C15-CBN</b>	Cabinet Jumper Power Cord, 250 VAC 13A, C14-C15 Connectors
<b>CAB-TA-JP</b>	Japan AC Type A Power Cable
<b>Spare accessory and rack mount kits for the Cisco Catalyst 9500 Series</b>	
<b>C9500-ACCKITH-19I=</b>	Accessory Kit for Cisco Catalyst 9500 Series - High-End - 19" rack mount
<b>C9500-ACCKITH-23I=</b>	Accessory Kit for Cisco Catalyst 9500 Series - High-End - 23" rack mount
<b>C9500-4PTH-KIT=</b>	Extension rails and brackets for four-point mounting for Cisco Catalyst 9500 Series - High-End
<b>C9500-ACC-KIT-19I=</b>	Accessory Kit for Cisco Catalyst 9500 Series - 19" rack mount
<b>C9500-ACC-KIT-23I=</b>	Accessory Kit for Cisco Catalyst 9500 Series - 23" rack mount
<b>C9500-4PT-KIT=</b>	Extension rails and brackets for four-point mounting for Cisco Catalyst 9500 Series

\* Cisco DNA Premier midcycle refresh SKUs can be found under C1-CAT-ADD-T.

For ordering information for Cisco DNA Software for the Cisco Catalyst 9500 Series Switches, go to <https://www.cisco.com/c/en/us/products/software/one-access/switching-part-numbers.html>.

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## Optics support

The Cisco Catalyst 9500 Series supports a wide range of optics. Because the list of supported optics is updated on a regular basis, please consult the tables available here for the latest compatibility information: <https://www.cisco.com/c/en/us/support/interfaces-modules/transceiver-modules/products-device-support-tables-list.html>.

## Cisco Capital

### Flexible payment solutions to help you achieve your objectives

Cisco Capital<sup>®</sup> makes it easier to get the right technology to achieve your objectives, enable business transformation and help you stay competitive. We can help you reduce the total cost of ownership, conserve capital, and accelerate growth. In more than 100 countries, our flexible payment solutions can help you acquire hardware, software, services and complementary third-party equipment in easy, predictable payments. [Learn more](#).



## Document history

New or revised topic	Described In	Date
Added NEBS Certification details, 16.11.1 features, VLAN ID correction, SDM template corrections, SVL	<a href="#">Page 13</a> , <a href="#">14</a> , <a href="#">15</a> , <a href="#">22</a> , <a href="#">23</a> , <a href="#">24</a>	April 16, 2019
Cisco Catalyst 9500 Series spec change	Updated <a href="#">Page 3</a>	January 11 <sup>th</sup> 2019
Product highlights changes (switching capacity and ports spec changes)	Updated <a href="#">Page 4</a>	January 11 <sup>th</sup> 2019
Cisco Catalyst 9500 Series configurations and port density spec changes	Updated <a href="#">Page 7</a>	January 11 <sup>th</sup> 2019
Performance spec changes	Updated <a href="#">Page 13</a>	January 11 <sup>th</sup> 2019
Text changes to “Important Note”	Updated <a href="#">Page 14</a>	January 11 <sup>th</sup> 2019
Text changes to “Cisco StackWise Virtual”	Updated <a href="#">Page 16</a>	January 11 <sup>th</sup> 2019
Text changes to “Trustworthy systems” and “Cisco StackWise Virtual”	Updated <a href="#">Page 18</a>	January 11 <sup>th</sup> 2019
Added text for Layer 3 Subinterface and BGP EVPN with VXLAN	Updated <a href="#">Page 20</a>	January 11 <sup>th</sup> 2019
Deleted text for “High-performance IP routing” and spec edits to “Minimum software requirements”	Updated <a href="#">Page 22</a>	January 11 <sup>th</sup> 2019
Text changes to “Licensing” and spec edits to “Network Essentials and Advantage Package Features”	Updated <a href="#">Page 23</a>	January 11 <sup>th</sup> 2019
Text changes to “Cisco DNA Essentials and Advantage Package Features”	Updated <a href="#">Page 24</a>	January 11 <sup>th</sup> 2019
Added product numbers for “Cisco Catalyst 9500 Series”	Updated <a href="#">Page 33</a>	January 11 <sup>th</sup> 2019
Deleted product numbers for “Cisco Catalyst 9500 Series”	Updated <a href="#">Page 34</a>	January 11 <sup>th</sup> 2019
Product highlights changes (switching capacity and ports spec changes)	Updated <a href="#">Page 4</a>	January 11 <sup>th</sup> 2019
Updates to Table 1	Updated <a href="#">Table 1</a>	August 15 <sup>th</sup> 2018
Added clearer description of SKUs, Updated date for Tables 1, 10, 11	Updated SKU descriptions, <a href="#">Table 11 data</a> , <a href="#">Table 10 data</a> , <a href="#">Table 1 Footnotes</a>	July 3 <sup>rd</sup> 2018
Added clearer descriptions of host routes and scale adjacency in hardware	Updated <a href="#">Table 10 Footnotes</a>	June 1 <sup>st</sup> 2018

New or revised topic	Described In	Date
<p>Added Catalyst 9500 high density platforms and updated associated speeds and densities, e.g. Up to 6.4-Tbps switching capacity with up to 2 Bpps of forwarding performance from “3.2 Tbps/1 Bpps” a. 32 port 100G, b. 32 port 40G, c. 48 port 25G. Added Catalyst 9500 mid density platform a. 24 port 25G, b. 16 port 1/10G. Added new optical interfaces - QSFP28, SFP28. Added new power supply options - 650W, 1600W. Added RESCONF support. StackWise Virtual extended to all Catalyst 9500 platforms.</p>	<p>Updated <a href="#">Product Overview</a></p>	<p>Mar 31<sup>st</sup> 2018</p>
<p>AVB support noted for certain platforms. Corrected references to Catalyst 9000 switches, rather than Catalyst 9000 Series switches. Corrected references to Cisco IOS XE, rather than IOS-XE.</p>	<p>Updated <a href="#">Audio Video Bridging</a></p>	<p>Dec 15<sup>th</sup> 2017</p>

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# Cisco Catalyst 9300 Series Switches

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## Built for security, IoT, mobility, and cloud

The Cisco® Catalyst® 9300 Series switches are Cisco's lead stackable enterprise switching platform built for security, IoT, mobility, and cloud. They are the next generation of the industry's most widely deployed switching platform. Catalyst 9300 Series switches form the foundational building block for Software-Defined Access (SD-Access), Cisco's lead enterprise architecture. At up to 480 Gbps, they are the industry's highest-density stacking bandwidth solution with the most flexible uplink architecture. The Catalyst 9300 Series is the first optimized platform for high-density Wi-Fi 6 and 802.11ac Wave2. It sets new maximums for network scale. These switches are also ready for the future, with an x86 CPU architecture and more memory, enabling them to host containers and run third-party applications and scripts natively within the switch.

The Catalyst 9300 Series is designed for Cisco StackWise® technology, providing flexible deployment with support for nonstop forwarding with Stateful Switchover (NSF/SSO), for the most resilient architecture in a stackable (sub-50-ms) solution. The highly resilient and efficient power architecture features Cisco StackPower®, which delivers high-density Cisco Universal Power over Ethernet (Cisco UPOE®) and Power over Ethernet Plus (PoE+) ports. The switches are based on the Cisco Unified Access™ Data Plane 2.0 (UADP) 2.0 architecture which not only protects your investment but also allows a larger scale and higher throughput. A modern operating system, Cisco IOS® XE with programmability offers advanced security capabilities and Internet of Things (IoT) convergence.

### The Foundation of Software-Defined access

Advanced persistent security threats. The exponential growth of Internet of Things (IoT) devices. Mobility everywhere. Cloud adoption. All of these require a network fabric that integrates advanced hardware and software innovations to automate, secure, and simplify customer networks. The goal of this network fabric is to enable customer revenue growth by accelerating the rollout of business services.

The Cisco Digital Network Architecture (Cisco DNA) with Software-Defined Access (SD-Access) is the network fabric that powers business. It is an open and extensible, software-driven architecture that accelerates and simplifies your enterprise network operations. The programmable architecture frees your IT staff from time-consuming, repetitive network configuration tasks so they can focus instead on innovation that positively transforms your business. SD-Access enables policy-based automation from edge to cloud with foundational capabilities. These include:

- Simplified device deployment
- Unified management of wired and wireless networks
- Network virtualization and segmentation
- Group-based policies
- Context-based analytics

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## Cisco DNA software

Cisco DNA Software offers a valuable and flexible way to buy software for the access, WAN, and data center domains. At each stage in the product lifecycle, Cisco DNA Software helps make buying, managing, and upgrading your network and infrastructure software easier. Cisco DNA Software provides:

- Flexible licensing models to smoothly distribute customers' software spending over time
- Investment protection for software purchases through software services-enabled license portability
- Access to updates, upgrades, and new technology from Cisco through Cisco® Software Support Services (SWSS)
- Lower cost of entry with the new Cisco DNA Subscription for Switching model

Cisco DNA lets you manage your entire switching structure as a single, converged component. With one management system and one policy for wired and wireless networks, it offers an efficient way to provide more secure access.

## Product overview: Features

### Product highlights

- Highest wireless scale for Wi-Fi 6 and 802.11ac Wave 2 access points supported on a single switch with select models
- Cisco UADP 2.0 Application-Specific Integrated Circuit (ASIC) with programmable pipeline and microengine capabilities, along with template-based, configurable allocation of Layer 2 and Layer 3 forwarding, Access Control Lists (ACLs), and Quality of Service (QoS) entries
- x86 CPU complex with 8-GB memory, and 16 GB of flash and external USB 3.0 SSD pluggable storage slot (delivering 120GB of storage with an option SSD drive) to host containers
- USB 2.0 slot to load system images and set configurations
- Up to 480 Gbps of local stackable switching bandwidth
- Deeper buffer and higher scale model options for rich multi-media content delivery applications
- Flexible and dense uplink offerings with 1G, Multigigabit, 10G, 25G, and 40G in the form of fixed or modular uplinks
- Easy transition from 10G to 25G with dual-rate optics
- Flexible downlink options with 1G Copper and Fiber as well as Multigigabit links
- Leading PoE capabilities with up to 384 ports of PoE per stack, 60W Cisco UPOE, and PoE+
- Intelligent Power Management with Cisco StackPower technology, providing power stacking among members for power redundancy
- Line-rate, hardware-based Flexible NetFlow (FNF), delivering flow collection of up to 64,000 flows
- IPv6 support in hardware, providing wire-rate forwarding for IPv6 networks
- Dual-stack support for IPv4/IPv6 and dynamic hardware forwarding table allocations, for ease of IPv4-to-IPv6 migration
- IEEE 802.1ba AV Bridging (AVB) built in to provide a better audio and video experience through improved time synchronization and QoS

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- Precision Time Protocol (PTP; IEEE 1588v2) provides accurate clock synchronization with sub-microsecond accuracy making it suitable for distribution and synchronization of time and frequency over network
  - Cisco IOS XE, a modern operating system for the enterprise with support for model-driven programmability including NETCONF, RESTCONF, YANG, on-box Python scripting, streaming telemetry, container-based application hosting, and patching for critical bug fixes. The OS also has built-in defenses to protect against runtime attacks
  - **SD-Access:** Cisco Catalyst 9300 Series switches form the foundational building block for SD-Access, Cisco's lead enterprise architecture:
    - Policy-based automation from edge to cloud
    - Simplified segmentation and micro-segmentation, with predictable performance and scalability
    - Automation through Cisco DNA Center
    - Policy handled through the Cisco Identity Services Engine (ISE)
    - Network assurance provided through the Cisco DNA Center
    - Faster launch of new business services and significantly improved issue resolution time
  - **SD-Access Embedded Wireless:** The Cisco Catalyst 9800 embedded Wireless Controller Software package can be installed on Cisco Catalyst 9300 Series switches to enable wireless controller functionality for distributed branches and small campuses. Once installed, the Catalyst 9800 embedded Wireless Controller running on a Catalyst 9300 Series switch can support up to 200 APs and 4000 Clients. A maximum two wireless controllers can be enabled per site on two different Catalyst 9300 Series switches which will increase to scale up to 200 APs and 4000 Wireless Clients. The Catalyst 9800 embedded Wireless Controller Software package will enable wireless functionality only for SD-Access deployments with two supported topologies:
    - The Catalyst 9800 embedded Wireless Controller Software package can be enabled on Catalyst 9300 Series switches functioning as Co-Located Border and Control Plane
    - C9800 Wireless Software Package can be enabled on Catalyst 9300 Series switches functioning as Fabric in a Box
  - Plug and Play (PnP) enabled: A simple, secure, unified, and integrated offering to ease new branch or campus device rollouts or updates to an existing network
  - Advanced security
    - Encrypted Traffic Analytics (ETA): You benefit from the power of machine learning to identify and take actions toward threats or anomalies in your network, including malware detection in encrypted traffic (without decryption) and distributed anomaly detection
    - Support for AES-256 with the powerful MACsec 256-bit encryption algorithm available on all models
    - Trustworthy solutions: Hardware anchored Secure Boot and Secure Unique Device Identification (SUDI) support for Plug and Play, to verify the identity of the hardware and software

## Platform details

### Switch models and configurations

Models	FRU Power Supply	FRU Fans	Modular Uplinks	Stacking Bandwidth Support	Cisco StackPower	Catalyst 9800 Embedded WLC	SD-Access Support
Modular uplink models (C9300 SKUs)	✓	✓	✓	480 Gbps	✓	Yes (200 APs)	Yes (256 Virtual Networks)
Fixed uplink Models (C9300L SKUs)	✓	✓	✗	320 Gbps	✗	Yes (50 APs)	Yes (64 Virtual Networks)

The Cisco Catalyst 9300 Series is made up of eleven modular uplink switch models and ten fixed uplink switch models.



Figure 1.  
Cisco Catalyst 9300 Series switches

Table 1 lists port scale and power details for the Cisco Catalyst 9300 Series models.

Table 1. Cisco Catalyst 9300 Series switch configurations

Model	Total 10/100/1000, Multigigabit copper or SFP Fiber	Uplink Configuration	Default AC power supply	Available PoE power
<b>Modular uplink models</b>				
C9300-24T	24 Data	Modular Uplinks	350W AC	N/A
C9300-48T	48 Data	Modular Uplinks	350W AC	N/A
C9300-24P	24 POE+	Modular Uplinks	715W AC	445W
C9300-48P	48 POE+	Modular Uplinks	715W AC	437W
C9300-24U	24 Cisco UPOE	Modular Uplinks	1100W AC	830W
C9300-48U	48 Cisco UPOE	Modular Uplinks	1100W AC	822W



Model	Total 10/100/1000, Multigigabit copper or SFP Fiber	Uplink Configuration	Default AC power supply	Available PoE power
C9300-24UX	24 Multigigabit Cisco UPOE (100M, 1G, 2.5G, 5G, or 10 Gbps)	Modular Uplinks	1100W AC	560W
C9300-48UXM	36x 100 Mbps, 1G, 2.5G + 12x Multigigabit (100M, 1G, 2.5G, 5G, or 10 Gbps)	Modular Uplinks	1100W AC	490W
C9300-48UN	48x 5 Gbps UPOE ports (100M, 1G, 2.5G, 5G)	Modular Uplinks	1100W AC	645W
C9300-24UB	24 Cisco UPOE	Modular Uplinks	1100W AC	830W
C9300-24UXB	24 Multigigabit Cisco UPOE (100M, 1G, 2.5G, 5G, or 10 Gbps)	Modular Uplinks	1100W AC	560W
C9300-48UB	48 Cisco UPOE	Modular Uplinks	1100W AC	822W
C9300-24S	24x 1G SFP	Modular Uplinks	715W AC	N/A
C9300-48S	48x 1G SFP	Modular Uplinks	715W AC	N/A
<b>Fixed uplink models</b>				
C9300L-24T-4G	24 Data	4x 1G fixed uplinks	350W	N/A
C9300L-24T-4X	24 Data	4x 10G fixed uplinks	350W	N/A
C9300L-48T-4G	48 Data	4x 1G fixed uplinks	350W	N/A
C9300L-48T-4X	48 Data	4x 10G fixed uplinks	350W	N/A
C9300L-24P-4G	24 PoE+	4x 1G fixed uplinks	715W*	505W
C9300L-24P-4X	24 PoE+	4x 10G fixed uplinks	715W*	505W
C9300L-48P-4G	48 PoE+	4x 1G fixed uplinks	715W*	505W
C9300L-48P-4X	48 PoE+	4x 10G fixed uplinks	715W*	505W

\* Upgrade option for 1100W PSU is available

Cisco Catalyst 9300 Series switches (C9300 SKUs) support optional network modules for uplink ports (Figure 2). These field-replaceable network modules with 25G and 40G speeds in the Cisco Catalyst 9300 Series enable greater architectural flexibility and infrastructure investment protection by allowing a nondisruptive migration from 10G to 25G and beyond. The default switch configuration does not include the network module. When you purchase the switch, you can choose from the network modules described in Table 2.



**Figure 2.**  
Cisco Catalyst 9300 Series Network Modules

**Table 2.** Network module numbers and descriptions

Network module	Description
C9300-NM-4G	Catalyst 9300 Series 4x 1G Network Module
C9300-NM-4M	Catalyst 9300 Series 4x Multigigabit Network Module
C9300-NM-8X	Catalyst 9300 Series 8x 10G Network Module
C9300-NM-2Q	Catalyst 9300 Series 2x 40G Network Module
C9300-NM-2Y	Catalyst 9300 Series 2x 25G Network Module

Please note: Existing Catalyst 3850 network modules are also supported in Cisco Catalyst 9300 Series switches.

For additional details, please read our FAQs: <https://www.cisco.com/c/dam/en/us/products/collateral/switches/catalyst-9300-series-switches/nb-09-cat-9k-faq-cte-en.pdf>.

## Power supplies

Cisco Catalyst 9300 Series switches support dual redundant power supplies. The switches ship with one power supply by default, and the second power supply can be purchased when the switch is ordered or at a later time. If only one power supply is installed, it should always be in power supply bay #1. The switches also ship with three field-replaceable fans.



**Figure 3.**  
Cisco Catalyst 9300 Series Dual Redundant power supplies

Table 3 lists the different power supplies available in these switches and available PoE power.

Table 3. Power supply models

Model	Default power supply	Available PoE power	With 350W Secondary PS	With 715W Secondary PS	With 1100W Secondary PS
C9300-24T	PWR-C1-350WAC***	n/a	n/a	n/a	n/a
C9300-48T	PWR-C1-350WAC***	n/a	n/a	n/a	n/a
C9300-24P	PWR-C1-715WAC***	445W	720W*	720W*	720W*
C9300-48P	PWR-C1-715WAC***	437W	787W	1152W	1440W*
C9300-24U	PWR-C1-1100WAC	830W	1180W	1440W*	1440W*
C9300-48U	PWR-C1-1100WAC	822W	1172W	1537W	1800W**
C9300-24UX	PWR-C1-1100WAC-P	560W	910W	1275W	1440W*
C9300-48UXM	PWR-C1-1100WAC-P	490W	840W	1205W	1590W
C9300-48UN	PWR-C1-1100WAC-P	645W	995W	1360W	1745W
C9300-24UB	PWR-C1-1100WAC	830W	1180W	1440W*	1440W*
C9300-24UXB	PWR-C1-1100WAC-P	560W	910W	1275W	1440W*
C9300-48UB	PWR-C1-1100WAC	822W	1172W	1537W	1800W**
C9300-24S	PWR-C1-715WAC-P	n/a	n/a	n/a	n/a
C9300-48S	PWR-C1-715WAC-P	n/a	n/a	n/a	n/a
C9300L-24T-4G	PWR-C1-350WAC-P	n/a	n/a	n/a	n/a
C9300L-24T-4X	PWR-C1-350WAC-P	n/a	n/a	n/a	n/a
C9300L-48T-4G	PWR-C1-350WAC-P	n/a	n/a	n/a	n/a
C9300L-48T-4X	PWR-C1-350WAC-P	n/a	n/a	n/a	n/a
C9300L-24P-4G	PWR-C1-715WAC-P	505W	720W*	720W*	720W*
C9300L-24P-4X	PWR-C1-715WAC-P	505W	720W*	720W*	720W*
C9300L-48P-4G	PWR-C1-715WAC-P***	505W	855W	1220W	1440W*
C9300L-48P-4X	PWR-C1-715WAC-P***	505W	855W	1220W	1440W*

\* Limited by port number and port rating (e.g. 24 PoE+ 30W ports = 720W)

\*\* Limited by design

\*\*\* Upgrade options for 715W and 1100W PSU are available

## Stacking

Cisco Catalyst 9300 Series switch models are designed for stacking switches as a single virtual switch, enabling customers to have a single management plane and control plane for up to 448 access ports.



**Figure 4.** Cisco Catalyst 9300 Series modular uplink models stack (C9300 SKUs) and fixed uplink models stack (C9300L SKUs)

Table 4 lists the supported stacking options.

**Table 4.** Supported stacking options

Model	Stacking support	Stacking bandwidth support	Optional Stacking hardware	Number of members	Supported stack members
Modular uplink models (C9300 SKUs)	StackWise® -480	480 Gbps	StackWise Cable	8	Other C9300 SKUs with same license level
Fixed uplink models (C9300L SKUs)	StackWise-320	320 Gbps	C9300L-STACK-KIT	8	Other C9300L SKUs with same license level

Mixed stacking between C9300 and C9300L SKUs are **not supported**. You cannot stack fixed uplink models (C9300L SKUs) with modular uplink models (C9300 SKUs) or other Catalyst switches, e.g. Cisco Catalyst 3850 and 3650 Series. Any combination of C9300 models can form a stack. Separately, any combination of C9300L models can form a stack.

The StackWise cables that are available to configure stacking with Catalyst 9300 Series modular uplink models (C9300 SKUs) come in lengths of 0.5m, 1m and 3m.

The optional StackWise-320 kit for Catalyst 9300 Series fixed uplink models (C9300L SKUs) consists of two stack adapters and a stacking cable. The default stacking cable is 0.5 m, but options of 1m and 3m are also available. Table 5 lists the stacking accessories.

**Table 5.** Stacking accessories

Model	Description
STACK-T1-50CM	Data stack 50 cm (cable option with C9300 SKUs)
STACK-T1-1M	Data stack 1m (cable option with C9300 SKUs)
STACK-T1-3M	Data stack 3m (cable option with C9300 SKUs)
C9300L-STACK-KIT	Stack kit for C9300L SKUs only: Two data stack adapters and one data stack cable

Model	Description
STACK-T3-50CM	Data stack 50cm cable (default cable with C9300L Stack Kit)
STACK-T3-1M	Data stack 1m cable (cable option with C9300L Stack Kit)
STACK T3-3M	Data stack 3m cable (cable option with C9300L Stack Kit)



Figure 5.  
Cisco Catalyst 9300 Series switch stack units

## Fan

Cisco Catalyst 9300 Series switches also come with three field-replaceable fans and support (N+1) redundancy. Table 6 lists the fan module part number.

Table 6. Fan modules

Model	Description
FAN-T2=	Fan module

## Performance and scalability

Performance and scalability metrics for the Cisco Catalyst 9300 Series are provided in Table 7.

Table 7. Performance specifications

Description	Performance – C9300 modular uplink SKUs	Performance – C9300 higher scale, modular uplink SKUs	Performance: C9300L fixed uplink SKUs
Total number of MAC addresses	32,000	64,000	32,000
Total number of IPv4 routes (ARP plus learned routes)	32,000 (24,000 direct routes and 8000 indirect routes)	64,000	32,000 (24,000 direct routes and 8000 indirect routes)
IPv6 routing entries	16,000	32,000	16,000
Multicast routing scale	8,000	16,000	8,000
QoS scale entries	5,120	18,000	5,120

Description	Performance – C9300 modular uplink SKUs	Performance – C9300 higher scale, modular uplink SKUs	Performance: C9300L fixed uplink SKUs
ACL scale entries	5,120	18,000	5,120
Packet buffer per SKU	16 MB buffer for 24- or 48-port Gigabit Ethernet models 32 MB buffer for 24 and 48-port Multigigabit	32 MB buffer for 24- and 48-port Gigabit Ethernet models 64 MB buffer for 24-port Multigigabit model (24UXB)	16 MB buffer for 24 and 48 port Gigabit Ethernet models
FNF entries	64,000 flow on 24- and 48-port Gigabit Ethernet models 128,000 flows on 24-port Multigigabit	128,000 flow on 24- and 48-port Gigabit Ethernet models 256,000 flows on 24-port Multigigabit	64,000 flow on 24- and 48-port Gigabit Ethernet models
DRAM	8 GB	16 MB	8 GB
Flash	16 GB	16 GB	16 GB
VLAN IDs	4094	4094	4094
Total Switched Virtual Interfaces (SVIs)	1000	4094	1000
Jumbo frames	9198 bytes	9198 bytes	9198 bytes
Total routed ports per Catalyst 9300 Series stack	448	448	416

Table 8. Bandwidth specifications

SKU	Switching capacity	Switching capacity with stacking	Forwarding rate	Forwarding rate with stacking
C9300-24T	208 Gbps	688 Gbps	154.76 Mpps	511.90 Mpps
C9300-48T	256 Gbps	736 Gbps	190.47 Mpps	547.62 Mpps
C9300-24P	208 Gbps	688 Gbps	154.76 Mpps	511.90 Mpps
C9300-48P	256 Gbps	736 Gbps	190.47 Mpps	547.62 Mpps
C9300-24U	208 Gbps	688 Gbps	154.76 Mpps	511.90 Mpps
C9300-48U	256 Gbps	736 Gbps	190.48 Mpps	547.62 Mpps
C9300-24UX	640 Gbps	1120 Gbps	476.19 Mpps	833.33 Mpps
C9300-48UXM	580 Gbps	1060 Gbps	431.54 Mpps	788.69 Mpps
C9300-48UN	640 Gbps	1120 Gbps	476.19 Mpps	833.33 Mpps
C9300-24UB	208 Gbps	688 Gbps	154.76 Mpps	511.90 Mpps

SKU	Switching capacity	Switching capacity with stacking	Forwarding rate	Forwarding rate with stacking
C9300-48UB	256 Gbps	736 Gbps	190.48 Mpps	547.62 Mpps
C9300-24UXB	640 Gbps	1120 Gbps	476.19 Mpps	833.33 Mpps
C9300-24S	208 Gbps	688 Gbps	154.76 Mpps	511.90 Mpps
C9300-48S	256 Gbps	736 Gbps	190.47 Mpps	547.62 Mpps
C9300L-24T-4G	56 Gbps	376 Gbps	41.66 Mpps	279.76 Mpps
C9300L-24T-4X	128 Gbps	448 Gbps	95.23 Mpps	333.33 Mpps
C9300L-48T-4G	104 Gbps	424 Gbps	77.38 Mpps	315.48 Mpps
C9300L-48T-4X	176 Gbps	496 Gbps	130.95 Mpps	369.05 Mpps
C9300L-24P-4G	56 Gbps	376 Gbps	41.66 Mpps	279.76 Mpps
C9300L-24P-4X	128 Gbps	448 Gbps	95.23 Mpps	333.33 Mpps
C9300L-48P-4G	104 Gbps	424 Gbps	77.38 Mpps	315.48 Mpps
C9300L-48P-4X	176 Gbps	496 Gbps	130.95 Mpps	369.05 Mpps

All models are at wire-speed nonblocking performance for both IPv4 and IPv6. The forwarding rates in the table above are measured with 64 byte IPv4 packet sizes.

## SD-Access architecture

What if you could give time back to IT? Provide network access in minutes for any user or device to any application – without compromise? SD-Access is the industry’s first policy-based automation from network edge to cloud. Your foundation for your digital network, Cisco SD-Access. Built on the principles of the Cisco DNA, SD-Access provides end-to-end segmentation to keep user, device and application traffic separate without a redesign of the network. It automates user access policy so organizations can make sure the right policies are set 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.

There are 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 insights for fast issue resolution and capacity planning
- Open and programmable interfaces for integration with third-party solutions

For an overview of key use-cases SD-Access addresses, refer to [SD-Access Solution Overview](#).

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## Platform benefits

Cisco IOS XE opens a completely new paradigm in network configuration, operation, and monitoring through network automation. Cisco's automation solution is open, standards-based, and extensible across the entire lifecycle of a network device. The various automation mechanisms are outlined below.

- **Automated device provisioning** is the ability to automate the process of upgrading software images and installing configuration files on Cisco Catalyst switches when they are being deployed in the network for the first time. Cisco provides both turnkey solutions such as Plug and Play and off-the-shelf tools such as Zero-Touch Provisioning (ZTP) and Preboot Execution Environment (PXE) that enable an effortless and automated deployment.
- **API-driven configuration** is available with modern network switches such as the Cisco Catalyst 9300 Series. It supports a wide range of automation features and provides robust open APIs over NETCONF and RESTCONF and GNMI using YANG data models for external tools, both off-the-shelf and custom built, to automatically provision network resources.
- **Granular visibility** enables model-driven telemetry to stream data from a switch to a destination. The data to be streamed is identified through subscription to a data set in a YANG model. The subscribed data set is streamed to the destination at specified intervals. Additionally, Cisco IOS XE enables the push model. It provides near-real-time monitoring of the network, leading to quick detection and rectification of failures.
- **Seamless software upgrades and patching** supports OS resilience. Cisco IOS XE supports patching, which provides fixes for critical bugs and security vulnerabilities between regular maintenance releases. This support lets you add patches without having to wait for the next maintenance release.

## Security

- **Encrypted Traffic Analytics (ETA)** is a unique capability for identifying malware in encrypted traffic coming from the access layer. Since more and more traffic is becoming encrypted, the visibility this feature affords for threat detection is critical for keeping your network secure at different layers.
- **AES-256 MACsec encryption** is the IEEE 802.1AE standard for authenticating and encrypting packets between switches. The Cisco Catalyst 9300 Series switches support 256-bit and 128-bit Advanced Encryption Standard (AES), providing the most secure link encryption.
- **Trustworthy solutions built with Cisco Trust Anchor Technologies** provide a highly secure foundation for Cisco products. With the Catalyst 9300 Series, these technologies enable hardware and software authenticity assurance for supply chain trust and strong mitigation against man-in-the-middle attacks that compromise software and firmware. Trust Anchor capabilities include:
  - **Image signing:** Cryptographically signed images provide assurance that the firmware, BIOS, and other software are authentic and unmodified. As the system boots, the system's software signatures are checked for integrity.
  - **Secure Boot:** Cisco Secure Boot technology anchors the boot sequence chain of trust to immutable hardware, mitigating threats against a system's foundational state and the software that is to be loaded, regardless of a user's privilege level. It provides layered protection against the persistence of illicitly modified firmware.
  - **Cisco Trust Anchor module:** A tamper-resistant, strong cryptographic, single-chip solution provides hardware authenticity assurance to uniquely identify the product so that its origin can be confirmed to Cisco. This provides assurance that the product is genuine.



## Resiliency and high availability

- **StackWise-480:** Cisco Catalyst 9300 Series modular uplink models (C9300 SKUs) support the industry's highest back-panel stacking bandwidth solution (480 Gbps) with StackWise-480. Up to 8 Switches can be configured in a Stackwise-480 with the special connector at the back of the switch using dedicated stack cables.
- **StackWise-320:** The Cisco Catalyst 9300 Series fixed uplink models (C9300L SKUs) support stacking bandwidth solution (320 Gbps) with StackWise-320. Up to 8 Switches can be optionally configured in a Stackwise-320 with the special Stack Kit at the back of the switch using dedicated stack cables.
- **Cisco StackPower:** Cisco StackPower is an innovative power interconnect system that allows the power supplies in a stack to be shared as a common resource among all the switches. This allows you 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. Up to 4 switches can be configured in a StackPower stack with the special connector at the back of the switch. However, with the use of XPS-2200 appliance, up to 9 switches can be configured in the StackPower stack. **Cisco StackPower is only supported on the models with modular uplink stack - C9300 SKUs.**



Figure 6.  
Cisco Catalyst 9300 Series StackPower

- **High availability:** The Catalyst 9300 Series supports high-availability features, including the following:
  - Cross-stack EtherChannel provides the ability to configure Cisco EtherChannel technology across different members of the stack for high resiliency.
  - 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 ("err-disable" recovery) automatically attempts to reactivate a link that is disabled because of a network error.
  - The Catalyst 9300 Series platform delivers the best NSF/SSO resiliency architecture in a stackable solution with sub-50-ms failover.
  - Always-On wireless network with stateful switchover when wireless functionality is enabled on stack of Catalyst 9300 Series switches.

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## Deep buffer Technology

Cisco Catalyst 9300 higher scale models have a deeper buffer to address the requirements of rich multi-media lossless content delivery and large routing tables in a fixed access solution with a wide range of uplink choices for deployment flexibility.

## Flexible Netflow

- **Flexible NetFlow (FNF):** Cisco IOS Software FNF is the next generation in flow visibility technology. It enables optimization of the network infrastructure, reduces operation costs, and improves capacity planning and security incident detection with increased flexibility and scalability. The Catalyst 9300 Series is capable of up to 64,000 flow entries on 48-port and 24 port models and up to 128,000 flow entries on Multigigabit models.

## Application visibility and control

- **NBAR2:** Next-Generation Network-Based Application Recognition (NBAR2) enables advanced application classification techniques, accuracy with up to 1400 predefined and well-known application signatures and up to 150 encrypted applications on the Cisco Catalyst 9000 switches. The most popular applications included are Skype, Office 365, Microsoft Lync, Cisco WebEx<sup>®</sup>, and Facebook, among many others that are predefined and easy to configure. NBAR2 provides the network administrator with an important tool to identify, control, and monitor end-user application usage while helping ensure a quality user experience and securing the network from malicious attacks. NBAR2 leverages FNF to report application performance and activities within the network to any supported NetFlow collector, such as Cisco Prime<sup>®</sup>, Cisco Stealthwatch<sup>®</sup>, or any compliant third-party tool.

## QoS

- **Superior QoS:** The Cisco Catalyst 9300 Series offers Gigabit Ethernet speeds with intelligent services that keep traffic flowing smoothly, even at 10 times the normal network speed. Industry-leading mechanisms for cross-stack marking, classification, and scheduling deliver superior performance for data, voice, and video traffic at wire speed. Superior QoS includes granular wireless bandwidth management and fair sharing, 802.1p Class of Service (CoS) and Differentiated Services Code Point (DSCP) field classification, Shaped Round Robin (SRR) scheduling, Committed Information Rate (CIR), and eight egress queues per port.

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## Service discovery

- **Multicast DNS (mDNS) gateway:** This service discovery gateway capability facilitates sharing of services advertised using the Apple mDNS (Bonjour) protocol, such as printers, Apple TVs, and file services across the network. Additionally, the administrator can create policies defining which services can be seen and accessed by the users in the network. This capability facilitates a Bring-Your-Own-Device (BYOD) rollout.

## Smart operation

- **WebUI:** WebUI is an embedded GUI-based device-management tool that provides the ability to provision the device, to simplify device deployment and manageability, and to enhance the user experience. It comes with the default image, so there is no need to enable anything or install any license on the device. You can use WebUI to build configurations, and to monitor and troubleshoot the device without having CLI expertise.
- **Efficient switch operation**<sup>\*</sup>: Cisco Catalyst 9300 Series switches provide optimum power saving with Energy Efficient Ethernet (EEE) on the RJ-45 ports and low-power operations for industry best-in-class power management and power consumption capabilities. The ports support reduced power modes so that ports not in use can move into a lower power utilization state. Other efficient switch operation features are as follows:
  - Per-port power consumption command allows customers to specify a 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 MIB provides proactive visibility into power usage and allows you to set different power-level thresholds.
- **RFID tags:** Catalyst 9300 Series switches have an embedded RFID tag that facilitates easy asset and inventory management using commercial RFID readers.
- **Blue beacon:** Catalyst 9300 Series switches support a blue beacon LED for easy identification of the switch being accessed.

\* Energy Efficient Ethernet (EEE) will be fully supported on Multigigabit switches in a future SW release

## High-Performance IP routing

The Cisco Express Forwarding hardware routing architecture delivers extremely high-performance IP routing in Cisco Catalyst 9300 Series switches, based on:

- IP unicast routing protocols (including static, Routing Information Protocol Version 1 [RIPv1], RIPv2, RIPv6, and Open Shortest Path First [OSPF], Routed Access) are supported for small network routing applications with the Network Essentials stack. Equal-cost routing facilitates Layer 3 load balancing and redundancy across the stack.
- Advanced IP unicast routing protocols (including Full [OSPF], Enhanced Interior Gateway Routing Protocol [EIGRP], Border Gateway Protocol Version 4 [BGPv4], and Intermediate System-to-Intermediate System Version 4 [IS-ISv4]) are supported for load balancing and for constructing scalable LANs. IPv6 routing (using OSPFv3 and EIGRPv6) is supported in hardware for maximum performance.

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- Protocol-Independent Multicast (PIM) for IP multicast routing is supported, including PIM Sparse Mode (PIM SM), and Source-Specific Multicast (SSM).
  - IPv6 addressing is supported on interfaces with appropriate show commands for monitoring and troubleshooting.

## Audio Video Bridging (AVB)

Starting with Cisco IOS XE Software Release 16.8, the Cisco Catalyst 9300 Series supports the IEEE 802.1 AVB standard. This standard provided the means for highly reliable delivery of low-latency, time-synchronized audio and video 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.

### Benefits

- Improves quality of experience by lowering jitter and latency for time-synchronized delivery of high-quality AV.
- Provides scalability of applications across networked deployments, including expansive and complex AV infrastructure.
- Lowers Total Cost of Ownership (TCO) with reduced cabling (lowers CapEx) and no license fees (lowers OpEx).

For more details about AVB and specific models supported, check <https://www.cisco.com/go/avb>.

**Multigigabit Ethernet technology:** Cisco Multigigabit Ethernet technology allows you to achieve bandwidth speeds from 1 Gbps to 10 Gbps over traditional Category 5e/6 cabling or above. This technology addresses the need for exponential increases in bandwidth with the enormous growth of 802.11ac Wave 2, to be eclipsed by the growth of Wi-Fi 6 and new wireless applications without having to replace current cabling infrastructure.

## Power over ethernet leadership

**Cisco Universal Power over Ethernet (Cisco UPOE):** PoE removes the need for wall sockets to power each PoE-enabled device and eliminates the cost of additional electrical cabling and circuits that would otherwise be necessary in IP phone and WLAN deployments. Cisco UPOE extends the IEEE PoE+ standard to double the power per port to 60 watts. This facilitates delivery of network power to a broad range of devices requiring higher power, including virtual desktop terminals, IP turrets, compact switches, building management gateways, LED lights, wireless access points, and IP phones.

Catalyst 9300 Series modular uplink models (C9300 SKUs) supports Cisco UPoE or PoE+ and PoE, thereby addressing the largest range of network power needs. Catalyst 9300 fixed uplink models (C9300L SKUs) support PoE+ and PoE.

Tables 9 and 10 show the power supply combinations required for different PoE needs.

**Table 9.** Power supply requirements for Catalyst 9300 Series modular uplink PoE/PoE+ models (C9300-xxP SKUs)

	24-port PoE switch	48-port PoE switch
PoE on all ports (15.4W per port)	1 PWR-C1-715WAC/PWR-C1-715WAC-P/PWR-C1-715WDC	1 PWR-C1-1100WAC/PWR-C1-1100WAC-P or 2 PWR-C1-715WAC/PWR-C1-715WAC-P/PWR-C1-715WDC
PoE+ on all ports (30W per port)	1 PWR-C1-1100WAC/PWR-C1-1100WAC-P or 2 PWR-C1-715WAC/PWR-C1-715WAC-P/PWR-C1-715WDC	2 PWR-C1-1100WAC/PWR-C1-1100WAC-P or 1 PWR-C1-1100WAC/PWR-C1-1100WAC-P and 1 PWR-C1-715WAC/PWR-C1-715WAC-P/PWR-C1-715WDC

**Table 10.** Power supply requirements for Catalyst 9300 Series UPOE models (C9300-xxU/UXM/UN SKUs)

	24-port Cisco UPOE switch	48-port Cisco UPOE switch	48 and 24-port Multigigabit Cisco UPOE switch*
Cisco UPOE (60W per port) & IEEE 802.3bt type3 on all ports (24-port switch) or up to 30 ports (48-port switch)	1 PWR-C1-1100WAC/PWR-C1-1100WAC-P and 1 PWR-C1-715WAC/PWR-C1-715WAC-P/PWR-C1-715WDC	2 PWR-C1-1100WAC/PWR-C1-1100WAC-P	2 PWR-C1-1100WAC/PWR-C1-1100WAC-P

**Table 11.** Power supply requirements for Catalyst 9300 Series fixed uplink PoE/PoE+ models (C9300L-xxP SKUs)

	24-port PoE switch	48-port PoE switch
PoE on all ports (15.4W per port)	1 PWR-C1-715WAC-P/PWR-C1-715WDC	1 PWR-C1-1100WAC-P or 2 PWR-C1-715WAC-P
PoE+ on all ports (30W per port)	1 PWR-C1-1100WAC-P or 2 PWR-C1-715WAC-P/PWR-C1-715WDC	2 PWR-C1-1100WAC-P or 1 PWR-C1-1100WAC-P and 1 PWR-C1-715WAC-P/PWR-C1-715WDC

- **Perpetual PoE:** With Perpetual PoE, the PoE power is maintained during a switch reload. This is important for IoT endpoints such as PoE-powered lights, so that there is no disruption during switch reboot.
- **Fast PoE:** When power is restored to a switch, PoE starts delivering power to endpoints without waiting for the operating system to fully load, thereby speeding up the time for the endpoint to start up.

\* C9300-48UN, C9300-24UX, C9300-48UXM are available with PWR-C1-1100WAC-P Platinum-rated power supply. Platinum-rated power supplies are more efficient, lowering operating power costs

\* PWR-C1-1100WAC-UP and PWR-C1-715WAC-UP Platinum-rated power supply upgrade options are available to upgrade the default AC power supply to 1100W or 715W

## Software requirements

[Cisco DNA Software for Access Switching](#) is available for the Cisco Catalyst 9300 Series.

Cisco DNA Software for Access Switching offers comprehensive solutions for the enterprise campus and branch offices. Cisco DNA for Access Switching introduces a simpler and more economical way to deploy access, aggregation, and core switches across enterprise campus and branch locations.

The Cisco DNA Subscription for Switching offer delivers an unbound network on an open and extensible architecture to help you navigate the digital journey. This subscription offer simplifies the buying process and includes lower initiation costs and flexible terms. It includes: Cisco DNA Premier with full Cisco DNA capabilities and SD-Access, bundled with ISE Base, ISE Plus, and StealthWatch.

For ordering information for Cisco DNA Software for the Cisco Catalyst 9300 Series, go to <https://www.cisco.com/c/en/us/products/software/one-access/switching-part-numbers.html>.

Cisco Catalyst 9300 Series switches run on Cisco IOS XE 16.5.1a release or later with the following exceptions. Catalyst 9300 Series 1G fiber models (C9300-xxS SKUs) are supported on Cisco IOS XE 16.11.1a release or later. Catalyst 9300 Series fixed uplink models (C9300L SKUs) are supported on Cisco IOS XE 16.11.1b release or later. These software releases includes all the features listed earlier in the Platform Benefits section.

## Licensing

### Packaging

The Cisco Catalyst 9000 family of switches introduces a new and simplified licensing package in the form of base and add-on licenses.

- **The perpetual licensing** package includes the Network Essentials and Network Advantage licensing options that are tied to the hardware. Between them, the base licensing packages cover switching fundamentals, management automation, troubleshooting, and advanced switching features. These Network licenses are perpetual.
- **The subscription licensing** package includes the Cisco DNA Essentials and Cisco DNA Advantage options. In addition to on-box capabilities, the features available with this package provide Cisco innovations on the switch, as well as on Cisco DNA Center. The Cisco DNA subscription licenses are mandatory at the time of configuration.

**License consumption** is easily determined by the package itself. While perpetual licenses are always permanent and without an expiration date, subscription licenses have to be purchased for a 3-, 5-, or 7-year term (and hence are also known as term-based licenses). Table 12 shows the combinations of perpetual and subscription licenses that must be purchased.

**Table 12.** Licensing combinations

	Cisco DNA Essentials	Cisco DNA Advantage	Cisco DNA Premier
Network Essentials	Yes	No	No
Network Advantage	No *	Yes	Yes

\* At the time of Cisco DNA license renewal, the Cisco DNA Essentials license can be purchased to be used with Network Advantage

**Managing licenses with Smart Accounts:** Creating Smart Accounts by using the Cisco Smart Software Manager (SSM) enables you 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 subscription licenses that you want to renew.

You must order a Cisco DNA subscription term license in order to purchase a switch. 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.

Both the base and add-on licenses are also available for a 90-day evaluation period. An evaluation license is activated temporarily, without purchase. An expired evaluation license cannot be reactivated after reload.

**Note:** It is not required to deploy Cisco DNA Center just to use one of the above packages.

Table 13 shows the features included in the Network Essentials and Advantage packages.

Table 14 shows the features included in the Cisco DNA Essentials and Advantage packages.

**Table 13.** Network Essentials and Advantage package features

Features	Network Essentials	Network Advantage
<b>Switch fundamentals</b> Layer 2, Routed Access (RIP, EIGRP Stub, OSPF - 1000 routes), PBR, PIM Stub Multicast (1000 routes), PVLAN, VRRP, PBR, CDP, QoS, FHS, 802.1X, MACsec-128, CoPP, SXP, IP SLA Responder, SSO	✓	✓
<b>Advanced switch capabilities and scale</b> BGP, EIGRP, HSRP, IS-IS, BSR, MSDP, PIM-BIDIR, * IP SLA, OSPF	X	✓
<b>Network segmentation</b> VRF, VXLAN, LISP, SGT, MPLS, mVPN	X	✓
<b>Automation</b> NETCONF, RESTCONF, gRPC, YANG, PnP Agent, ZTP/Open PnP, GuestShell (On-Box Python)	✓	✓
<b>Telemetry and visibility</b> Model-driven telemetry, sampled NetFlow, SPAN, RSPAN	✓	✓
<b>High availability and resiliency</b> Nonstop Forwarding (NSF), Graceful Insertion and Removal (GIR), Fast Software Upgrade (FSU), Software Patching (CLI Based)	X	✓
<b>IOT integration</b> AVB, PTP, CoAP	X	✓
<b>Security</b> MACsec-256	X	✓

**Table 14.** Cisco DNA Essentials and Advantage package features (add a section for other software support and add Prime, ISE and Stealthwatch support)

Features	Cisco DNA Essentials	Cisco DNA Advantage	Cisco DNA Premier
<b>Switch features</b>			
<b>Optimized network deployments</b> Cisco DNA Service for Bonjour	X	✓	✓
<b>Advanced telemetry and visibility</b> Full Flexible NetFlow, EEM	✓	✓	✓
<b>Optimized telemetry and visibility</b> ERSPAN, AVC (NBAR2), app hosting (in containers/VMs), Wireshark	X	✓	✓
<b>Advanced security</b> Encrypted Traffic Analytics (ETA)	X	✓	✓
<b>Cisco DNA Center features</b>			
<b>Day-o network bring-up automation</b> Cisco Network Plug-and-Play application, network settings, device credentials, LAN automation, host onboarding	✓	✓	✓
<b>Element management</b> Discovery, inventory, topology, software image, licensing, and configuration management	✓	✓	✓
<b>Element management</b> Patch management	X	✓	✓
<b>Basic Assurance</b> Health dashboards – Network, Client, Application; switch and wired client health monitoring	✓	✓	✓
<b>SD-Access</b> Policy-based automation and assurance for wired and wireless	X	✓	✓
<b>SD-Access Embedded Wireless</b> C9800 Wireless Software package to enable Wireless Controller Functionality*	X	✓	✓
<b>Network assurance and analytics</b> Global insights, trends, compliance, custom reports; switch 360, wired client 360; fabric and non-fabric insights; app health, app 360, app performance (loss, latency, jitter)	X	✓	✓
<b>Other Software included (can be purchased separately)</b>			
<b>ISE Base</b>	X	X	✓
<b>ISE Plus</b>	X	X	✓
<b>StealthWatch</b>	X	X	✓

\* Note: A purchase of Cisco DNA Advantage or Cisco DNA Premier per Access Point is required in order to enable the Wireless Controller functionality on Catalyst Switches



## Specifications

### Dimensions, Weight, Acoustic, Mean time between failures

The table below shows the dimensions, weights, acoustic and mean time between failures of all models of Cisco Catalyst 9300 Series switches.

**Table 15.** Model Dimensions, Weight, and Mean Time between failures metrics

	General Specifications		
	Dimensions (H x W x D) inches		
Model	Chassis only	W/ Default Power Supply	W/ 1100W Power Supply
C9300-24T	1.73 x 17.5 x 16.1	1.73 x 17.5 x 17.7	1.73 x 17.5 x 19.2
C9300-24P	1.73 x 17.5 x 16.1	1.73 x 17.5 x 17.7	1.73 x 17.5 x 19.2
C9300-24U	1.73 x 17.5 x 16.1	1.73 x 17.5 x 19.2	1.73 x 17.5 x 19.2
C9300-24UX	1.73 x 17.5 x 17.1	1.73 x 17.5 x 20.2	1.73 x 17.5 x 20.2
C9300-24UB	1.73 x 17.5 x 16.1	1.73 x 17.5 x 19.2	1.73 x 17.5 x 19.2
C9300-24UXB	1.73 x 17.5 x 17.1	1.73 x 17.5 x 20.2	1.73 x 17.5 x 20.2
C9300-48T	1.73 x 17.5 x 16.1	1.73 x 17.5 x 17.7	1.73 x 17.5 x 19.2
C9300-48P	1.73 x 17.5 x 16.1	1.73 x 17.5 x 17.7	1.73 x 17.5 x 19.2
C9300-48U	1.73 x 17.5 x 16.1	1.73 x 17.5 x 19.2	1.73 x 17.5 x 19.2
C9300-48UXM	1.73 x 17.5 x 19.1	1.73 x 17.5 x 22.2	1.73 x 17.5 x 22.2
C9300-48UN	1.73 x 17.5 x 19.1	1.73 x 17.5 x 22.2	1.73 x 17.5 x 22.2
C9300-48UB	1.73 x 17.5 x 16.1	1.73 x 17.5 x 19.2	1.73 x 17.5 x 19.2
C9300-24S	1.73 x 17.5 x 17.7	1.73 x 17.5 x 19.2	1.73 x 17.5 x 20.7
C9300-48S	1.73 x 17.5 x 17.7	1.73 x 17.5 x 19.2	1.73 x 17.5 x 20.7
C9300L-24T-4G	1.73 x 17.5 x 16.1	1.73 x 17.5 x 17.7	1.73 x 17.5 x 19.2
C9300L-24T-4X	1.73 x 17.5 x 16.1	1.73 x 17.5 x 17.7	1.73 x 17.5 x 19.2
C9300L-48T-4G	1.73 x 17.5 x 16.1	1.73 x 17.5 x 17.7	1.73 x 17.5 x 19.2
C9300L-48T-4X	1.73 x 17.5 x 16.1	1.73 x 17.5 x 17.7	1.73 x 17.5 x 19.2
C9300L-24P-4G	1.73 x 17.5 x 16.1	1.73 x 17.5 x 17.7	1.73 x 17.5 x 19.2
C9300L-24P-4X	1.73 x 17.5 x 16.1	1.73 x 17.5 x 17.7	1.73 x 17.5 x 19.2
C9300L-48P-4G	1.73 x 17.5 x 16.1	1.73 x 17.5 x 17.7	1.73 x 17.5 x 19.2

General Specifications			
C9300L-48P-4X	1.73 X 17.5 X 16.1	1.73 X 17.5 X 17.7	1.73 X 17.5 X 19.2
Dimensions (H x W x D) Centimeters			
Model	Chassis only	W/ Default Power Supply	W/ 1100W Power Supply
C9300-24T	4.4 X 44.5 X 40.9	4.4 X 44.5 X 44.9	4.4 X 44.5 X 48.8
C9300-24P	4.4 X 44.5 X 40.9	4.4 X 44.5 X 44.9	4.4 X 44.5 X 48.8
C9300-24U	4.4 X 44.5 X 40.9	4.4 X 44.5 X 48.8	4.4 X 44.5 X 48.8
C9300-24UX	4.4 X 44.5 X 43.4	4.4 X 44.5 X 51.3	4.4 X 44.5 X 51.3
C9300-48T	4.4 X 44.5 X 40.9	4.4 X 44.5 X 44.9	4.4 X 44.5 X 48.8
C9300-48P	4.4 X 44.5 X 40.9	4.4 X 44.5 X 44.9	4.4 X 44.5 X 48.8
C9300-48U	4.4 X 44.5 X 40.9	4.4 X 44.5 X 48.8	4.4 X 44.5 X 48.8
C9300-48UXM	4.4 X 44.5 X 48.5	4.4 X 44.5 X 56.4	4.4 X 44.5 X 56.4
C9300-48UN	4.4 X 44.5 X 48.5	4.4 X 44.5 X 56.4	4.4 X 44.5 X 56.4
C9300-24S	4.3 X 44.4 X 44.9	4.3 X 44.4 X 48.8	4.3 X 44.4 X 52.6
C9300-48S	4.3 X 44.4 X 44.9	4.3 X 44.4 X 48.8	4.3 X 44.4 X 52.6
C9300L-24T-4G	4.4 X 44.5 X 40.9	4.4 X 44.5 X 44.9	4.4 X 44.5 X 48.8
C9300L-24T-4X	4.4 X 44.5 X 40.9	4.4 X 44.5 X 44.9	4.4 X 44.5 X 48.8
C9300L-48T-4G	4.4 X 44.5 X 40.9	4.4 X 44.5 X 44.9	4.4 X 44.5 X 48.8
C9300L-48T-4X	4.4 X 44.5 X 40.9	4.4 X 44.5 X 44.9	4.4 X 44.5 X 48.8
C9300L-24P-4G	4.4 X 44.5 X 40.9	4.4 X 44.5 X 44.9	4.4 X 44.5 X 48.8
C9300L-24P-4X	4.4 X 44.5 X 40.9	4.4 X 44.5 X 44.9	4.4 X 44.5 X 48.8
C9300L-48P-4G	4.4 X 44.5 X 40.9	4.4 X 44.5 X 44.9	4.4 X 44.5 X 48.8
C9300L-48P-4X	4.4 X 44.5 X 40.9	4.4 X 44.5 X 44.9	4.4 X 44.5 X 48.8
Weight (with default power supply)			
Model	Pounds	Kilograms	
C9300-24T	16.03	7.27	
C9300-24P	16.33	7.4	
C9300-24U	16.63	7.54	

	General Specifications	
C9300-24UX	18.18	8.25
C9300-24UB	16.63	7.54
C9300-24UXB	18.18	8.25
C9300-48T	16.43	7.45
C9300-48P	16.73	7.59
C9300-48U	17.03	7.72
C9300-48UXM	20.50	9.34
C9300-48UN	20.05	9.09
C9300-48UB	17.03	7.72
C9300-24S	16.84	7.64
C9300-48S	17.32	7.86
C9300L-24T-4G	14.93	6.78
C9300L-24T-4X	14.93	6.78
C9300L-48T-4G	15.41	7.0
C9300L-48T-4X	15.41	7.0
C9300L-24P-4G	14.99	6.81
C9300L-24P-4X	14.99	6.81
C9300L-48P-4G	15.46	7.03
C9300L-48P-4X	15.46	7.03
<b>Mean time between failures – MTBF (hours)</b>		
C9300-24T	314,790	
C9300-24P	299,000	
C9300-24U	238,410	
C9300-24UX	214,760	
C9300-24UB	354,300	
C9300-24UXB	288,520	
C9300-48T	305,870	

	General Specifications
C9300-48P	277,770
C9300-48U	227,410
C9300-48UXM	202,160
C9300-48UN	198,647
C9300-48UB	337,170
C9300-24S	284,130
C9300-48S	281,920
C9300L-24T-4G	395,800
C9300L-24T-4X	387,700
C9300L-48T-4G	387,860
C9300L-48T-4X	380,080
C9300L-24P-4G	346,940
C9300L-24P-4X	340,710
C9300L-48P-4G	314,140
C9300L-48P-4X	309,020
PWR-C1-350WAC-P	1,335,012 (ranges from 1.3M to 3.1M depending on temperature, input voltage and vendor)
PWR-C1-715WAC-P	1,054,881 (ranges from 1.05M to 2.6M depending on temperature, input voltage and vendor)
PWR-C1-1100WAC-P	1,217,904 (ranges from 1.2M to 2.8M depending on temperature, input voltage and vendor) (investigating an anomaly in MTBF data received from 1 Power Supply vendor – Artesyn)
C9300-NM-2Q	10,778,230
C9300-NM-2Y	7,568,820
C9300-NM-4G	8,953,570
C9300-NM-4M	10,549,060
C9300-NM-8X	7,151,930
FAN-T2	4,521,330

## General Specifications

### Environmental ranges

#### Acoustic noise

Measured per ISO 7779 and declared per ISO 9296

Bystander positions operating to an ambient temperature of 25°C

With AC power supply (with 24 PoE+ ports loaded for C9300 SKUs)

- LpA: 45dB typical, 48 dB max
- LwA: 5.6B typical, 5.9B max

With AC power supply (with half the number of PoE+ ports loaded for C9300L SKUs)

- LpA: 44dB typical, 47 dB max
- LwA: 5.5B typical, 5.8B max

Typical: Noise emission for a typical configuration

Maximum: Statistical maximum to account for variation in production

## Connectors

Table 16 shows the supported connectors for the Cisco Catalyst 9300 Series.

**Table 16.** Connectors

<b>Connectors and cabling</b>	<ul style="list-style-type: none"> <li>• 1000BASE-T ports: RJ-45 connectors, 4-pair Cat 5E UTP cabling</li> <li>• Multigigabit-T ports: RJ-45 connectors, 4-pair Cat 5E, Cat 6, Cat 6A UTP cabling</li> <li>• 1000BASE-T SFP-based ports: RJ-45 connectors, 4-pair Cat 5E UTP cabling</li> <li>• SFP transceivers: LC fiber connectors (single-mode or multimode fiber)</li> <li>• SFP+ transceivers: LC fiber connectors (single-mode or multimode fiber)</li> <li>• QSFP+ transceivers: MPO and LC fiber connectors (single-mode or multimode fiber)</li> <li>• QSFP+ connector</li> <li>• SFP+ connector</li> <li>• Cisco StackWise stacking ports: copper-based Cisco StackWise cabling</li> <li>• Cisco StackPower: Cisco proprietary power stacking cables</li> <li>• Ethernet management port: RJ-45 connectors, 4-pair Cat 5 UTP cabling</li> <li>• Management console port: RJ-45-to-DB9 cable for PC connections</li> </ul>
<b>Power connectors</b>	<ul style="list-style-type: none"> <li>• Customers can provide power to a switch by using the internal power at the back of the switch</li> <li>• Internal power supply connector: The internal power supply is an auto-ranging unit. It supports input voltages between 100 (115 for 1100WAC) and 240 VAC. Use the supplied AC power cord to connect the AC power connector to an AC power outlet</li> </ul>

For the latest Cisco transceiver module compatibility information, refer to

<https://www.cisco.com/c/en/us/support/interfaces-modules/transceiver-modules/products-device-support-tables-list.html>.

## Management and standards support

Table 17 shows management and standards support for the Cisco Catalyst 9300 Series.

**Table 17.** Management and standards support\*

Description	Specification	
Management	BRIDGE-MIB	CISCO-PORT-STORM-CONTROL-MIB
	CISCO-BRIDGE-EXT-MIB	CISCO-POWER-ETHERNET-EXT-MIB
	CISCO-BULK-FILE-MIB	CISCO-PRIVATE-VLAN-MIB
	CISCO-CABLE-DIAG-MIB	CISCO-PROCESS-MIB
	CISCO-CALLHOME-MIB	CISCO-PRODUCTS-MIB
	CISCO-CEF-MIB	CISCO-RF-MIB
	CISCO-CIRCUIT-INTERFACE-MIB	CISCO-RTP-METRICS-MIB
	CISCO-CONFIG-COPY-MIB	CISCO-RTTMON-ICMP-MIB
	CISCO-CONFIG-MAN-MIB	CISCO-STACKWISE-MIB
	CISCO-DEVICE-LOCATION-MIB	CISCO-STP-EXTENSIONS-MIB
	CISCO-DHCP-SNOOPING-MIB	CISCO-SYSLOG-MIB
	CISCO-EIGRP-MIB	CISCO-TCP-MIB
	CISCO-EMBEDDED-EVENT-MGR-MIB	CISCO-UDLDP-MIB
	CISCO-ENTITY-FRU-CONTROL-MIB	CISCO-VLAN-IFTABLE-RELATIONSHIP-MIB
	CISCO-ENTITY-SENSOR-MIB	ENTITY-MIB
	CISCO-ENTITY-VENDORTYPE-OID-MIB	HC-ALARM-MIB
	CISCO-ERR-DISABLE-MIB	HC-RMON-MIB
	CISCO-FLASH-MIB	IEEE8023-LAG-MIB
	CISCO-FLOW-MONITOR-MIB	IF-MIB
	CISCO-FTP-CLIENT-MIB	IP-FORWARD-MIB
	CISCO-HSRP-EXT-MIB	IP-MIB
	CISCO-HSRP-MIB	LLDP-EXT-MED-MIB
	CISCO-IETF-BFD-MIB	LLDP-MIB
	CISCO-IETF-PPVPN-MPLS-VPN-MIB	MAU-MIB
	CISCO-IETF-PW-MPLS-MIB	MPLS-L3VPN-STD-MIB
	CISCO-IF-EXTENSION-MIB	MPLS-LSR-STD-MIB
	CISCO-IGMP-FILTER-MIB	MPLS-VPN-MIB
	CISCO-IMAGE-LICENSE-MGMT-MIB	OLD-CISCO-CHASSIS-MIB
	CISCO-IMAGE-MIB	OLD-CISCO-CPU-MIB
	CISCO-IP-CBR-METRICS-MIB	OLD-CISCO-INTERFACES-MIB
	CISCO-IP-STAT-MIB	OLD-CISCO-IP-MIB
	CISCO-IP-TAP-MIB	OLD-CISCO-MEMORY-MIB
	CISCO-IP-URPF-MIB	OLD-CISCO-SYS-MIB
	CISCO-IPSEC-FLOW-MONITOR-MIB	OLD-CISCO-TCP-MIB
	CISCO-IPSEC-MIB	OLD-CISCO-TS-MIB
	CISCO-IPSEC-PROVISIONING-MIB	POWER-ETHERNET-MIB
	CISCO-IPSLA-AUTOMEASURE-MIB	RFC1213-MIB
	CISCO-IPSLA-ECHO-MIB	RMON-MIB

Description	Specification	Specification
	CISCO-IPSLA-JITTER-MIB CISCO-L2-CONTROL-MIB CISCO-L2L3-INTERFACE-CONFIG-MIB CISCO-LAG-MIB CISCO-LICENSE-MGMT-MIB CISCO-LOCAL-AUTH-USER-MIB CISCO-MAC-NOTIFICATION-MIB CISCO-MDI-METRICS-MIB CISCO-MEDIA-METRICS-MIB CISCO-MEMORY-POOL-MIB CISCO-MPLS-LSR-EXT-STD-MIB CISCO-NBAR-PROTOCOL-DISCOVERY-MIB CISCO-NHRP-EXT-MIB CISCO-NTP-MIB CISCO-PAGP-MIB CISCO-PORT-SECURITY-MIB	RMON2-MIB SMON-MIB SNMPv2-MIB SONET-MIB TCP-MIB UDP-MIB
<b>Standards</b>	IEEE 802.1s IEEE 802.1w IEEE 802.1x IEEE 802.1x-Rev IEEE 802.3ad IEEE 802.3af IEEE 802.3at IEEE 802.3x full duplex on 10BASE-T, 100BASE-TX, and 1000BASE-T ports IEEE 802.1D Spanning Tree Protocol IEEE 802.1p CoS prioritization IEEE 802.1Q VLAN IEEE 802.3 10BASE-T specification IEEE 802.3u 100BASE-TX specification IEEE 802.3ab 1000BASE-T specification IEEE 802.3z 1000BASE-X specification IEEE 802.3bz Multirate 2.5G/5G specification IEEE 802.3an 10G BASE-T specification	RMON I and II standards SNMPv1, v2c, and v3

## Power supply specifications

Table 18 lists the power specifications for the Cisco Catalyst 9300 Series based on the kind of power supply used.

**Table 18.** Power specifications

Description	Specification			
	PWR-C1-1100WAC-P	PWR-C1-715WAC-P	PWR-C1-350WAC-P	PWR-C1-715WDC
Power supply rated maximum	1100W	715W	350W	715W
Total output BTU (note: 1000 BTU/hr = 293W)	3754 BTU/hr, 1100W	2440 BTU/hr, 715W	1194 BTU/hr, 350W	2440 BTU/hr
Input-voltage range and frequency	115V to 240 VAC, 50 to 60 Hz	100 to 240 VAC, 50 to 60 Hz	100 to 240 VAC, 50 to 60 Hz	-36V to -72 VDC
Input current	12-6A	10-5A	4-2A	24-12A
Output ratings	-56V at 19.64A	-56V at 12.8A	-56V at 6.25A	-56V at 12.8A
Output holdup time	20 ms minimum at 100VAC	20 ms minimum at 100VAC	20 ms minimum at 100VAC	2 ms minimum at -48Vdc
Power-supply input receptacles	IEC 320-C16 (IEC60320-C16)	IEC 320-C16 (IEC60320-C16)	IEC 320-C14 (IEC60320-C14)	Right angle barrier style terminal block
Power cord rating	15A	15A	10A	25A@100VDC
Physical specifications	(H x W x D): 1.58 x 3.25 x 13.7 in Weight: 3.1 lb (1.4 kg)	(H x W x D): 1.58 x 3.25 x 12.20 in Weight: 2.6 lb (1.2 kg)	(H x W x D): 1.58 x 3.25 x 12.20 in Weight: 2.3 lb (1.2 kg)	(H x W x D): 1.58 x 3.25 x 12.20 in Weight: 2.2 lb (1kg)

**Table 19.** Power specifications – platinum rated power supplies

Description	Specification		
	*PWR-C1-1100WAC-P	*PWR-C1-715WAC-P	PWR-C1-350WAC-P
Power supply rated maximum	1100W	715W	350W
Total output BTU (note: 1000 BTU/hr = 293W)	3754 BTU/hr, 1100W	2440 BTU/hr, 715W	1194 BTU/hr, 350W
Input-voltage range and frequency	115V to 240 VAC, 50 to 60 Hz	100 to 240 VAC, 50 to 60 Hz	100 to 240 VAC, 50 to 60 Hz
Input current	12-6A	10-5A	4-2A
Output ratings	-56V at 19.64A	-56V at 12.8A	-56V at 6.25A
Output holdup time	20 ms minimum at 100VAC	20 ms minimum at 100VAC	20 ms minimum at 100VAC



Description	Specification		
Power-supply input receptacles	IEC 320-C16 (IEC60320-C16)	IEC 320-C16 (IEC60320-C16)	IEC 320-C14 (IEC60320-C14)
Power cord rating	15A	15A	10A
Physical specifications	(H x W x D): 1.58 x 3.25 x 13.7 in Weight: 3.1 lb (1.4 kg)	(H x W x D): 1.58 x 3.25 x 12.20 in Weight: 2.6 lb (1.2 kg)	(H x W x D): 1.58 x 3.25 x 12.20 in Weight: 2.3 lb (1.2 kg)
Operating temperature	Normal operating temperature* and altitudes: <ul style="list-style-type: none"> <li>-5°C to +45°C, up to 5000 feet (1500m)</li> <li>-5°C to +40°C, up to 10,000 feet (3000m)</li> </ul> * Minimum ambient temperature for cold start is 32°F (0°C) Short-term* exceptional conditions: <ul style="list-style-type: none"> <li>-5°C to +50°C, up to 5000 feet (1500m)</li> <li>-5°C to +45°C, up to 10,000 feet (3000m)</li> <li>-5°C to +45°C, at sea level with single fan failure</li> </ul> * Not more than following in one-year period: 96 consecutive hours, or 360 hours total, or 15 occurrences		
Storage temperature	-40° to 158°F (-40° to 70°C)		
Relative humidity operating and nonoperating noncondensing	5% to 90% noncondensing		
Altitude	10,000 ft. (3000 meters), up to 45°C		
EMI and EMC compliance	FCC Part 15 (CFR 47) Class A ICES-003 Class A EN 55032 Class A CISPR 32 Class A AS/NZS 3548 Class A BSMI Class A (AC input models only) VCCI Class A EN 55024, EN300386, EN 61000-3-2, EN 61000-3-3 EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN 61000-6-1		
Safety compliance			
LED indicators	"AC OK": Input power to the power supply is OK "PS OK": Output power from the power supply is OK		

\* PWR-C1-1100WAC-UP is available as an PSU upgrade option to 1100W primary PSU

\* PWR-C1-715WAC-UP is available as an PSU upgrade option to 715W primary PSU

## Power consumption of standalone 9300 Series Switches

Table 20 shows the power consumption of standalone Cisco Catalyst 9300 Series Switches based on Alliance for Telecommunications Industry Solutions (ATIS) testing using Internet Mix (IMIX) distribution stream traffic, with input voltage of 115VAC at 60 Hz and no PoE loading. The values given are the maximum possible power consumption numbers under the respective test scenarios.

**Table 20.** Power Consumption of Standalone 9300 Series Switches (tested on IOS XE 16.5.1)

				Measured P(W)																	
				Half port traffic					Full port traffic					Weighted average Pw	No link	PoE test (no traffic)					
SKU	FEP	Uplink	Input	0.01%/E EE	10%	30%	50%	100%	0.01%/EEE	10%	30%	50%	100%			25%	50%	90%	100%		
C9300-24T	350W	Not Installed	115Vac	77.7	86.1	89.1	89.5	89.7	77.5	91.0	91.7	91.9	92.5	89.8	78.1						
			230Vac	77.4	85.4	88.5	88.7	88.8	77.0	89.8	90.7	90.9	91.3	88.7	77.7						
		NM-4-1G	115Vac	82.5	88.4	92.1	93.3	94.1	85.9	96.0	98.9	99.7	100.0	95.4	81.2						
			230Vac	81.8	87.6	90.4	92.0	92.9	84.9	94.2	96.9	97.9	98.3	93.7	80.5						
		NM-4-10G	115Vac	86.4	96.3	98.0	98.2	98.7	90.2	103.7	104.5	104.9	105.9	102.6	87.0						
			230Vac	85.4	95.1	96.6	96.8	97.3	89.1	102.1	102.9	103.3	104.2	101.0	86.0						
		NM-2-40G	115Vac	84.0	94.7	95.7	95.9	96.1	87.1	101.1	101.7	102.1	103.0	99.9	83.9						
			230Vac	83.2	93.6	94.4	94.6	95.1	86.2	99.2	100.1	100.5	101.4	98.1	83.2						
		NM-8-10G	115Vac	86.3	95.6	97.5	97.8	98.2	90.7	103.9	104.7	105.1	106.1	102.8	85.0						
			230Vac	85.4	94.5	96.2	96.4	97.0	89.7	102.2	103.2	103.6	104.5	101.2	84.3						
		C9300-24P	715W	Not Installed	115Vac	82.6	91.0	93.4	93.7	93.9	82.0	94.8	95.9	96.1	96.6	93.7	82.9	202.3	325.8	527.5	579.0
					230Vac	81.6	89.8	92.2	92.4	92.6	81.7	93.7	94.6	94.7	95.2	92.6	82.3	199.0	318.2	510.6	559.9
NM-4-1G	115Vac			87.5	93.0	96.5	97.7	98.5	89.8	99.5	102.4	103.0	103.4	98.9	85.4	211.4	334.5	537.8	585.7		
	230Vac			86.1	91.3	94.4	95.8	96.6	88.9	98.5	101.5	101.9	102.4	97.9	84.6	207.9	328.0	520.3	568.2		
NM-4-10G	115Vac			90.4	100.4	101.6	101.9	102.3	94.1	106.8	107.8	108.2	109.1	105.7	90.8	214.9	337.9	539.4	590.8		
	230Vac			89.4	99.1	100.3	100.5	100.7	92.8	106.1	106.5	106.9	107.8	104.9	89.6	211.0	329.7	522.2	571.0		
NM-2-40G	115Vac			88.1	98.6	99.5	99.6	99.9	91.1	104.4	105.2	105.6	106.5	103.3	88.4	212.2	335.2	536.2	586.5		
	230Vac			87.1	97.2	98.1	98.3	98.8	90.0	103.3	103.9	104.3	105.2	102.1	87.5	208.0	326.8	519.3	567.6		
NM-8-10G	115Vac			90.0	99.4	101.0	101.2	101.6	94.2	107.1	107.9	108.3	109.2	106.0	88.7	215.3	339.6	541.4	591.3		
	230Vac			89.0	97.9	99.8	100.0	100.5	93.1	105.8	106.7	107.1	108.1	104.8	87.8	211.7	331.9	524.2	572.3		

			Measured P(W)																		
			Half port traffic						Full port traffic						Weighted average Pw	No link	PoE test (no traffic)				
C9300-24U	1100W	Not Installed	115Vac	87.4	95.9	99.0	99.2	99.4	87.0	100.8	101.5	101.8	102.3	99.6	87.8	313.7	547.9	940.3	1041.4		
			230Vac	85.9	94.7	97.3	97.6	97.8	85.5	98.0	99.6	99.8	100.3	96.9	86.4	306.2	529.1	895.6	988.7		
		NM-4-1G	115Vac	92.2	97.8	101.2	102.7	103.6	95.4	105.2	108.3	109.0	109.4	104.6	94.4	321.0	554.0	943.5	1045.5		
			230Vac	90.6	96.1	99.4	100.9	101.7	93.7	103.4	106.4	107.2	107.6	102.8	93.2	313.5	536.6	901.5	994.6		
		NM-4-10G	115Vac	96.0	106.2	107.6	107.8	108.4	99.7	113.4	114.2	114.6	115.6	112.3	96.1	325.7	559.0	950.6	1053.0		
			230Vac	94.3	104.5	105.8	106.1	106.6	97.9	112.1	112.8	113.2	114.0	110.8	94.4	318.3	541.9	906.2	997.8		
		NM-2-40G	115Vac	93.4	103.9	104.8	105.0	105.5	96.5	110.4	111.3	111.5	112.4	109.2	93.4	323.2	555.8	946.7	1048.6		
			230Vac	91.8	102.0	103.0	103.3	103.7	94.8	108.7	109.4	109.8	110.6	107.5	91.8	314.9	538.4	902.2	994.5		
		NM-8-10G	115Vac	95.8	105.4	107.3	107.6	108.1	100.2	114.0	114.8	115.2	116.2	112.8	94.4	324.4	557.7	946.6	1049.0		
			230Vac	94.0	103.0	105.1	105.4	106.0	98.4	112.0	113.1	113.5	114.5	110.9	93.2	317.8	541.8	907.7	999.1		
		C9300-24UB	1100W	Not Installed	115Vac	87.4	95.9	99.0	99.2	99.4	87.0	100.8	101.5	101.8	102.3	99.6	87.8	313.7	547.9	940.3	1041.4
					230Vac	85.9	94.7	97.3	97.6	97.8	85.5	98.0	99.6	99.8	100.3	96.9	86.4	306.2	529.1	895.6	988.7
				NM-4-1G	115Vac	92.2	97.8	101.2	102.7	103.6	95.4	105.2	108.3	109.0	109.4	104.6	94.4	321.0	554.0	943.5	1045.5
					230Vac	90.6	96.1	99.4	100.9	101.7	93.7	103.4	106.4	107.2	107.6	102.8	93.2	313.5	536.6	901.5	994.6
NM-4-10G	115Vac			96.0	106.2	107.6	107.8	108.4	99.7	113.4	114.2	114.6	115.6	112.3	96.1	325.7	559.0	950.6	1053.0		
	230Vac			94.3	104.5	105.8	106.1	106.6	97.9	112.1	112.8	113.2	114.0	110.8	94.4	318.3	541.9	906.2	997.8		
NM-2-40G	115Vac			93.4	103.9	104.8	105.0	105.5	96.5	110.4	111.3	111.5	112.4	109.2	93.4	323.2	555.8	946.7	1048.6		
	230Vac			91.8	102.0	103.0	103.3	103.7	94.8	108.7	109.4	109.8	110.6	107.5	91.8	314.9	538.4	902.2	994.5		
NM-8-10G	115Vac			95.8	105.4	107.3	107.6	108.1	100.2	114.0	114.8	115.2	116.2	112.8	94.4	324.4	557.7	946.6	1049.0		
	230Vac			94.0	103.0	105.1	105.4	106.0	98.4	112.0	113.1	113.5	114.5	110.9	93.2	317.8	541.8	907.7	999.1		
C9300-48T	350W			Not Installed	115Vac	81.5	94.9	95.7	95.9	96.4	80.8	98.6	100.2	101.3	102.3	97.2	82.2				
					230Vac	80.5	93.7	94.6	94.8	95.3	80.1	97.3	99.5	99.9	100.8	96.0	81.5				
				NM-4-1G	115Vac	86.4	94.9	97.8	99.4	100.4	89.3	104.6	107.6	108.6	108.9	103.5	85.7				
					230Vac	85.3	93.8	96.6	98.4	99.1	88.2	103.4	106.2	106.9	107.2	102.3	84.8				
		NM-4-10G	115Vac	89.6	103.4	104.2	104.6	105.4	93.0	112.7	113.5	114.1	115.7	111.0	90.6						
			230Vac	89.0	102.0	102.8	103.1	103.9	91.9	111.0	111.8	112.4	114.0	109.4	89.3						
		NM-2-40G	115Vac	88.3	102.4	102.9	103.3	104.2	91.0	110.5	111.3	112.1	113.9	108.9	88.6						
			230Vac	87.3	100.9	101.4	101.8	102.7	89.9	108.8	109.6	110.3	112.1	107.2	87.6						
		NM-8-10G	115Vac	92.1	105.2	106.1	106.5	107.4	98.6	117.6	118.4	119.1	120.9	116.0	91.0						
			230Vac	91.1	103.9	104.7	105.1	106.0	97.3	115.8	116.6	117.3	119.0	114.3	90.0						

			Measured P(W)																		
			Half port traffic							Full port traffic					Weighted average Pw	No link	PoE test (no traffic)				
C9300-48P	715W	Not Installed	115Vac	90.5	103.2	104.5	104.7	105.2	89.9	104.9	107.8	109.2	110.2	103.9	91.3	206.1	324.1	514.4	563.2		
			230Vac	89.4	102.2	103.4	103.6	104.1	88.9	103.7	106.9	108.4	109.3	102.7	89.9	202.9	316.9	500.6	547.5		
		NM-4-1G	115Vac	95.3	103.5	106.2	108.1	108.8	98.0	112.1	114.9	115.9	116.2	111.1	94.3	215.0	332.6	523.4	572.1		
			230Vac	94.0	102.2	105.2	106.9	107.8	96.4	111.3	114.1	115.2	115.5	110.2	93.1	211.2	324.8	509.3	555.8		
		NM-4-10G	115Vac	98.7	111.5	112.3	112.7	113.5	101.5	119.7	120.5	121.2	122.8	118.2	99.2	219.1	336.5	528.8	576.6		
			230Vac	97.1	110.7	111.5	111.9	112.7	100.6	119.2	120.0	120.7	122.3	117.6	97.9	215.5	329.5	514.2	560.5		
		NM-2-40G	115Vac	96.9	110.1	110.7	111.0	111.9	99.3	118.2	119.0	119.7	121.5	116.7	97.6	217.4	335.4	527.4	577.8		
			230Vac	95.6	109.2	109.7	110.1	111.0	98.1	117.5	118.2	119.0	120.6	115.8	96.0	213.0	326.9	511.9	558.8		
		NM-8-10G	115Vac	100.5	113.4	114.2	114.6	115.5	106.4	124.5	125.4	126.1	128.0	123.0	99.5	215.1	334.7	520.8	568.8		
			230Vac	99.4	112.8	113.5	113.9	114.9	105.3	124.0	124.9	125.6	127.4	122.5	98.4	212.3	327.4	507.4	553.1		
		C9300-48U	1100W	Not Installed	115Vac	96.0	110.2	110.9	111.2	111.7	95.6	112.5	114.3	115.9	116.9	111.3	97.0	315.1	544.0	925.9	1023.0
					230Vac	94.8	108.5	109.2	109.4	109.9	94.2	110.0	112.5	114.1	115.0	108.9	95.6	308.6	529.4	889.9	978.8
				NM-4-1G	115Vac	97.4	105.8	109.0	110.7	111.0	99.9	115.1	117.8	118.9	119.2	114.0	96.4	319.2	547.3	928.0	1026.3
					230Vac	95.4	103.9	107.4	108.7	110.0	98.8	113.4	116.2	117.0	117.4	112.4	94.9	314.3	535.6	896.0	984.3
NM-4-10G	115Vac			104.4	118.5	119.0	119.5	120.1	107.4	126.8	127.6	128.3	130.0	125.2	104.9	326.2	556.0	938.6	1035.6		
	230Vac			102.8	116.0	117.1	117.5	118.2	106.4	124.8	125.5	126.2	127.7	123.2	103.6	320.4	541.4	903.0	991.6		
NM-2-40G	115Vac			102.9	117.2	117.6	118.0	119.0	104.8	123.8	124.6	125.3	127.0	122.2	102.5	324.1	552.4	934.4	1032.6		
	230Vac			101.2	114.9	115.5	115.9	117.0	103.9	123.0	123.7	124.4	126.1	121.4	101.7	316.9	537.9	898.2	988.3		
NM-8-10G	115Vac			106.7	120.4	121.1	121.5	122.3	112.7	131.5	132.4	133.0	134.8	130.0	105.7	330.0	563.7	941.8	1043.4		
	230Vac			105.0	118.5	119.2	119.6	120.2	110.9	129.4	130.2	131.0	132.6	127.9	104.1	324.5	549.0	908.0	998.9		
C9300-24UX	1100W			NM-8-10G	115Vac	188.0	195.7	196.8	197.4	198.9	208.8	224.6	227.0	228.6	232.0	223.8	168.6	364.2	521.6	784.3	851.4
					230Vac	184.4	192.2	192.9	193.5	195.1	204.6	220.0	222.0	223.5	226.9	219.2	165.3	354.2	505.0	749.7	810.6
C9300-24UXB	1100W			NM-8-10G	115Vac	188.0	195.7	196.8	197.4	198.9	208.8	224.6	227.0	228.6	232.0	223.8	168.6	364.2	521.6	784.3	851.4
					230Vac	184.4	192.2	192.9	193.5	195.1	204.6	220.0	222.0	223.5	226.9	219.2	165.3	354.2	505.0	749.7	810.6
C9300-48UXM	1100W	NM-8-10G	115Vac	236.2	241.4	246.6	247.8	249.6	253.2	261.5	272.4	278.5	283.0	262.8	219.2	392.3	528.7	750.8	810.1		
			230Vac	232.2	237.4	242.5	243.7	245.6	249.0	256.7	267.6	272.9	277.2	258.0	215.7	382.8	515.2	728.0	784.7		
C9300-48UN	1100W	NM-8-10G	115Vac	172.9	176.7	178.7	179.8	181.8	193.8	199.8	201.5	203.1	206.9	199.9	159.1	357.3	525.0	803.9	875.1		
			230Vac	171.2	174.8	176.8	178.1	179.9	191.7	197.8	199.4	201.0	204.7	197.9	157.9	351.5	512.1	777.0	843.8		
C9300-48UB	1100W	NM-8-10G	115Vac	106.7	120.4	121.1	121.5	122.3	112.7	131.5	132.4	133.0	134.8	130.0	105.7	330.0	563.7	941.8	1043.4		
			230Vac	105.0	118.5	119.2	119.6	120.2	110.9	129.4	130.2	131.0	132.6	127.9	104.1	324.5	549.0	908.0	998.9		
C9300L-48T-4G	350W	Integrated	115Vac	60.32	69.53	70.41	71.16	72.00	61.57	79.62	80.62	81.44	82.32	78.083	59.47						
			230Vac	59.75	68.45	69.31	70.05	70.81	60.58	78.05	79.06	79.80	80.67	76.564	59.00						
C9300L-48P-4X	715W	Integrated	115Vac	68.05	78.83	80.51	80.97	81.98	69.18	90.03	91.95	92.67	94.13	88.35	68.50	203.00	337.40	559.30	616.70		
			230Vac	66.98	77.59	79.12	79.53	80.51	67.76	88.18	90.24	90.79	92.67	86.58	67.40	200.30	331.50	545.00	598.60		

			Measured P(W)																
			Half port traffic						Full port traffic						Weighted average Pw	No link	PoE test (no traffic)		
C9300L-24T-4G	350W	Integrated	115Vac	57.75	63.72	64.67	65.37	66.09	58.39	69.87	70.92	71.74	72.37	68.97	57.30				
			230Vac	56.63	62.65	63.60	64.28	65.02	57.16	68.55	69.59	70.38	70.99	67.65	56.20				
C9300L-24P-4G	715W	Integrated	115Vac	62.33	68.39	69.42	70.19	70.99	62.74	74.98	76.05	76.93	77.70	74.02	61.92	203.54	341.71	569.96	627.59
			230Vac	60.91	67.07	68.18	68.91	69.68	61.32	73.88	74.99	75.84	76.58	72.89	60.60	199.69	334.16	552.06	606.54
C9300L-48T-4X	350W	Integrated	115Vac	61.28	73.75	75.38	75.85	76.86	64.15	83.82	85.53	86.68	88.72	82.34	62.37				
			230Vac	61.91	72.22	73.73	74.13	75.06	62.82	82.21	84.17	84.97	86.77	80.73	60.97				
C9300L-48P-4G	715W	Integrated	115Vac	69.21	77.07	78.03	78.82	79.86	70.06	86.76	87.97	88.97	90.01	85.41	68.42	213.65	351.15	575.52	632.46
			230Vac	67.90	76.03	76.95	77.76	78.78	68.72	85.61	86.74	87.62	88.63	84.22	67.16	209.87	342.56	556.81	611.08
C9300L-24T-4X	350W	Integrated	115Vac	58.69	65.61	67.13	67.54	68.03	59.12	71.55	73.49	74.06	75.14	70.66	58.13				
			230Vac	57.36	64.19	65.74	65.94	66.41	57.85	70.03	71.96	72.31	73.54	69.17	56.85				
C9300L-24P-4X	715W	Integrated	115Vac	64.32	70.97	72.60	73.02	73.63	69.27	76.96	79.15	79.85	81.00	76.59	64.99	207.17	343.00	569.93	626.15
			230Vac	64.09	69.90	71.75	72.28	72.92	67.80	76.12	78.34	78.78	79.91	75.67	63.70	203.04	336.39	553.25	607.02
C9300-48S	715W	C9300-NM-4G	115Vac	116.30	117.00	118.40	119.10	119.60	149.40	151.10	152.20	152.90	153.50	151.17	93.50				
			230Vac	114.90	115.60	116.70	117.60	118.10	147.10	148.80	150.10	150.30	150.70	148.82	92.10				
C9300-48S	715W	C9300-NM-2Q	115Vac	117.70	121.30	121.80	122.40	124.10	150.60	154.10	155.30	156.30	158.60	154.20	88.00				
			230Vac	116.40	119.70	120.20	120.80	122.10	147.70	151.20	152.70	153.80	156.10	151.34	87.60				
C9300-48S	715W	C9300-NM-8X	115Vac	120.50	123.60	124.30	125.20	126.00	152.80	156.10	157.60	158.60	160.80	156.24	87.40				
			230Vac	119.00	121.90	122.90	123.40	124.40	150.20	153.90	154.90	155.80	158.30	153.97	88.90				
C9300-48S	715W	C9300-NM-4M	115Vac	118.29	121.62	122.36	122.78	124.03	153.80	157.53	158.17	159.28	161.00	157.50	87.53				
			230Vac	117.15	120.62	120.89	121.30	122.35	150.20	153.61	154.60	155.58	157.86	153.69	86.48				
C9300-48S	715W	C9300-NM-2Y	115Vac	114.30	119.20	119.70	120.30	121.50	144.40	152.00	152.80	153.10	156.10	151.65	85.80				
			230Vac	112.00	118.00	118.60	118.90	120.10	142.20	149.20	150.20	151.00	153.40	148.92	83.90				
C9300-24S	715W	C9300-NM-4G	115Vac	99.40	100.30	101.50	102.10	102.50	116.20	117.70	119.10	119.50	119.80	117.76	91.70				
			230Vac	98.00	98.90	99.70	100.60	101.60	114.40	115.80	116.70	117.20	117.70	115.85	90.90				
C9300-24S	715W	C9300-NM-2Q	115Vac	101.90	104.80	105.30	105.40	106.10	117.60	120.50	121.10	121.70	123.10	120.47	85.40				
			230Vac	100.20	103.00	103.50	103.70	104.30	115.70	118.70	119.30	119.50	120.70	118.60	84.40				
C9300-24S	715W	C9300-NM-8X	115Vac	104.60	107.40	108.30	108.50	109.10	121.30	124.10	124.80	125.40	126.40	124.05	85.90				
			230Vac	103.40	105.70	106.40	106.70	107.00	119.40	122.50	122.90	123.20	124.30	122.37	84.60				
C9300-24S	715W	C9300-NM-4M	115Vac	99.15	101.80	102.50	102.70	103.30	116.60	119.70	120.30	121.00	122.20	119.64	82.10				
			230Vac	97.64	100.30	100.80	101.00	101.60	115.40	118.30	118.90	119.30	120.20	118.20	81.20				
C9300-24S	715W	C9300-NM-2Y	115Vac	101.24	104.48	104.75	104.81	105.42	116.40	119.01	120.31	120.58	121.31	118.98	85.02				
			230Vac	99.17	102.36	102.63	102.85	103.57	114.10	117.42	118.00	118.46	119.62	117.31	83.03				

**Table 21.** Power consumption of standalone 9300 Series Switches with platinum rated power supply (tested on Cisco IOS XE 16.8.1)

SKU	FEP	Uplink	Input	Measured P(W)															
				Half port traffic					Full port traffic					Weighted average Pw	No link	PoE test (no traffic)			
				0.01%/EEE	10%	30%	50%	100%	0.01%/EEE	10%	30%	50%	100%			25%	50%	90%	100%
C9300-24T	350W-P	NM-8-10G	115Vac	83.1	88.2	92.9	94	94.5	85.8	92.9	97.2	99.6	100.4	92.9	80.5				
			230Vac	81.9	86.8	91.3	92.4	92.9	84.4	91.6	95.9	98.2	99	91.6	79.2				
C9300-24P	715W-P	NM-8-10G	115Vac	89.2	94.3	99	100.1	100.7	92	98.9	103.5	105.9	107.1	99	85.8	205.6	324.7	518.9	568.4
			230Vac	86.7	91.8	96.4	97.5	98	89.4	97.1	101.4	103.6	104.5	97	84.1	201.9	318.7	507.2	554.4
C9300-24U	1100W-P	NM-8-10G	115Vac	90.5	95.9	100.5	101.6	102.1	93.3	100.6	104.9	107.2	108.1	100.6	87.9	319.9	549.5	935.3	1034.1
			230Vac	88.1	93.1	97.7	98.8	99.4	92.8	98	102.4	104.6	105.5	98.2	85.4	313.4	535.5	899.7	990.3
C9300-48T	350W-P	NM-8-10G	115Vac	89.8	95.4	100.4	101.1	102	90.4	102.4	107.5	109.8	111.8	102.2	85.4				
			230Vac	88.7	94.5	99.4	100.1	101	88.7	101.2	106	108.1	109.9	100.8	83.9				
C9300-48P	715W-P	NM-8-10G	115Vac	99.1	105.5	110.8	111.3	112.4	99.6	112.5	118.2	120.1	122.2	112.2	94.7	214.7	336.1	521.5	569.4
			230Vac	97.3	103.7	108.9	109.4	110.4	99	110.3	115.8	118.3	119.5	110.1	92.6	213.9	329.3	509.4	555
C9300-48U	1100W-P	NM-8-10G	115Vac	168.9	170.6	172.4	176.6	178.5	190.8	194	198.3	200.1	203.9	194.6	147.3	355.4	524.9	804.6	875.4
			230Vac	165.7	167.3	169.2	169.9	171.5	186.5	189.6	193.9	195.7	199.8	190.3	145	348.8	511.7	777.7	844.9
C9300-24UX	1100W-P	NM-8-10G	115Vac	186.8	191	194.9	197.1	198.9	209	215.4	227.2	230.1	233.1	216.6	165.3	367.5	522.1	776.1	842.3
			230Vac	182.8	186.9	190.6	193	194.1	205	211.2	222.7	225.5	229.8	212.5	162.7	361.1	510.2	752.3	809.9
C9300-48UXM	1100W-P	NM-8-10G	115Vac	241	248.1	254.8	256.4	258.9	260.1	269.4	281.6	286.5	291.6	270.7	225.1	394.8	531.4	755	809.5
			230Vac	237.5	243.1	249	250.3	251.1	253.9	261.8	273.9	279.2	283.6	263.2	218.5	386.8	518.1	731.3	785.5
C9300-48UN	1100W-P	NM-8-10G	115Vac	172.9	176.7	178.7	179.8	181.8	193.8	199.8	201.5	203.1	206.9	199.9	159.1	357.3	525	803.9	875.1
			230Vac	171.2	174.8	176.8	178.1	179.9	191.7	197.8	199.4	201	204.7	197.9	157.9	351.5	512.1	777	843.8

## Safety and compliance

Table 22 lists the safety and compliance information for the Cisco Catalyst 9300 Series.

**Table 22.** Safety and compliance information

Description	Specification
Safety certifications	<ul style="list-style-type: none"> <li>• UL 60950-1</li> <li>• CAN/CSA-C222.2 No. 60950-1</li> <li>• EN 60950-1</li> <li>• IEC 60950-1</li> <li>• AS/NZS 60950.1</li> <li>• IEEE 802.3</li> </ul>

Description	Specification
Electromagnetic emissions certifications	<ul style="list-style-type: none"> <li>• 47 CFR Part 15</li> <li>• CISPR22 Class A</li> <li>• EN 300 386 V1.6.1</li> <li>• EN 55022 Class A</li> <li>• EN 55032 Class A</li> <li>• CISPR 32 Class A</li> <li>• EN61000-3-2</li> <li>• EN61000-3-3</li> <li>• ICES-003 Class A</li> <li>• TCVN 7189 Class A</li> <li>• V-3 Class A</li> <li>• CISPR24</li> <li>• EN 300 386</li> <li>• EN55024</li> <li>• TCVN 7317</li> <li>• V-2/2015.04</li> <li>• V-3/2015.04</li> <li>• CNS13438</li> <li>• KN32</li> <li>• KN35</li> <li>• IEC 61000-6-1</li> <li>• EN 61000-6-1</li> </ul> <p><b>Additional Certifications for C9300L SKUs:</b></p> <ul style="list-style-type: none"> <li>• QCVN 118:2018/BTTTT</li> <li>• CISPR24/25</li> <li>• CISPR 32 Class A</li> <li>• VCCI-CISPR 32 Class A</li> <li>• EN55035</li> </ul>
Environmental	Reduction of Hazardous Substances (ROHS) 5

## Warranty

### Cisco enhanced limited lifetime hardware warranty

The Cisco Catalyst 9300 Series Switches come with a Cisco Enhanced Limited Lifetime hardware Warranty (E-LLW) that includes Next-Business-Day (NBD) delivery of replacement hardware where available and 90 days of 8x5 Cisco Technical Assistance Center (TAC) support.

Your formal warranty statement, including the warranty applicable to Cisco software, appears in the information packet that accompanies your Cisco product. We encourage you to review the warranty statement shipped with your specific product carefully before use.

Cisco reserves the right to refund the purchase price as its exclusive warranty remedy.

For further information about warranty terms, visit <https://www.cisco.com/go/warranty>. Table 23 provides information about the E-LLW.

**Table 23.** E-LLW details

	Cisco E-LLW
<b>Devices covered</b>	Applies to Cisco Catalyst 9300 Series Switches.
<b>Warranty duration</b>	As long as the original customer owns the product.
<b>End-of-life policy</b>	In the event of discontinuance of product manufacture, Cisco warranty support is limited to 5 years from the announcement of discontinuance.
<b>Hardware replacement</b>	Cisco or its service center will use commercially reasonable efforts to ship a replacement for NBD delivery, where available. Otherwise, a replacement will be shipped within 10 working days after receipt of the Return Materials Authorization (RMA) request. Actual delivery times might vary depending on customer location.
<b>Effective date</b>	Hardware warranty commences from the date of shipment to customer (and in case of resale by a Cisco reseller, not more than 90 days after original shipment by Cisco).
<b>TAC support</b>	Cisco will provide during business hours, 8 hours per day, 5 days per week, basic configuration, diagnosis, and troubleshooting of device-level problems for up to a 90-day period from the date of shipment of the originally purchased Cisco Catalyst 9300 Series product. This support does not include solution or network-level support beyond the specific device under consideration.
<b>Cisco.com access</b>	Warranty allows guest access only to Cisco.com.

## Cisco environmental sustainability

Information about Cisco’s environmental sustainability policies and initiatives for our products, solutions, operations, and extended operations or supply chain is provided in the “Environment Sustainability” section of Cisco’s [Corporate Social Responsibility](#) (CSR) Report.

Reference links to information about key environmental sustainability topics (mentioned in the “Environment Sustainability” section of the CSR Report) are provided in the following table:

Sustainability topic	Reference
Information on product material content laws and regulations	<a href="#">Materials</a>
Information on electronic waste laws and regulations, including products, batteries, and packaging	<a href="#">WEEE compliance</a>

Cisco makes the packaging data available for informational purposes only. It may not reflect the most current legal developments, and Cisco does not represent, warrant, or guarantee that it is complete, accurate, or up to date. This information is subject to change without notice.



## Cisco Services

### Cisco Services for next-generation Cisco Catalyst 9000 Switches

Achieve infrastructure excellence faster and with less risk. Cisco Catalyst 9000 Services provide expert guidance to help you successfully deploy, manage and support the new Cisco Catalyst 9000 switching family. With unmatched networking expertise, best practices, and innovative tools, we can help you reduce overall upgrade, refresh, and migration costs as you introduce new hardware, software, and protocols into the network. Offering a comprehensive lifecycle of services – from implementation, optimization, technical, and managed services – Cisco experts help you reduce disruption and achieve operational excellence to extract maximum value from your Cisco DNA ready infrastructure.

[Learn more about Cisco Services for Enterprise Networks](#)

### Software policy for Cisco Catalyst 9300 Series Switches

#### Software policy for network stack components

Customers with the Network Essentials Stack and Network Advantage Stack software feature sets are provided with maintenance updates and bug fixes designed to maintain compliance of the software. This includes compliance with published specifications, release notes, and industry standards as long as the original end user continues to own or use the product or up to one year from the end-of-sale date for the product, whichever occurs earlier.

### Cisco embedded support for Cisco DNA term components

Cisco Embedded Support delivers the right support for Cisco software products and suites. It will keep your business applications performing as expected and protect your investment. Cisco Embedded Support for the Cisco DNA Essentials and Cisco DNA Advantage term components is included. Cisco Embedded Support provides access to TAC support, major software updates, maintenance and minor software releases, and the Cisco Embedded Support site, for increased productivity with anytime access.

## Ordering information

Table 24 lists ordering information for the Cisco Catalyst 9300 Series. To place an order, visit the Cisco Ordering home page at [https://www.cisco.com/en/US/ordering/or13/or8/order\\_customer\\_help\\_how\\_to\\_order\\_listing.html](https://www.cisco.com/en/US/ordering/or13/or8/order_customer_help_how_to_order_listing.html).

Table 24. Ordering information

Switches	
Product number	Product description
C9300-24T-E	Catalyst 9300 24-port modular uplinks data only, Network Essentials
C9300-24T-A	Catalyst 9300 24-port modular uplinks data only, Network Advantage
C9300-24P-E	Catalyst 9300 24-port modular uplinks PoE+, Network Essentials
C9300-24P-A	Catalyst 9300 24-port modular uplinks PoE+, Network Advantage
C9300-24U-E	Catalyst 9300 24-port modular uplinks UPOE, Network Essentials
C9300-24U-A	Catalyst 9300 24-port modular uplinks UPOE, Network Advantage
C9300-24UB-E	Catalyst 9300 higher scale 24-port modular uplinks UPOE, Network Essentials

Switches	
C9300-24UB-A	Catalyst 9300 higher scale 24-port modular uplinks UPOE, Network Advantage
C9300-24UX-E	Catalyst 9300 24-port modular uplinks mGig UPOE, Network Essentials
C9300-24UX-A	Catalyst 9300 24-port modular uplinks mGig UPOE, Network Advantage
C9300-24UXB-E	Catalyst 9300 higher scale 24-port modular uplinks mGig UPOE, Network Essentials
C9300-24UXB-A	Catalyst 9300 higher scale 24-port modular uplinks mGig UPOE, Network Advantage
C9300-48T-E	Catalyst 9300 48-port modular uplinks data only, Network Essentials
C9300-48T-A	Catalyst 9300 48-port modular uplinks data only, Network Advantage
C9300-48P-E	Catalyst 9300 48-port modular uplinks PoE+, Network Essentials
C9300-48P-A	Catalyst 9300 48-port modular uplinks PoE+, Network Advantage
C9300-48U-E	Catalyst 9300 48-port modular uplinks UPOE, Network Essentials
C9300-48U-A	Catalyst 9300 48-port modular uplinks UPOE, Network Advantage
C9300-48UXM-E	Catalyst 9300 48-port modular uplinks 2.5G (12 mGig) UPOE, Network Essentials
C9300-48UXM-A	Catalyst 9300 48-port modular uplinks 2.5G (12 mGig) UPOE, Network Advantage
C9300-48UN-E	Catalyst 9300 48-port modular uplinks 5G UPOE, Network Essentials
C9300-48UN-A	Catalyst 9300 48-port modular uplinks 5G UPOE, Network Advantage
C9300-48UB-E	Catalyst 9300 higher scale 48-port modular uplinks 1G UPOE, Network Essentials
C9300-48UB-A	Catalyst 9300 higher scale 48-port modular uplinks 1G UPOE, Network Advantage
C9300-24S-E	Catalyst 9300 24-port modular uplinks 1G SFP, Network Essentials
C9300-24S-A	Catalyst 9300 24-port modular uplinks 1G SFP, Network Advantage
C9300-48S-E	Catalyst 9300 48-port modular uplinks 1G SFP, Network Essentials
C9300-48S-A	Catalyst 9300 48-port modular uplinks 1G SFP, Network Advantage
C9300L-24T-4G-E	Catalyst 9300 24-port fixed uplinks data only, 4X1G uplinks, Network Essentials
C9300L-24T-4G-A	Catalyst 9300 24-port fixed uplinks data only, 4X1G uplinks, Network Advantage
C9300L-24P-4G-E	Catalyst 9300 24-port fixed uplinks PoE+, 4X1G uplinks, Network Essentials
C9300L-24P-4G-A	Catalyst 9300 24-port fixed uplinks PoE+, 4X1G uplinks, Network Advantage
C9300L-48T-4G-E	Catalyst 9300 48-port fixed uplinks data only, 4X1G uplinks, Network Essentials
C9300L-48T-4G-A	Catalyst 9300 48-port fixed uplinks data only, 4X1G uplinks, Network Advantage

Switches	
C9300L-48P-4G-E	Catalyst 9300 48-port fixed uplinks PoE+, 4X1G uplinks, Network Essentials
C9300L-48P-4G-A	Catalyst 9300 48-port fixed uplinks PoE+, 4X1G uplinks, Network Advantage
C9300L-24T-4X-E	Catalyst 9300 24-port fixed uplinks data only, 4X10G uplinks, Network Essentials
C9300L-24T-4X-A	Catalyst 9300 24-port fixed uplinks data only, 4X10G uplinks, Network Advantage
C9300L-24P-4X-E	Catalyst 9300 24-port fixed uplinks PoE+, 4X10G uplinks, Network Essentials
C9300L-24P-4X-A	Catalyst 9300 24-port fixed uplinks PoE+, 4X10G uplinks, Network Advantage
C9300L-48T-4X-E	Catalyst 9300 48-port fixed uplinks data only, 4X10G uplinks, Network Essentials
C9300L-48T-4X-A	Catalyst 9300 48-port fixed uplinks data only, 4X10G uplinks, Network Advantage
C9300L-48P-4X-E	Catalyst 9300 48-port fixed uplinks PoE+, 4X10G uplinks, Network Essentials
C9300L-48P-4X-A	Catalyst 9300 48-port fixed uplinks PoE+, 4X10G uplinks, Network Advantage
Network modules	
Product number	Product description
C9300-NM-4G	Catalyst 9300 4 x 1GE Network Module
C9300-NM-4G=	Catalyst 9300 4 x 1GE Network Module, spare
C9300-NM-8X	Catalyst 9300 8 x 10GE Network Module
C9300-NM-8X=	Catalyst 9300 8 x 10GE Network Module, spare
C9300-NM-2Q	Catalyst 9300 2 x 40GE Network Module
C9300-NM-2Q=	Catalyst 9300 2 x 40GE Network Module, spare
C9300-NM-2Y	Catalyst 9300 2 x 25G Network Module
C9300-NM-2Y=	Catalyst 9300 2 x 25G Network Module, spare
C9300-NM-4M	Catalyst 9300 4 x mGig Network Module
C9300-NM-4M=	Catalyst 9300 4 x mGig Network Module, spare
NM-BLANK-T1=	Cisco Catalyst Type 1 Network Module Blank, spare

## Switches

### Storage Module

Product number	Product description
SSD-120G	Cisco pluggable USB3.0 SSD storage
SSD-120G=	Cisco pluggable USB3.0 SSD storage, spare

### Software licenses for C9300 SKUs

Product number	Product description
C9300-DNA-P-24-3Y	C9300 Cisco DNA Premier, 24-port, 3 Year Term license
C9300-DNA-P-24-5Y	C9300 Cisco DNA Premier, 24-port, 5 Year Term license
C9300-DNA-P-24-7Y	C9300 Cisco DNA Premier, 24-port, 7 Year Term license
C9300-DNA-P-48-3Y	C9300 Cisco DNA Premier, 48-port, 3 Year Term license
C9300-DNA-P-48-5Y	C9300 Cisco DNA Premier, 48-port, 5 Year Term license
C9300-DNA-P-48-7Y	C9300 Cisco DNA Premier, 48-port, 7 Year Term license
C9300-DNA-E-24-3Y	C9300 Cisco DNA Essentials, 24-port, 3 Year Term license
C9300-DNA-E-24-5Y	C9300 Cisco DNA Essentials, 24-port, 5 Year Term license
C9300-DNA-E-24-7Y	C9300 Cisco DNA Essentials, 24-port, 7 Year Term license
C9300-DNA-A-24-3Y	C9300 Cisco DNA Advantage, 24-port, 3 Year Term license
C9300-DNA-A-24-5Y	C9300 Cisco DNA Advantage, 24-port, 5 Year Term license
C9300-DNA-A-24-7Y	C9300 Cisco DNA Advantage, 24-port, 7 Year Term license
C9300-DNA-E-48-3Y	C9300 Cisco DNA Essentials, 48-port, 3 Year Term license
C9300-DNA-E-48-5Y	C9300 Cisco DNA Essentials, 48-port, 5 Year Term license
C9300-DNA-E-48-7Y	C9300 Cisco DNA Essentials, 48-port, 7 Year Term license
C9300-DNA-A-48-3Y	C9300 Cisco DNA Advantage, 48-port, 3 Year Term license
C9300-DNA-A-48-5Y	C9300 Cisco DNA Advantage, 48-port, 5 Year Term license
C9300-DNA-A-48-7Y	C9300 Cisco DNA Advantage, 48-port, 7 Year Term license
C9300-DNA-P-24S-3Y	C9300 1G Fiber Cisco DNA Premier, 24-port, 3 Year Term license
C9300-DNA-P-24S-5Y	C9300 1G Fiber Cisco DNA Premier, 24-port, 5 Year Term license
C9300-DNA-P-24S-7Y	C9300 1G Fiber Cisco DNA Premier, 24-port, 7 Year Term license

Switches	
C9300-DNA-P-48S-3Y	C9300 1G Fiber Cisco DNA Premier, 48-port, 3 Year Term license
C9300-DNA-P-48S-5Y	C9300 1G Fiber Cisco DNA Premier, 48-port, 5 Year Term license
C9300-DNA-P-48S-7Y	C9300 1G Fiber Cisco DNA Premier, 48-port, 7 Year Term license
C9300-DNA-E-24S-3Y	C9300 1G Fiber Cisco DNA Essentials, 24-port, 3 Year Term license
C9300-DNA-E-24S-5Y	C9300 1G Fiber Cisco DNA Essentials, 24-port, 5 Year Term license
C9300-DNA-E-24S-7Y	C9300 1G Fiber Cisco DNA Essentials, 24-port, 7 Year Term license
C9300-DNA-A-24S-3Y	C9300 1G Fiber Cisco DNA Advantage, 24-port, 3 Year Term license
C9300-DNA-A-24S-5Y	C9300 1G Fiber Cisco DNA Advantage, 24-port, 5 Year Term license
C9300-DNA-A-24S-7Y	C9300 1G Fiber Cisco DNA Advantage, 24-port, 7 Year Term license
C9300-DNA-E-48S-3Y	C9300 1G Fiber Cisco DNA Essentials, 48-port, 3 Year Term license
C9300-DNA-E-48S-5Y	C9300 1G Fiber Cisco DNA Essentials, 48-port, 5 Year Term license
C9300-DNA-E-48S-7Y	C9300 Cisco DNA Essentials, 48-port, 7 Year Term license
C9300-DNA-A-48S-3Y	C9300 1G Fiber Cisco DNA Advantage, 48-port, 3 Year Term license
C9300-DNA-A-48S-5Y	C9300 1G Fiber Cisco DNA Advantage, 48-port, 5 Year Term license
C9300-DNA-A-48S-7Y	C9300 1G Fiber Cisco DNA Advantage, 48-port, 7 Year Term license
C9300-LIC=	Electronic Cisco DNA Upgrade License for C9300 switches. Note: when upgrading from Cisco DNA Essentials to Cisco DNA Advantage, Network Essentials is also upgraded to Network Advantage
CAT-CDNA-P	Cisco DNA Premier Term Add for Catalyst Switches
Software licenses for C9300L SKUs	
Product number	Product number
C9300L-DNA-P-24-3Y	C9300L Cisco DNA Premier, 24-port, 3 Year Term license
C9300L-DNA-P-24-5Y	C9300L Cisco DNA Premier, 24-port, 5 Year Term license
C9300L-DNA-P-24-7Y	C9300L Cisco DNA Premier, 24-port, 7 Year Term license
C9300L-DNA-P-48-3Y	C9300L Cisco DNA Premier, 48-port, 3 Year Term license
C9300L-DNA-P-48-5Y	C9300L Cisco DNA Premier, 48-port, 5 Year Term license
C9300L-DNA-P-48-7Y	C9300L Cisco DNA Premier, 48-port, 7 Year Term license
C9300L-DNA-E-24-3Y	C9300L Cisco DNA Essentials, 24-port, 3 Year Term license
C9300L-DNA-E-24-5Y	C9300L Cisco DNA Essentials, 24-port, 5 Year Term license

Switches	
C9300L-DNA-E-24-7Y	C9300L Cisco DNA Essentials, 24-port, 7 Year Term license
C9300L-DNA-A-24-3Y	C9300L Cisco DNA Advantage, 24-port, 3 Year Term license
C9300L-DNA-A-24-5Y	C9300L Cisco DNA Advantage, 24-port, 5 Year Term license
C9300L-DNA-A-24-7Y	C9300L Cisco DNA Advantage, 24-port, 7 Year Term license
C9300L-DNA-E-48-3Y	C9300L Cisco DNA Essentials, 48-port, 3 Year Term license
C9300L-DNA-E-48-5Y	C9300L Cisco DNA Essentials, 48-port, 5 Year Term license
C9300L-DNA-E-48-7Y	C9300L Cisco DNA Essentials, 48-port, 7 Year Term license
C9300L-DNA-A-48-3Y	C9300L Cisco DNA Advantage, 48-port, 3 Year Term license
C9300L-DNA-A-48-5Y	C9300L Cisco DNA Advantage, 48-port, 5 Year Term license
C9300L-DNA-A-48-7Y	C9300L Cisco DNA Advantage, 48-port, 7 Year Term license
C9300L-LIC=	Electronic Cisco DNA Upgrade License for C9300L switches. Note: when upgrading from Cisco DNA Essentials to Cisco DNA Advantage, Network Essentials is also upgraded to Network Advantage
Power supplies	
Product number	Product description
PWR-C1-350WAC=	350WAC power supply spare
PWR-C1-715WAC=	715WAC power supply spare
PWR-C1-715WDC=	715WDC power supply spare
PWR-C1-1100WAC=	1100WAC power supply spare
PWR-C1-350WAC-P=	350WAC Platinum-rated power supply spare
PWR-C1-715WAC-P=	715WAC Platinum-rated power supply spare
PWR-C1-1100WAC-P=	1100WAC Platinum-rated power supply spare
PWR-C1-715WAC-UP	Upgrade to 715WAC Platinum-rated power supply
PWR-C1-1100WAC-UP	Upgrade to 1100WAC Platinum-rated power supply
Cisco StackWise-480 and StackPower cables	
Product number	Product description
STACK-T1-50CM=	Cisco StackWise-480 50cm stacking cable spare
STACK-T1-1M=	Cisco StackWise-480 1m stacking cable spare
STACK-T1-3M=	Cisco StackWise-480 3m stacking cable spare

Switches	
CAB-SPWR-30CM=	Cisco Catalyst 3850 StackPower cable 30cm spare
CAB-SPWR-150CM=	Cisco Catalyst 3850 StackPower cable 150cm spare
Cisco StackWise-320 Accessories	
Product number	Product description
C9300L-STACK-KIT	Stack Kit for C9300L SKUs – includes 2 Stack Adaptors and 1 Stack Cable
C9300L-STACK-KIT=	Stack Kit for C9300L SKUs – includes 2 Stack Adaptors and 1 Stack Cable, spare
STACK-T3-50CM	50CM Type 3 Stacking Cable – default with Stack Kit for C9300L SKUs
STACK-T3-50CM=	50CM Type 3 Stacking Cable, spare for C9300L SKUs
STACK-T3-1M	1M Type 3 Stacking Cable for C9300L SKUs
STACK-T3-1M=	1M Type 3 Stacking Cable, spare for C9300L SKUs
STACK-T3-3M	3M Type 3 Stacking Cable for C9300L SKUs
STACK-T3-3M=	3M Type 3 Stacking Cable, spare for C9300L SKUs
Spare power cords	
CAB-TA-NA=	AC power cord for Cisco Catalyst (North America)
CAB-TA-AP=	AC power cord for Cisco Catalyst (Australia)
CAB-TA-AR=	AC power cord for Cisco Catalyst (Argentina)
CAB-TA-SW=	AC power cord for Cisco Catalyst (Switzerland)
CAB-TA-UK=	AC power cord for Cisco Catalyst (United Kingdom)
CAB-TA-JP=	AC power cord for Cisco Catalyst (Japan)
CAB-TA-250VAC-JP=	Japan 250VAC power cord for Cisco Catalyst (Japan)
CAB-TA-EU=	AC power cord for Cisco Catalyst (Europe)
CAB-TA-IT=	AC power cord for Cisco Catalyst (Italy)
CAB-TA-IN=	AC power cord for Cisco Catalyst (India)
CAB-TA-CN=	AC power cord for Cisco Catalyst (China)
CAB-TA-DN=	AC power cord for Cisco Catalyst (Denmark)
CAB-TA-IS=	AC power cord for Cisco Catalyst (Israel)
CAB-ACBZ-12A=	AC power cord for Cisco Catalyst (Brazil), 12A/125V BR-3-20 plug up to 12A

## Switches

CAB-ACBZ-10A=	AC power cord for Cisco Catalyst (Brazil), 10A/250V BR-3-10 plug up to 10A
CAB-C15-CBN	Cabinet jumper power cord, 250VAC 13A, C14-C15 connectors

## Optics online reference

The Cisco Catalyst 9300 Series supports a wide range of optics. Because the list of supported optics is updated on a regular basis, consult the tables available here for the latest QSFP+, SFP+, and SFP compatibility information:

[https://www.cisco.com/en/US/products/hw/modules/ps5455/products\\_device\\_support\\_tables\\_list.html](https://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html).

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## Document history

New or revised topic	Described In	Date
Updates for Brattain Program for C9300 – this is higher buffer and higher scale SKUs	All relevant sections	October 9, 2019
Adding Primary PSU upgrade option for 9300	<a href="#">Table 3: Power supply models</a>	June 20, 2019
Product name change: Cisco ONE to Cisco DNA	<a href="#">Introduction</a>	May 10, 2019
Wi-Fi 6 addition	<a href="#">Product Overview: Features</a>	May 10, 2019
Add: Features	<a href="#">Product Overview: Features</a>	May 10, 2019
Add: Modular uplink models table	<a href="#">Platform Details</a>	May 10, 2019
Edit: Cisco Catalyst 9300 Series modular uplink	<a href="#">Platform Details</a>	May 10, 2019
Edit: Table 1: Cisco Catalyst 9300 Series Switch configurations; uplink configuration add	<a href="#">Platform Details</a>	May 10, 2019
Edit: Table 2: Name change to "Catalyst 9300..."	<a href="#">Platform Details</a>	May 10, 2019
Add: Figure 3: pic for Franklin	<a href="#">Platform Details</a>	May 10, 2019
Edit: Table 3: Power supply models	<a href="#">Platform Details</a>	May 10, 2019
Add: Stacking, Table 4	<a href="#">Platform Details</a>	May 10, 2019
Add: Stacking Accessories, Table 5	<a href="#">Platform Details</a>	May 10, 2019
Edit: Replaced C3850 stack picture with C9300 stack picture	<a href="#">Platform Details</a>	May 10, 2019
Add: Fan, Table 6	<a href="#">Platform Details</a>	May 10, 2019
Edit: Table 7	<a href="#">Performance and Scalability</a>	May 10, 2019
Add: Bandwidth Specifications	<a href="#">Performance and Scalability</a>	May 10, 2019
Add: StackWise-320	<a href="#">Resiliency and High Availability</a>	May 10, 2019
Edit: name change from Cisco One to Cisco DNA Software	<a href="#">Software Requirements</a>	May 10, 2019
Edit: text edits	<a href="#">Licensing</a>	May 10, 2019
Edit: Table 13	<a href="#">Licensing</a>	May 10, 2019

New or revised topic	Described In	Date
Edit: Table 14	<a href="#">Specifications</a>	May 10, 2019
Edit: Table 15	<a href="#">Connectors</a>	May 10, 2019
Edit: Table 17	<a href="#">Power Supply Specifications</a>	May 10, 2019
Edit: Table 21	<a href="#">Safety and Compliance</a>	May 10, 2019
Edit: Table 23	<a href="#">Ordering Information</a>	May 10, 2019
Added support for SD-Access Embedded Wireless	Added support for SD-Access Embedded Wireless Controller functionality.	Nov 13, 2018
Updated Platinum Power Supply specifications	Platinum rated power supplies available on the C9300 switches.	Oct 5, 2018
Updated availability of SSD card	Availability of 120G storage module for the C9300.	Oct 5, 2018
Updated <a href="#">Product overview</a>	Added Catalyst 9500 high density platforms and updated associated speeds and densities, e.g. Up to 6.4-Tbps switching capacity with up to 2 Bpps of forwarding performance from "3.2 Tbps/1 Bpps" a. 32 port 100G, b. 32 port 40G, c. 48 port 25G. Added Catalyst 9500 mid density platform a. 24 port 25G, b. 16 port 1/10G. Added new optical interfaces - QSFP28, SFP28. Added new power supply options - 650W, 1600W. Added RESCONF support. Stackwise Virtual extended to all Catalyst 9500 platforms.	Mar 31, 2018
Updated <a href="#">Audio Video Bridging</a>	AVB support noted for certain platforms. Corrected references to Catalyst 9000 switches, rather than Catalyst 9000 Series switches. Corrected references to Cisco IOS XE, rather than IOS-XE.	Dec 15, 2017

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# Cisco Prime Infrastructure 3.x

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## One Management and One Assurance of Enterprise Networks from Campus/Branch to the Data Center

### Overview

Cisco Prime Infrastructure is a network management tool that supports lifecycle management of your entire network infrastructure from a single graphical interface. Cisco Prime Infrastructure provides network administrators a single solution for provisioning, monitoring, optimizing, and troubleshooting both wired and wireless devices. Robust graphical interfaces make device deployments and operations simple and cost-effective.

To overcome these challenges, IT professionals need a comprehensive solution to manage, visualize, and monitor the network from a single graphical interface. Cisco Prime™ Infrastructure provides lifecycle management, assurance visibility, and troubleshooting capabilities network-wide - from the wireless user in the branch office, across the WAN, and to the data center. In essence, it is One Management and One Assurance, for One Network (Figure 1).

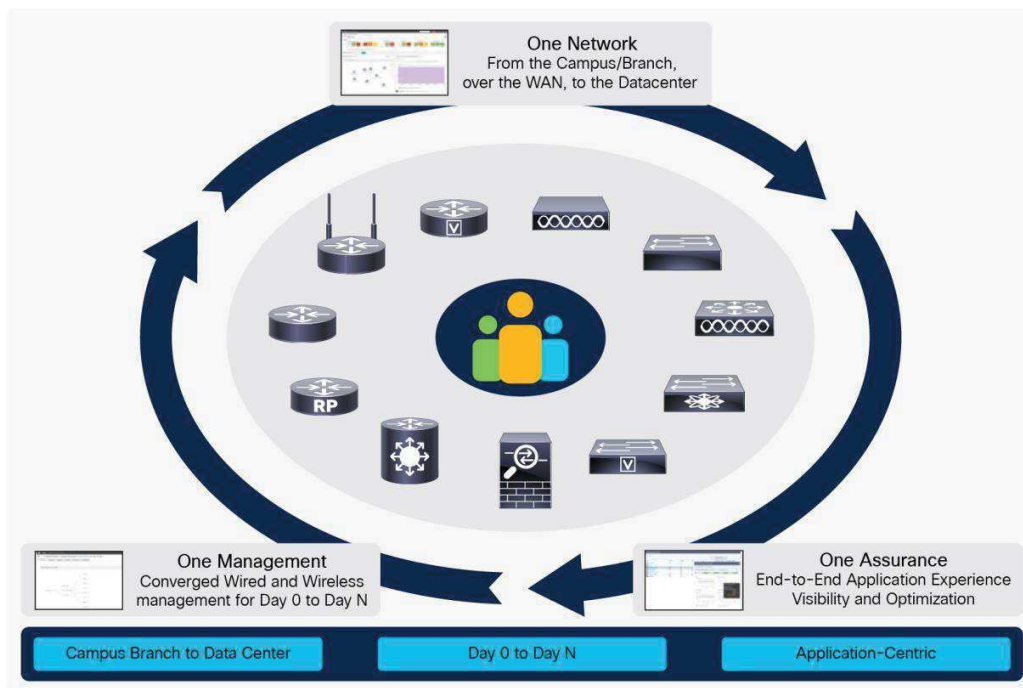


Figure 1.  
Cisco Prime Infrastructure

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## Cisco Prime Infrastructure highlights

Cisco Prime Infrastructure allows/helps you to manage your network more efficiently and effectively, thereby enabling you to achieve the highest levels of wireless and wired network performance, service assurance, and application-centric end-user experience.

- **Single-pane-of-glass management:** Cisco Prime Infrastructure delivers a single, unified platform for network service provisioning, monitoring and assurance, and change and compliance management. It accelerates the device and services deployment and helps you rapidly resolve problems that can affect the end-user experience. It minimizes the amount of time you spend managing the existing network so you can maximize the time you spend in supporting business growth.
- **Simplified deployment of Cisco<sup>®</sup> capabilities:** Cisco Prime Infrastructure makes the design and fulfillment of Cisco differentiated features and services fast and efficient. With out-of-the-box support for technologies such as Intelligent WAN (IWAN), Distributed Wireless with Converged Access, Application Visibility and Control (AVC), Zone-Based Firewall, and Cisco TrustSec<sup>®</sup> 6.4 Identity-Based Networking Services, it helps you get the most from the intelligence built in to your Cisco devices as quickly as possible.
- **Deep Application Visibility:** Cisco Prime Infrastructure configures and uses embedded Cisco instrumentation and industry-leading technologies for application visibility and network policy optimization. These technologies include NetFlow, Network-Based Application Recognition 2 (NBAR2), Simple Network Management Protocol (SNMP), and more. Cisco Prime Infrastructure also triggers the capture, processing, and drill-down into application performance and packet diagnostics data from distributed Cisco Network Analysis Module (NAM) deployments.
- **Comprehensive coverage of enterprise mobility:** Cisco Prime Infrastructure delivers pinpoint visibility into the who, what, when, where, and how of wireless access through its own data collection and key integrations. It includes 802.11ac support; correlated wired-wireless client visibility; unified access infrastructure monitoring; spatial mapping; integrated security and policy application and troubleshooting with [Cisco Identity Services Engine \(ISE\)](#) integration; integrated location-based tracking of interferers, rogues, and Wi-Fi client reporting with [Cisco Mobility Services Engine \(MSE\)](#) and Cisco CleanAir<sup>®</sup> integration; RF prediction tools; and more.
- **Unified assurance across network and compute:** Cisco Prime Infrastructure delivers scalable management and service assurance across the breadth of enterprise infrastructure in your branch office, campus, and data center networks including network equipment, UCS servers, and virtual machines. The ability to track a user in the branch connecting via a mobile or wired device, all the way to a compute resource in the data center, is essential for fast onboarding, remediation, and troubleshooting.
- **Centralized visibility of distributed networks:** Large or global organizations often distribute network management by domain, region, or country. Cisco Prime Infrastructure Operations Center helps you visualize up to 10 Cisco Prime Infrastructure instances, scaling your network-management capability while maintaining centralized visibility and control.
- What is new in Prime Infrastructure 3.x?
  - Cisco Prime Infrastructure 3.x offers new capabilities and a few are highlighted below.

- 
- **Platform Enhancements:**
    - **New User Interface:** Modern user interface with HTML 5.0 (and removal of flash) provides operators with a quick and easy view to isolate issues in the network and identify root cause remediation. The new interface also allows customers to have a superior experience independent of/irrespective of whether they are using a tablet or a traditional PC.
    - **Alarm Customization:** Network operators have the ability to customize alarms based on the operational needs of the enterprise. Customizable syslog-based alarms provide the ability to custom create new alarms and prioritize operator response.
    - **Correlated Performance Graphs:** Correlated charts enable administrators to carry out comparative troubleshooting of network KPIs. The overlay of alarms and configuration change events in the correlated graphs helps connect network change events to performance degradation/improvements.
    - **Configuration Compliance:** With the addition of a compliance engine, the product provides operators the ability to specify the golden network configuration and perform an audit of the network devices against the configuration archive or the device configuration. The audit report identifies devices that are out of compliance. Operators can remediate the devices that are out of compliance with the desired configuration. This engine also helps ingenerating reports for EoL/EoS/PCI for network device and Hardware modules. The CVE, CVSS, and Caveats fields are listed in the PSIRT report/page.
    - **Japanese Localization Support:** Provides alternative UI support in Kanji.
  - **Wireless Management:** Simplified client troubleshooting enables network operators to easily identify the root cause of client issues in a graphical format, speeding up problem identification and resolution. Rogue management and troubleshooting is simplified with enhancements to Switch Port Tracing (SPT) to identify rogue devices on the wire in the network.
  - **Routing - Intelligent WAN (IWAN) management:** Guided workflows based on Cisco Validated Designs and best practices radically simplify deployment and management of Cisco IWAN devices and services. The workflow speeds up provisioning of services such as Dynamic Multipoint VPN (DMVPN) and Performance Routing (PFR) and simplifies Quality-of-Service (QoS) configuration and monitoring. The new PFR monitoring dashboard provides visibility on how application path optimization is working on alternative transport routes and aids troubleshooting of route change events driven by IWAN.
  - **Web Content Accessibility Guidelines (WCAG 2.0):** Runs all the PI 3.x WCAG tests according to the Web Content Accessibility Guidelines 2.0 (<https://www.w3.org/TR/WCAG20/>) checklist.
  - **Cisco DNA Center (Cisco DNAC) Co-Existence:** Objective of the Co-Existence is to enable Prime Infrastructure customers to jump-start with Cisco DNA Center using minimal efforts. To help Migrate Devices, Location Groups, Maps, and CMX Servers from Prime Infrastructure to Cisco DNA Center seamlessly using the workflow. Allow Incremental updates to the migrated dataset and start using Cisco DNA Center Assurance for the migrated sites from Day 1. Refer [Cisco DNA Center and Prime Co-Existence](#) for more details.
  - **Device Support in Wired and Wireless devices:** In Prime Infrastructure it covers almost all categories of network devices on Routing, Switching, IoT device, Wireless device with access points, and Mobility Express Mode. Refer [Cisco Prime Infrastructure 3.6 Supported Devices](#) and [Cisco Wireless Solutions Software Compatibility Matrix](#).

## Ordering and licensing information

For details, refer to the [Cisco Prime Infrastructure 3.x Ordering and Licensing Guide](#). This guide also provides information about obtaining an evaluation copy of Prime Infrastructure 3.x.

## Product specifications

Table 1 provides product specifications for the various virtual and physical appliance deployment options supported by Cisco Prime Infrastructure.

Prime Infrastructure is available on the Prime Infrastructure Physical Appliance and Cisco Digital Network Architecture Center (Cisco DNA Center) Appliance. Prime Infrastructure 3.6 is not supported on the PRIME-NCS-APL-K9 (also known as "Gen 1"). Prime Infrastructure 3.6 is supported on PI-UCS-APL-K9 (also known as the Gen 2 appliance), PI-UCSM5-APL-K9 (also known as Gen 3 appliance – 44 core only for Cisco DNA Center) and DN1-HW-APL (also known as Cisco DNA Center Appliance). You can upgrade a Prime Infrastructure Physical Appliance running Prime Infrastructure 3.4.x or 3.5.x to Prime Infrastructure 3.6. You can upgrade the older versions to 3.4.x or 3.5.x to upgrade to the Prime Infrastructure 3.6.

**Table 1.** Product specifications for Cisco Prime Infrastructure 3.x

VMware	VMware ESXi Version 6.0, 6.5, or 6.7				
<b>Virtual appliance resource requirements</b>	Recommended Virtual Appliance	vCPU (Virtual CPUs)	Memory (DRAM)	Minimum Hard Disk Drive Size **	Disk Input/output Bandwidth
	Express	4	12 GB	300 GB	200 MBps
	Express Plus	8	16 GB	600 GB	200 MBps
	Standard	16	16 GB	900 GB	200 MBps
	Pro	16	24 GB	1200 GB	320 MBps**
<b>Physical appliance specifications</b>	Physical Appliance*	CPU	Memory (DRAM)	Hard Disk Drive Size	Disk Input/output Bandwidth
	(Gen 2) Cisco Prime Appliance*	10 Core Physical CPUs - 20 Threads	64 GB	4 x 900GB RAID10	320 MBps**
	(Gen 3) Cisco Prime Appliance	20 Core Physical CPUs – 40 Threads	64 GB	4x1.2 TB RAID 10	320 MBps**
	Gen 1 Cisco DNA Center Appliance	44 Core Physical CPUs – 88 Threads	256 GB	6 X 1.9 TB; 4 X 2 480 GB	320 MBps**

\* Hard Disk Drive sizes mentioned above are the VM sizes for thick allocation. It is recommended to leave an additional 50% of space free in the data-store of the VM, to allow taking snapshots of the VM when required, as snapshots will take additional space.

\*\* Customers upgrading from PI 2.2 to PI 3.x are recommended to configure Disk I/O Bandwidth to 320 Mbps to minimize performance degradation.

\* Gen-3 Appliance are supported starting Prime Infrastructure 3.5. [End-of-Sale and End-of-Life Announcement for the Cisco Prime Infrastructure HW Gen3 Appliance and 3.1 and 3.2 Software](#).

## Technical services

Cisco Prime Infrastructure 3.x is available with the new Cisco Software Support Service (SWSS), which provides reactive maintenance support in the form of technical support, access to Cisco.com, software support, and access to major and minor



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upgrades from the Cisco.com software download site during the service contract term. For more information, please refer to the [Cisco Software Support Service](#) description.

The Cisco Prime Appliance option comes with a Cisco 90-day hardware warranty. Adding a contract for a technical service offering to your device coverage, such as Cisco SMARTnet<sup>®</sup> Service, provides access to the Cisco TAC and can provide a variety of hardware replacement options to meet critical business needs, updates for licensed operating system software, and registered access to the extensive Cisco.com knowledge base and support tools.

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# Cisco Stealthwatch Enterprise

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## Solution overview

Cisco Stealthwatch® Enterprise provides enterprise-wide network visibility and applies advanced security analytics to detect and respond to threats in real time. Using a combination of behavioral modeling, machine learning, and global threat intelligence, Stealthwatch Enterprise can quickly, and with high confidence, detect threats such as command-and-control (C&C) attacks, ransomware, distributed-denial-of-service (DDoS) attacks, illicit cryptomining, unknown malware, and insider threats. With a single, agentless solution, you get comprehensive threat monitoring across the entire network traffic, even if it's encrypted.

Organizations have already invested a lot into their IT infrastructure and security. Yet, threats are finding ways to get through. Moreover, it takes them months or even years to detect threats. This lack of visibility is a function of the growing network complexity as well as the constantly evolving threats. And security teams with their limited resources and disjointed tools can only do so much. We all have security solutions, such as firewalls, but how do we know those are working, managed, and configured properly? How do we know these tools are doing the job that we need them to do?

We decided to turn the problem on its head—why not enlist your existing investment, the network, to secure your organization? The network telemetry is a rich data source that can provide useful insights about who is connecting to the organization and what they are up to. Everything touches the network, so this visibility extends from the HQ to the branch, data center, roaming users, and smart devices. And also, from the private to the public cloud. Analyzing this data can help detect threats that may have found a way to bypass your existing controls, **before** they are able to have a major impact.

The solution is Cisco Stealthwatch, which enlists the network to provide end-to-end visibility of traffic. This visibility includes knowing every host—seeing who is accessing which information at any given point. From there, it's important to know what is normal behavior for a particular user or "host" and establish a baseline from which you can be alerted to any change in the user's behavior the instant it happens.

Stealthwatch offers different deployment models—on-premises as a hardware appliance or a virtual machine called [Stealthwatch Enterprise](#)—or cloud-delivered as a software-as-a-service (SaaS) solution called [Stealthwatch Cloud](#).

## Primary use cases

Through its unique view and analysis of network traffic, Stealthwatch Enterprise dramatically improves:

- Real-time threat detection
  - Unknown threat—Identify suspicious behavior and communications to malicious domains
  - Insider threat—Get alarmed on data hoarding or exfiltration, suspicious lateral movement
  - Encrypted malware—Use multilayered machine learning to analyze traffic without decryption
  - Policy violation—Ensure security and compliance policies set in other tools are enforced
- Incident response and forensics
- Network segmentation
- Ability to satisfy regulatory requirements
- Network performance and capacity planning

## Key benefits

- **No more blind spots**—Stealthwatch is the only security analytics solution that can provide comprehensive visibility in the private network as well as the public cloud, and without deploying sensors everywhere. It is also the first solution to detect malware in encrypted traffic, without any decryption.

- 
- **Focus on incidents, not noise**—Using the power of behavioral modeling, multilayered machine learning, and global threat intelligence, Stealthwatch reduces false positives and alarms on critical threats affecting your environment.
  - **Catch them in the act**—Stealthwatch is constantly monitoring the network in order to detect advanced threats in real time. Attacks are usually preceded by activities such as port scanning, constant pinging, etc. Stealthwatch can recognize these early signs to prevent high impact. Once a threat is identified, you can also conduct forensic investigations to pinpoint the source of the threat and determine where else it might have propagated.
  - **Make the most of your investment**—With a single, agentless solution, you are using the rich telemetry generated by your existing network infrastructure to improve your security posture.
  - **Scale security with business growth**—Now there's no need to compromise on security as the business needs change. Whether you are adding a new branch or a data center, moving workloads to the cloud, or simply adding more devices, Stealthwatch deployment can be expanded easily to provide coverage. It can be deployed on-premises or on the cloud, can be consumed as a SaaS-based or license-based solution, and has the automatic role classification capability to automatically classify new devices being added to the network.

## Encrypted Traffic Analytics

The rapid rise in encrypted traffic is changing the threat landscape. As more businesses become digital, a significant number of services and applications are using encryption as the primary method of securing information. Encryption technology has enabled much greater privacy and security for enterprises that use the Internet to communicate and transact business online. However, threat actors have leveraged these same benefits to evade detection and to secure their malicious activities.

Traditional threat inspection with bulk decryption, analysis, and re-encryption is not always practical or feasible, for performance and resource reasons. Also, it compromises privacy and data integrity.

Cisco, with its expertise in the network infrastructure market, conducted extensive research and has introduced an innovative and revolutionary technology, [Encrypted Traffic Analytics \(ETA\)](#). It helps illuminate the dark corners in encrypted traffic without any decryption by using new types of data elements or telemetry that are independent of protocol details. This enhanced ETA telemetry is generated by the next-generation Cisco® routers, switches, and wireless controllers, as well as the Stealthwatch Flow Sensor. Stealthwatch analyses this ETA telemetry to detect threats in encrypted traffic as well as to ensure cryptographic compliance.

## Solution components

At the core of Stealthwatch Enterprise are the required components: the Flow Rate License, Flow Collector, and Management Console. In addition, optional components like the Flow Sensor and the UDP (User Datagram Protocol) Director are also available. Following are other optional licenses available for added functionality:

- [Cisco Stealthwatch Endpoint License](#): Available as a license add-on to extend visibility to end user devices. (Requires Cisco AnyConnect® Network Visibility Module to be purchased separately.)
- [Cisco Stealthwatch Cloud](#): Available as an SaaS product offer to provide visibility and threat detection within public cloud infrastructures such as Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP).
- [Cisco Stealthwatch Threat Intelligence License](#): A global threat intelligence feed powered by the industry-leading threat intelligence group, [Cisco Talos](#)®, provides an additional layer of protection against botnets and other sophisticated attacks. It correlates suspicious activity in the local network environment with data on thousands of known command-and-control servers and campaigns to provide high-fidelity detection and faster threat response. Cisco Talos sees 1.5 million unique malware samples and blocks 20 billion threats per day.

## Required components of the system

### Flow Rate License

The Flow Rate License is required for the collection, management, and analysis of flow telemetry and aggregates flows at the Management Console. The Flow Rate License also defines the volume of flows that may be collected and is licensed on the basis of flows per second (fps). Licenses may be combined in any permutation to achieve the desired level of flow capacity.

### Flow Collector

The Flow Collector leverages enterprise telemetry such as NetFlow, IPFIX (Internet Protocol Flow Information Export), and other types of flow data from existing infrastructure such as routers, switches, firewalls, endpoints, and other network infrastructure devices. The Flow Collector can also receive and collect telemetry from proxy data sources, which can be analyzed by the cloud-based, multilayered machine learning engine, Cognitive Intelligence, for deep visibility into both web and network traffic. Please note that the Cognitive Intelligence feature is built into the system at no extra cost, but it will need to be enabled upon deployment.

The telemetry data is analyzed to provide a complete picture of network activity. Months or even years of data can be stored, creating an audit trail that can be used to improve forensic investigations and compliance initiatives. The volume of telemetry collected from the network is determined by the capacity of the deployed Flow Collectors. Multiple Flow Collectors may be installed. Flow Collectors are available as hardware appliances or as virtual machines. Table 1 outlines Flow Collector's benefits.

**Table 1.** Major benefits of the Flow Collector

Benefit	Description
Threat detection	Ingests proxy records and associates them with flow records, delivering the user application and URL information for each flow, to increase contextual awareness. This process enhances your organization's ability to pinpoint threats and shortens your Mean Time To Know (MTTK).
Flow traffic monitoring	Monitors flow traffic across hundreds of network segments simultaneously, so you can spot suspicious network behavior. This capability is especially valuable at the enterprise level.
Extended data retention	Allows organizations and agencies to retain large amounts of data for long periods.
Scalability	Performs well in extremely high-speed environments and can protect every part of the network that is IP reachable, regardless of size.

Benefit	Description
<b>Deduplication and stitching</b>	Performs deduplication so that any flows that might have traversed more than one router are counted only once. It then stitches the flow information together for full visibility of a network transaction.
<b>Choice of delivery methods</b>	You can order the Appliance Edition, a scalable device suitable for any size organization. Or you can order the Virtual Edition, designed to perform the same functions as the appliance edition, but in a VMware or KVM Hypervisor environment. This solution scales dynamically according to the resources allocated to it.

#### Flow Collector specifications

- [Stealthwatch Flow Collector 4210](#)—Part number: ST-FC4210-K9
- [Stealthwatch Flow Collector 5210](#)—Part number: ST-FC5210-K9
- Stealthwatch Flow Collector Virtual Edition can be configured as either FCVE-1000, FCVE-2000, or FCVE-4000—Part number: L-ST-FC-VE-K9

#### Management Console

The Stealthwatch Management Console aggregates, organizes, and presents analysis from up to 25 Flow Collectors, the Cisco Identity Services Engine, and other sources. It uses graphical representations of network traffic, identity information, customized summary reports, and integrated security and network intelligence for comprehensive analysis.

The capacity of the console determines the volume of telemetry data that can be analyzed and presented, as well as the number of Flow Collectors that are deployed. The console is available as a hardware appliance or a virtual machine. Table 2 lists the benefits of the consoles.

**Table 2.** Major benefits of the Management Console

Benefit	Description
<b>Real-time, up-to-the-minute data</b>	Delivers data flow for monitoring traffic across hundreds of network segments simultaneously, so you can spot suspicious network behavior. This capability is especially valuable at the enterprise level.
<b>Capability to detect and prioritize security threats</b>	Rapidly detects and prioritizes security threats, pinpoints network misuse and suboptimal performance, and manages event response across the enterprise, all from a single control center.
<b>Management of appliances</b>	Configures, coordinates, and manages Cisco Stealthwatch appliances, including the Flow Collector, Flow Sensor, and UDP Director.
<b>Use of multiple types of flow data</b>	Consumes multiple types of flow data, including NetFlow, IPFIX, and sFlow. The result: cost-effective, behavior-based network protection.
<b>Scalability</b>	Supports even the largest of network demands. Performs well in extremely high-speed environments and can protect every part of the network that is IP reachable, regardless of size.

Benefit	Description
<b>Audit trails for network transactions</b>	Provides a full audit trail of all network transactions for more effective forensic investigations.
<b>Real-time, customizable relational flow maps</b>	Provides graphical views of the current state of the organization's traffic. Administrators can easily construct maps of their network based on any criteria, such as location, function, or virtual environment. By creating a connection between two groups of hosts, operators can quickly analyze the traffic traveling between them. Then, simply by selecting a data point in question, they can gain even deeper insight into what is happening at any point in time.
<b>Flexible delivery options</b>	You can order the Physical Appliance, a scalable device suitable for any size organization. Or you can order the Virtual Edition, designed to perform the same functions as the appliance edition, but in a VMware or KVM Hypervisor environment.

#### Management Console specifications

- [Stealthwatch Management Console 2210](#)—Part number: ST-SMC2210-K9
- Stealthwatch Management Console Virtual Edition can be configured as either SMC VE or SMC VE 2000—Part number: L-ST-SMC-VE-K9

## Optional components of the system

### Flow Sensor

The Flow Sensor is an optional component of Stealthwatch Enterprise and produces telemetry for segments of the switching and routing infrastructure that can't generate NetFlow natively. It also provides visibility into the application layer data. In addition to all the telemetry collected by Stealthwatch, the Flow Sensor provides additional security context to enhance the Stealthwatch security analytics. And starting with Stealthwatch Software Release 7.1, Flow Sensor is also able to generate enhanced ETA telemetry to be able to analyze encrypted traffic. Advanced behavioral modeling and cloud-based, multilayered machine learning is applied to this dataset to detect advanced threats and perform faster investigations.

The Flow Sensor is installed on a mirroring port or network tap and generates telemetry based on the observed traffic. The volume of telemetry generated from the network is determined by the capacity of the deployed Flow Sensors. Multiple Flow Sensors may be installed. Flow Sensors are available as hardware appliances or as virtual appliances to monitor virtual machine environments. It also works in environments where an overlay monitoring solution requiring additional security context better fits the operations model of the IT organization.

Table 3 lists the major benefits of the Flow Sensor.

**Table 3.** Major benefits of the Flow Sensor

Benefit	Description
<b>Layer 7 application visibility</b>	Provides true Layer 7 application visibility by gathering application information. This includes data features like RTT (Round trip time), SRT (Server Response Time), and Retransmissions.
<b>Packet-level performance and analysis</b>	Provides true Layer 7 application visibility by gathering application information. This includes data features like RTT, SRT, and Retransmissions.
<b>Alerts on network anomalies</b>	Additional telemetry from the Flow Sensor, such as URL information for web traffic and TCP flag detail, helps generate alarms with contextual intelligence so that security personnel can take quick action and mitigate damage.
<b>Lower costs</b>	Enhances operational efficiency and reduces costs by identifying and isolating the root



Benefit	Description
	cause of an issue or incident within seconds.
Choice of delivery methods	You can order the Appliance Edition, a scalable device suitable for any size organization. Or you can order the Virtual Edition, designed to perform the same function as the appliance edition, but in a VMware or KVM Hypervisor environment.

#### Flow Sensor specifications

- [Stealthwatch Flow Sensor 1210](#)—Part number: ST-FS1210-K9
- [Stealthwatch Flow Sensor 3210](#)—Part number: ST-FS3210-K9
- [Stealthwatch Flow Sensor 4210](#)—Part number: ST-FS4210-K9
- Stealthwatch Flow Sensor Virtual Edition—Part number: L-ST-FS-VE-K9

#### UDP Director

The UDP Director simplifies the collection and distribution of network and security data across the enterprise. It helps reduce the processing power on network routers and switches by receiving essential network and security information from multiple locations and then forwarding it to a single data stream to one or more destinations.

Table 4 list the major benefits of the UDP Director.

**Table 4.** Major benefits of the UDP Director

Benefit	Description
Reduces unplanned downtime and service disruption	UDP Director high availability applies to the UDP Director 2210 appliance.
Simplifies network security and monitoring	UDP Director aggregates and provides a single standardized destination for NetFlow, sFlow, syslog, and Simple Network Management Protocol (SNMP) information. UDP Director appliances can receive data from any connectionless UDP application, and then retransmit it to multiple destinations, duplicating the data if required.
Can direct UDP data from any source to any destination	Receives data from any connectionless UDP application, and then retransmits it to multiple destinations, duplicating the data if required.
Removes the need to reconfigure infrastructure	Directs point log data (NetFlow, sFlow, syslog, SNMP) to a single destination without the need to reconfigure the infrastructure when new tools are added or removed.

#### UDP Director specifications

- [Stealthwatch UDP Director 2210](#)—Part number: ST-UDP2210-K9
- Cisco Stealthwatch UDP Director Virtual Edition—Part number: L-ST-UDP-VE-K9

#### Ordering information

Stealthwatch is available as a one-, three-, and five-year term subscription. The Cisco Stealthwatch ordering guide provides more details about the system's models, components, and licensing types. To place an order, contact your account representative.

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## Service and support

A number of service programs are available for the Cisco Stealthwatch system. These services help you protect your network investment, optimize network operations, and prepare your network for new applications to extend network intelligence and the power of your business. For more information about Professional Services, see the [Technical Support](#) homepage.

## Cisco Capital

### Flexible payment solutions to help you achieve your objectives

Cisco Capital<sup>®</sup> makes it easier to get the right technology to achieve your objectives, enable business transformation, and help you stay competitive. We can help you reduce the total cost of ownership, conserve capital, and accelerate growth. In more than 100 countries, our flexible payment solutions can help you acquire hardware, software, services, and complementary third-party equipment in easy, predictable payments. [Learn more.](#)

## For more information

For more information about Cisco Stealthwatch, visit [www.cisco.com/go/stealthwatch](http://www.cisco.com/go/stealthwatch) or contact your Cisco security account representative to learn how your organization can gain visibility across your extended network by participating in a complimentary [Stealthwatch visibility assessment](#).

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# Cisco Catalyst 9800-L Wireless Controller

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## Built from the ground up for intent-based networking



**Figure 1.**  
Cisco Catalyst 9800-L

The Cisco® Catalyst® 9800-L is a fixed wireless controller with seamless software updates for small and midsize enterprises.

Built from the ground up for intent-based networking, the Cisco Catalyst 9800-L brings together Cisco IOS® XE Software and Cisco RF excellence to create a best-in-class wireless experience for your evolving and growing organization.

The Cisco Catalyst 9800-L is feature rich and enterprise ready to power your business-critical operations and transform end-user experiences:

- Choose between copper and fiber uplinks. This choice gives you flexibility in your network.
- High availability and seamless software updates, enabled by hot and cold patching, keep your clients and services **always on** in planned and unplanned events.
- **Secure** the air, devices, and users with the Cisco Catalyst 9800-L. The wireless infrastructure becomes the strongest first line of defense, with Encrypted Traffic Analytics and Software-Defined Access (SD-Access). The controller comes with built-in security: Secure Boot, runtime defenses, image signing, integrity verification, and hardware authenticity.
- Built on a modular operating system, the controller features open and programmable APIs that enable **automation** of day-0 to day-N network operations. Model-driven streaming telemetry provides deep insights into your **network and client health**.

### Product overview: Key features

Feature	Description
Maximum number of access points	250
Maximum number of clients	5000
Maximum throughput	5 Gbps
Maximum WLANs	4096

Feature	Description
Maximum VLANs	4096
Fixed uplinks	2x 10G/Multigigabit copper or 2x 10G/Multigigabit fiber
Power supply	110W, 12VDC, AC/DC adapter
Maximum power consumption	9800-L-C: 86.9W (with 4.5W USB load) 9800-L-F: 84.5W (assumes 2pc 2.5W SFP and with 4.5W USB load)
Deployment modes	Centralized, Cisco FlexConnect®, and fabric
Form factor	1RU; half-width chassis allows side-by-side installation in standard 19-in. rack
License	Smart License enabled
Software	Cisco IOS XE
Management	Cisco DNA Center, Cisco Prime® Infrastructure, and third party (open standards APIs)
Interoperability	AireOS-based controllers
Access points	Cisco Aironet® 802.11ac Wave 1 and Wave 2 access points, Cisco Catalyst 9100 802.11ax access points

### Always on

The Cisco Catalyst 9800-L provides seamless software updates for faster resolution of critical issues, the ability to introduce new access points with zero downtime, and flexible software upgrades. Stateful Switchover (SSO) with active standby and N+1 redundancy keeps your network, services, and clients always on, even in unplanned events.

### Secure

Secure the air, devices, and users with the Cisco Catalyst 9800-L. Wireless infrastructure becomes the strongest first line of defense with Encrypted Traffic Analytics and SD-Access. The controller comes with built-in security: Secure Boot, runtime defenses, image signing, integrity verification, and hardware authenticity.

### Open and programmable

The Cisco Catalyst 9800-L controller is built on the Cisco IOS XE operating system, which offers a rich set of open standards-based programmable APIs and model-driven telemetry that provide an easy way to automate day-0 to day-N network operations.

## Platform details

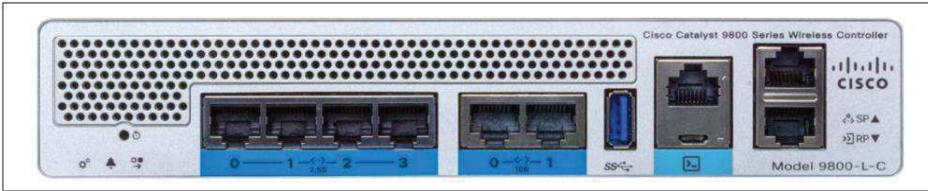
### Physical dimensions

**Table 1.** Cisco Catalyst 9800-L physical dimensions

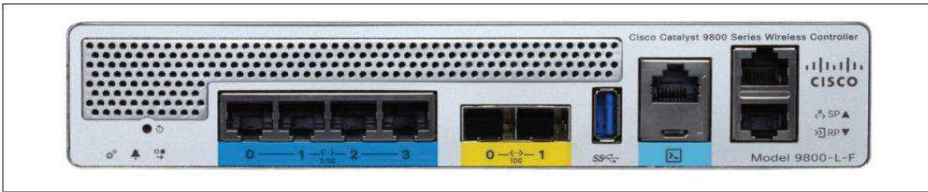
Dimension	Value
Width	8.5 in. (21.59 cm)
Depth	9.06 in. (23.01 cm)

Dimension	Value
Height	1.58 in. (4.02 cm)
Weight	C9800-L-C: 3.95 lb. (1.79 kg) C9800-L-F: 4.01 lb. (1.82 kg)

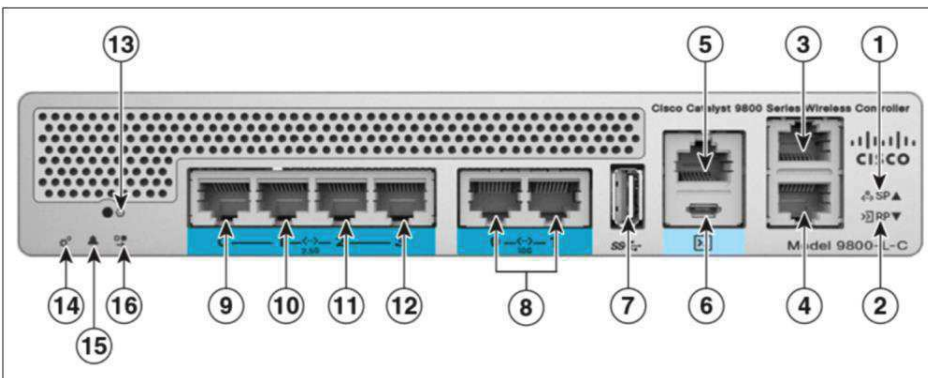
### Front panel



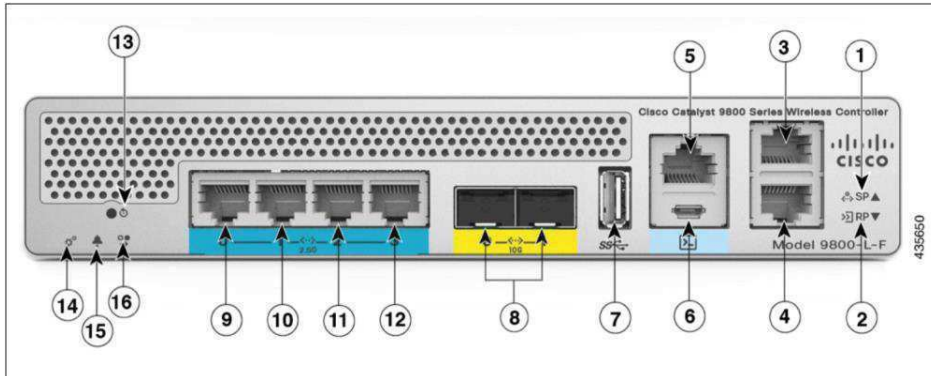
**Figure 2.**  
Cisco Catalyst 9800-L-C front panel



**Figure 3.**  
Cisco Catalyst 9800-L-F front panel



**Figure 4.**  
Cisco Catalyst 9800-L-C front panel with components labeled



**Figure 5.**  
Cisco Catalyst 9800-L-F front panel with components labeled

**Table 2.** Cisco Catalyst 9800-L front panel components

Label	Description
1	Service port LED
2	Redundancy port LED
3	Service Port (SP) (RJ-45) for out-of-band management
4	Redundancy port
5	RJ-45 console port
6	Micro-B USB console
7	USB 3.0 port
8	2x 10G/Multigigabit copper (Figure 4) 2x 10G/Multigigabit fiber (Figure 5)
9-12	Quad RJ-45 2.5G/1G Multigigabit Ethernet ports
13	Reset button
14	System LED
15	Alarm LED
16	High availability LED

## Ports

**Table 3.** Cisco Catalyst 9800-L ports and their purpose

Port	Description
1x RJ-45 console port	Console port for out-of-band management.
1x Micro USB console port	Console port for out-of-band management.



Port	Description
1x USB 3.0 port	USB 3.0 port for plugging in external memory.
1x RJ-45 management port	Management port used for out-of-band management. Also known as the service port.
1x RJ-45 redundancy port	Redundancy port used for SSO.
4x 2.5G/1G and 2x 10G copper ports	Ports used for sending and receiving traffic between access points and controller, northbound traffic, in-band management traffic, and wireless client traffic. Must be connected to the switch.
4x 2.5G/1G copper and 2x 10G SFP+ fiber ports	Ports used for sending and receiving traffic between access points and controller, northbound traffic, in-band management traffic, and wireless client traffic. Must be connected to the switch.

The four data ports can operate in either 2.5 Gigabit Ethernet or 1 Gigabit Ethernet mode.

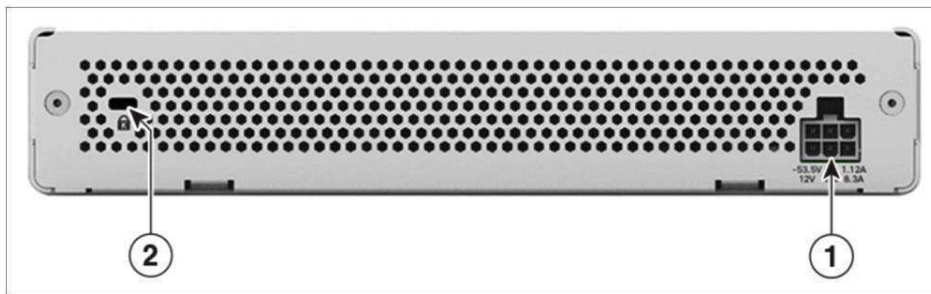
**Note:** 10-Mbps operation is not supported.

### Front LEDs

**Table 4.** Cisco Catalyst 9800-L front-panel LEDs and their purpose

LED	Color	Function
Power	Green	Green if all power rails are within spec
System status	Green	On: Cisco IOS XE boot is complete Blinking: Cisco IOS boot in progress
	Red	On: System crash Blinking: Secure Boot failure Off: ROMMON boot
High Availability (HA) port	Green	On: HA active Slow blink: HA standby hot
	Amber	Slow blink: Booted with HA standby cold Fast blink: HA maintenance
Alarm	Green	On: ROMMON boot complete Blinking: System upgrade in progress
	Amber	On: ROMMON boot and SYSTEM bootup Blinking: Temperature error and Secure Boot failure
Network link LED Indicator	Green	Solid green: Link Flashing green: Activity LED off: Link down

## Rear panel



**Figure 6.**  
Cisco Catalyst 9800-L rear panel with components labeled

**Table 5.** Cisco Catalyst 9800-L rear panel components

Label	Description
1	Power adapter
2	Kensington lock

## Power

The Cisco Catalyst 9800-L Wireless Controller is powered by a single output 12VDC, 110W 120/240VAC adapter (C9800-AC-110W) that is shipped by default.

## SFPs supported (C9800-L-F-K9 only)

**Table 6.** SFPs supported on the Cisco Catalyst 9800-L

Type	Module supported
SFP	GLC-BX-D
	GLC-BX-U
	GLC-SX-MMD
	GLC-ZX-MMD
	SFP-10G-SR
	SFP-10G-SR-X
	SFP-H10GB-ACU7M
	SFP-H10GB-ACU10M

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## Product benefits

### Cisco IOS XE

The Cisco Catalyst 9800 Series opens a completely new paradigm in network configuration, operation, and monitoring through network automation. Cisco's automation solution is open, standards based, and extensible across the entire lifecycle of a network device. The various mechanisms that bring about network automation are outlined below, based on the device lifecycle.

- **Automated device provisioning:** This is the ability to automate the process of upgrading software images and installing configuration files on Cisco Catalyst access points when they are being deployed in the network for the first time. Cisco provides turnkey solutions with Plug and Play (PnP) capabilities that enable an effortless and automated deployment.
- **API-driven configuration:** Modern wireless controllers such as the Cisco Catalyst 9800 Series support a wide range of automation features and provide robust open APIs over NETCONF and RESTCONF using YANG data models for external tools, both off-the-shelf and custom built, to automatically provision network resources.
- **Granular visibility:** Model-driven telemetry provides a mechanism to stream data from a switch to a destination. The data to be streamed is driven through subscription to a data set in a YANG model. The subscribed data set is streamed out to the destination at configured intervals. Additionally, Cisco IOS XE enables the push model, which provides near-real-time monitoring of the network, leading to quick detection and rectification of failures.
- **Seamless software upgrades and patching:** To enhance OS resilience, Cisco IOS XE supports patching, which provides fixes for critical bugs and security vulnerabilities between regular maintenance releases. This support allows customers to add patches without having to wait for the next maintenance release.

### Security

- **Trustworthy systems:** Cisco Trust Anchor Technologies provide a highly secure foundation for Cisco products. With the Cisco Catalyst 9800 Series, these trustworthy systems enable hardware and software authenticity assurance for supply chain trust and strong mitigation against man-in-the-middle attacks on software and firmware. Trust Anchor capabilities include:
- **Image signing:** Cryptographically signed images provide assurance that the firmware, BIOS, and other software are authentic and unmodified. As the system boots, its software signatures are checked for integrity.
- **Secure Boot:** Cisco Secure Boot technology anchors the boot sequence chain of trust to immutable hardware, mitigating threats against a system's foundational state and the software that is to be loaded, regardless of a user's privilege level. It provides layered protection against the persistence of illicitly modified firmware.
- **Cisco Trust Anchor module:** A tamper-resistant, strong cryptographic, single-chip solution provides hardware authenticity assurance to uniquely identify the product so that its origin can be confirmed to Cisco, providing assurance that the product is genuine.

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## Resiliency and high availability

- **Stateful Switchover (SSO):** Stateful Switchover with an active standby and N+1 redundancy keeps your network, services, and clients always on, even in unplanned events.
- **Software Maintenance Upgrades (SMUs) and hot and cold patching:** Patching allows for a patch to be installed as a bug fix without bringing down the entire network and avoiding the need to requalify an entire software image. The SMU is a package that can be installed on a system to provide a patch fix or security resolution to a released image. SMUs allow you to address the network issue quickly while reducing the time and scope of the testing required. The Cisco IOS XE platform internally validates the SMU compatibility and does not allow you to install incompatible SMUs. All SMUs are integrated into the subsequent Cisco IOS XE Software maintenance releases.
- **Intelligent rolling access point upgrades and seamless multisite upgrades:** The Cisco Catalyst 9800 Series comes with intelligent rolling access point upgrades to simplify network operations. Multisite upgrades can now be done in stages, and access points can be upgraded intelligently without restarting the entire network.

## Flexible NetFlow

- **Flexible NetFlow (FNF):** Cisco IOS Software FNF is the next generation in flow visibility technology, allowing optimization of the network infrastructure, reducing operating costs, and improving capacity planning and security incident detection with increased flexibility and scalability.

## Application Visibility and Control

- **Next-Generation Network-Based Application Recognition (NBAR2):** NBAR2 enables advanced application classification techniques and accuracy, with up to 1400 predefined and well-known application signatures and up to 150 encrypted applications on the Cisco Catalyst 9800 Series. Some of the most popular applications included are Skype, Office 365, Microsoft Lync, Cisco WebEx®, and Facebook. Many others are already predefined and easy to configure. NBAR2 provides the network administrator with an important tool to identify, control, and monitor end-user application usage while helping ensure a quality user experience and securing the network from malicious attacks. It uses FNF to report application performance and activities within the network to any supported NetFlow collector, such as Cisco Prime, Cisco Stealthwatch®, or any compliant third-party tool.

## Quality of Service (QoS)

- **Superior QoS:** QoS technologies are a set of tools and techniques for managing network resources and are considered the key enabling technologies for the transparent convergence of voice, video, and data networks. QoS on the Cisco Catalyst 9800 Series consists of classification and marking, policing and markdown, and scheduling, shaping, and queuing functions. A modular QoS command-line framework provides consistent platform-independent and flexible configuration behavior. The Cisco Catalyst 9800 Series also supports 2-level hierarchical or nested policies.

## Smart operation

- **Bluetooth ready:** The Cisco Catalyst 9800-L has hardware support to connect a Bluetooth dongle to the controller, enabling you to use this wireless interface as a management port. This port functions as an IP management interface and can be used for configuration and troubleshooting using the WebUI or Command-Line Interface (CLI), and to transfer images and configurations.
- **WebUI:** WebUI is an embedded GUI-based device-management tool that enables provisioning of the device, simplifying device deployment and manageability and enhancing the user experience. WebUI comes with the default image. There is no need to enable anything or install any license on the device. You can use WebUI to build a

day-1 configuration and from then on monitor and troubleshoot the device without having to know how to use the CLI.

## Specifications

**Table 7.** Cisco Catalyst 9800-L specifications

Item	Specification	
<b>Wireless</b>	IEEE 802.11a, 802.11b, 802.11g, 802.11d, WMM/802.11e, 802.11h, 802.11n, 802.11k, 802.11r, 802.11u, 802.11w, 802.11ac Wave1 and Wave2, 802.11ax	
<b>Wired, switching, and routing</b>	IEEE 802.3 10BASE-T, IEEE 802.3u 100BASE-TX specification, 1000BASE-T, 1000BASE-SX, 1000-BASE-LH, IEEE 802.1Q VLAN tagging, IEEE 802.1AX Link Aggregation	
<b>Data Requests For Comments (RFCs)</b>	<ul style="list-style-type: none"> <li>• RFC 768 UDP</li> <li>• RFC 791 IP</li> <li>• RFC 2460 IPv6</li> <li>• RFC 792 ICMP</li> <li>• RFC 793 TCP</li> <li>• RFC 826 ARP</li> <li>• RFC 1122 Requirements for Internet Hosts</li> <li>• RFC 1519 CIDR</li> <li>• RFC 1542 BOOTP</li> <li>• RFC 2131 DHCP</li> <li>• RFC 5415 CAPWAP Protocol Specification</li> <li>• RFC 5416 CAPWAP Binding for 802.11</li> </ul>	
<b>Security standards</b>	<ul style="list-style-type: none"> <li>• Wi-Fi Protected Access (WPA)</li> <li>• IEEE 802.11i (WPA2, RSN)</li> <li>• RFC 1321 MD5 Message-Digest Algorithm</li> <li>• RFC 1851 ESP Triple DES Transform</li> <li>• RFC 2104 HMAC: Keyed-Hashing for Message Authentication</li> <li>• RFC 2246 TLS Protocol Version 1.0</li> <li>• RFC 2401 Security Architecture for the Internet Protocol</li> <li>• RFC 2403 HMAC-MD5-96 within ESP and AH</li> <li>• RFC 2404 HMAC-SHA-1-96 within ESP and AH</li> <li>• RFC 2405 ESP DES-CBC Cipher Algorithm with Explicit IV</li> <li>• RFC 2407 Interpretation for ISAKMP</li> <li>• RFC 2408 ISAKMP</li> <li>• RFC 2409 IKE</li> <li>• RFC 2451 ESP CBC-Mode Cipher Algorithms</li> <li>• RFC 3280 Internet X.509 PKI Certificate and CRL Profile</li> <li>• RFC 4347 Datagram Transport Layer Security</li> <li>• RFC 5246 TLS Protocol Version 1.2</li> </ul>	

Item	Specification	
<b>Encryption</b>	<ul style="list-style-type: none"> <li>• Wired Equivalent Privacy (WEP) RC4 40, 104 and 128 bits (both static and shared keys)</li> <li>• Advanced Encryption Standard (AES): Cipher Block Chaining (CBC), Counter with CBC-MAC (CCM), Counter with Cipher Block Chaining Message Authentication Code Protocol (CCMP)</li> <li>• Data Encryption Standard (DES): DES-CBC, 3DES</li> <li>• Secure Sockets Layer (SSL) and Transport Layer Security (TLS): RC4 128-bit and RSA 1024- and 2048-bit</li> <li>• DTLS: AES-CBC</li> <li>• IPsec: DES-CBC, 3DES, AES-CBC</li> <li>• 802.1AE MACsec encryption</li> </ul>	
<b>Authentication, Authorization, and Accounting (AAA)</b>	<ul style="list-style-type: none"> <li>• IEEE 802.1X</li> <li>• RFC 2548 Microsoft Vendor-Specific RADIUS Attributes</li> <li>• RFC 2716 PPP EAP-TLS</li> <li>• RFC 2865 RADIUS Authentication</li> <li>• RFC 2866 RADIUS Accounting</li> <li>• RFC 2867 RADIUS Tunnel Accounting</li> <li>• RFC 2869 RADIUS Extensions</li> <li>• RFC 3576 Dynamic Authorization Extensions to RADIUS</li> <li>• RFC 5176 Dynamic Authorization Extensions to RADIUS</li> <li>• RFC 3579 RADIUS Support for EAP</li> <li>• RFC 3580 IEEE 802.1X RADIUS Guidelines</li> <li>• RFC 3748 Extensible Authentication Protocol (EAP)</li> <li>• Web-based authentication</li> <li>• TACACS support for management users</li> </ul>	
<b>Management</b>	<ul style="list-style-type: none"> <li>• Simple Network Management Protocol (SNMP) v1, v2c, v3</li> <li>• RFC 854 Telnet</li> <li>• RFC 1155 Management Information for TCP/IP-Based Internets</li> <li>• RFC 1156 MIB</li> <li>• RFC 1157 SNMP</li> <li>• RFC 1213 SNMP MIB II</li> <li>• RFC 1350 TFTP</li> <li>• RFC 1643 Ethernet MIB</li> <li>• RFC 2030 SNMP</li> <li>• RFC 2616 HTTP</li> <li>• RFC 2665 Ethernet-Like Interface Types MIB</li> <li>• RFC 2674 Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering, and Virtual Extensions</li> <li>• RFC 2819 RMON MIB</li> <li>• RFC 2863 Interfaces Group MIB</li> <li>• RFC 3164 Syslog</li> <li>• RFC 3414 User-Based Security Model (USM) for SNMPv3</li> <li>• RFC 3418 MIB for SNMP</li> <li>• RFC 3636 Definitions of Managed Objects for IEEE 802.3 MAUs</li> <li>• RFC 4741 Base NETCONF protocol</li> <li>• RFC 4742 NETCONF over SSH</li> <li>• RFC 6241 Network Configuration Protocol (NETCONF)</li> </ul>	

Item	Specification	
	<ul style="list-style-type: none"> <li>• RFC 6242 NETCONF over SSH</li> <li>• RFC 5277 NETCONF event notifications</li> <li>• RFC 5717 Partial Lock Remote Procedure Call</li> <li>• RFC 6243 With-Defaults capability for NETCONF</li> <li>• RFC 6020 YANG</li> <li>• Cisco private MIBs</li> </ul>	
<b>Management interfaces</b>	<ul style="list-style-type: none"> <li>• Web-based: HTTP/HTTPS</li> <li>• Command-line interface: Telnet, Secure Shell (SSH) Protocol, serial port</li> <li>• Cisco Prime Infrastructure</li> </ul>	
<b>Environmental conditions supported</b>	<p>Operating temperature:</p> <ul style="list-style-type: none"> <li>• 32° to 113°F (0° to 45°C)</li> </ul> <p>Note: The maximum temperature is derated by 1.0°C for every 1000 ft (305 m) of altitude above sea level.</p> <p>Nonoperating temperature:</p> <ul style="list-style-type: none"> <li>• -13° to 158°F (-25° to 70°C)</li> </ul> <p>Operating humidity:</p> <ul style="list-style-type: none"> <li>• 10% to 95% noncondensing</li> </ul> <p>Nonoperating humidity:</p> <ul style="list-style-type: none"> <li>• 0% to 95% noncondensing</li> </ul> <p>Altitude:</p> <ul style="list-style-type: none"> <li>• Operating altitude: 0 to 3000 m (0 to 10,000 ft)</li> <li>• Nonoperating altitude: 0 to 12,192 m (0 to 40,000 ft.)</li> </ul> <p>Electrical input:</p> <ul style="list-style-type: none"> <li>• AC input frequency range: 47 to 63 Hz</li> <li>• AC input range: 90 to 264 VAC</li> </ul> <p>Maximum power:</p> <ul style="list-style-type: none"> <li>• 9800-L-C max measured power = 86.9W (with 4.5W USB load)</li> <li>• 9800-L-F max measured power = 84.5W (assumes 2pc 2.5W SFP and with 4.5W USB load)</li> </ul> <p>Maximum heat dissipation:</p> <ul style="list-style-type: none"> <li>• 9800-L-C: 296.4 Btu/hr (with 4.5W USB load)</li> <li>• 9800-L-F: 288.2 Btu/hr (assumes 2pc 2.5W SFP and with 4.5W USB load)</li> </ul> <p>Sound power level measure:</p> <ul style="list-style-type: none"> <li>• Normal: 40 dBA at 25C</li> <li>• Maximum: 42.9 dBA at 40C</li> </ul> <p>Power adapter:</p> <ul style="list-style-type: none"> <li>• Input power: 100 to 240 VAC; 50/60 Hz</li> </ul>	

Item	Specification	
Regulatory compliance	Safety: <ul style="list-style-type: none"> <li>• UL/CSA 60950-1</li> <li>• IEC/EN 60950-1</li> <li>• AS/NZS 60950.1</li> <li>• CAN/CSA-C22.2 No. 60950-1</li> </ul>	
	EMC - Emissions: <ul style="list-style-type: none"> <li>• FCC 47CFR15</li> <li>• AS/NZS CISPR 22</li> <li>• CISPR 22</li> <li>• EN55022/EN55032 (EMI-1)</li> <li>• ICES-003</li> <li>• VCCI</li> <li>• KN 32 (EMI-2)</li> <li>• CNS-13438</li> </ul>	<b>Class A</b>
	EMC – Emissions: <ul style="list-style-type: none"> <li>• EN61000-3-2 Power Line Harmonics (EMI-3)</li> <li>• EN61000-3-3 Voltage Changes, Fluctuations, and Flicker (EMI-3)</li> </ul>	

## Software requirements

The Cisco Catalyst 9800-L runs on Cisco IOS XE Software version 16.12.1 or later. This software release includes all the features listed earlier in the Product Benefits section.

Table 8 lists the minimum software requirements for the controller models.

**Table 8.** Minimum software requirements

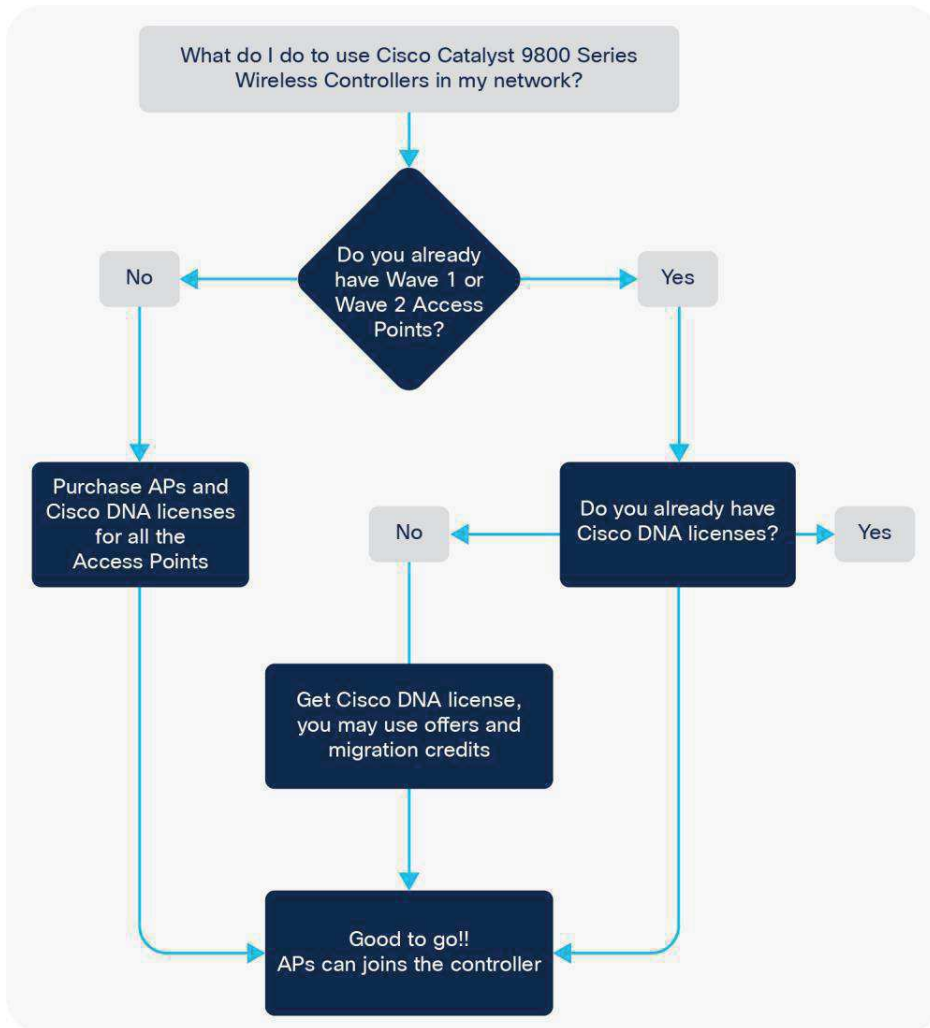
Model	Description	Minimum software requirement
C9800-L-F-K9 C9800-L-C-K9	Cisco Catalyst 9800-L Wireless Controller	Cisco IOS XE Software Release 16.12.1

## Licensing

**The Cisco Catalyst 9800 Series Wireless Controllers require mandatory Smart Licensing.** This provides ease of use for Cisco DNA license management, consumption, and tracking.

No licenses are required to boot up a **Cisco Catalyst 9800 Series Wireless Controller**. However, in order to connect any access points to the controller, Cisco DNA licenses are required. Every access point connecting to the Cisco Catalyst 9800 Series controller requires a Cisco DNA subscription license. See Figure 8.





**Figure 7.**  
Adding a Cisco Catalyst 9800 Series controller to your network

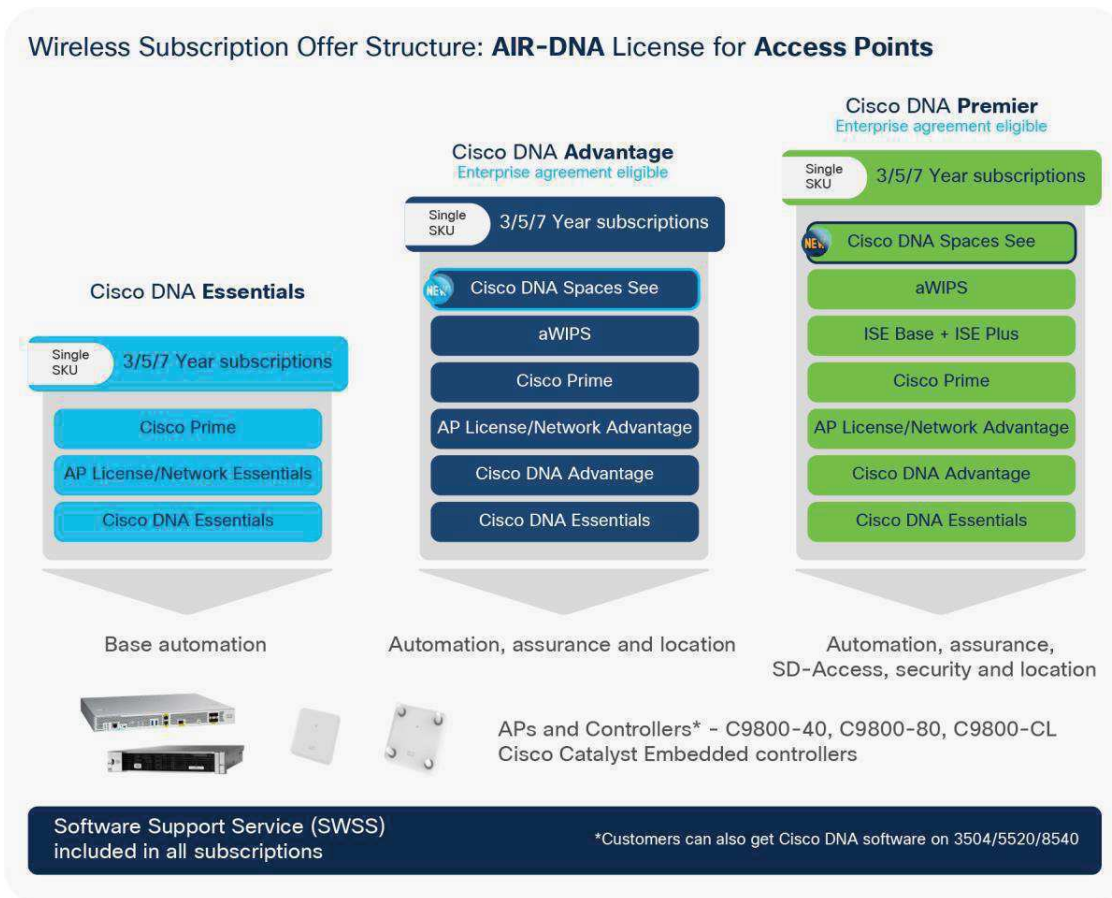
The APs connecting to the Cisco Catalyst 9800 Series have a new and simplified licensing package.

They can support three types of Cisco DNA license: Cisco DNA Essentials, Cisco DNA Advantage, and Cisco DNA Premier.

The Cisco DNA licenses provide Cisco innovations on the access points. The license also includes the Network Essentials and Network Advantage licensing options, which cover wireless fundamentals such as 802.1X authentication, QoS, PnP, etc., telemetry and visibility, and SSO, as well as security controls. These Network Essentials and Network Advantage components are perpetual and are valid throughout the life of the AP. Cisco DNA subscription licenses have to be purchased for a 3-, 5-, or 7-year subscription term. Upon expiration of a Cisco DNA license, the Cisco DNA features will expire, but the Network Essentials and Network Advantage features will remain.

The following figures and tables show what each base and add-on package includes.

Wireless Subscription Offer Structure: **AIR-DNA** License for **Access Points**



**Figure 8.**  
Wireless subscription offer structure

Cisco Catalyst 9800 Wireless Controller- Advantage vs. Essentials

C9800-40/C9800-80/C9800-CL

Advantage	Essentials
<p><b>Cisco DNA Advantage (Inclusive of Cisco DNA Essentials)</b></p> <p><b>Advanced Automation</b></p> <ul style="list-style-type: none"> <li>• SD-Access Cisco</li> <li>• Location Plug and Play</li> <li>• Automated ISE integration for guest</li> <li>• Third Party API integration</li> </ul> <p><b>Enhanced Security and IoT</b></p> <ul style="list-style-type: none"> <li>• Encrypted Traffic Analytics</li> <li>• Advanced WIPS*</li> </ul> <p><b>Policy Based Workflows</b></p> <ul style="list-style-type: none"> <li>• EasyQos configuration</li> <li>• EasyQos monitoring</li> <li>• Policy-based Automation</li> </ul> <p><b>Assurance and Analytics</b></p> <ul style="list-style-type: none"> <li>• Guided Remediation</li> <li>• Apple iOS Insights</li> <li>• Proactive issue Detection                             <ul style="list-style-type: none"> <li>- Aironet Active Sensor Tests</li> <li>- Intelligent capture</li> <li>- Client Location Heatmaps</li> <li>- Spectrum Analyzer</li> </ul> </li> <li>• Application performance (Packet Loss, Latency and Jitter)</li> <li>• App 360, AP 360, Client 360 and WLC 360</li> <li>• Custom Reports*</li> </ul> <p><b>Element Management</b></p> <ul style="list-style-type: none"> <li>• Path Lifecycle Management</li> </ul>	<p><b>Cisco DNA Essentials</b></p> <p><b>Basic Automation</b></p> <ul style="list-style-type: none"> <li>• PhP Application</li> <li>• Network Site Design and Device Provisioning</li> </ul> <p><b>Element Management</b></p> <ul style="list-style-type: none"> <li>• Software Image Management</li> <li>• Discovery, Network Topology</li> <li>• AVC</li> </ul> <p><b>Telemetry</b></p> <ul style="list-style-type: none"> <li>• Flexible Netflow</li> </ul> <p><b>Basic Assurance</b></p> <ul style="list-style-type: none"> <li>• Health dashboard (Network, Client and Application)</li> <li>• AP Floorplan and Coverage map</li> <li>• Pre-defined Reports</li> </ul> <p><b>Basic Security</b></p> <ul style="list-style-type: none"> <li>• Basic WIPS*</li> </ul>
<p><b>Network Advantage (Inclusive of Network Essentials)</b></p> <p><b>High Availability and Resiliency</b></p> <ul style="list-style-type: none"> <li>• ISSU, Process Restart</li> <li>• Rolling AP Upgrades</li> <li>• Patching (CLI)</li> <li>• AP service pack/AP device pack</li> </ul> <p><b>Flexible Network Segmentation</b></p> <ul style="list-style-type: none"> <li>• VXLAN</li> </ul>	<p><b>Network Essentials</b></p> <p><b>Essential Wireless Capabilities</b></p> <ul style="list-style-type: none"> <li>• 802.1x authentications, Guest access, device onboarding, Infra and client IPv6, ACLs, QoS, Videostream, Smart defaults, RRM, Spectrum intelligence, BLE, Zigbee, USB, TrustSec SXP, SSO, Dynamic QoS, Analytics, ADP, OpenDNS, IPSec, Rogue Management and Detection, Mobility</li> </ul> <p><b>Optimized RF</b></p> <ul style="list-style-type: none"> <li>• FRA, Client link, Clear Air Advanced</li> <li>• NG-HDX, Predictive/Proactive RRM</li> </ul> <p><b>IoT Optimized</b></p> <ul style="list-style-type: none"> <li>• Identity PSK, Enhanced Device profilers</li> </ul> <p><b>DevOps Integration</b></p> <ul style="list-style-type: none"> <li>• PhP Agent</li> <li>• NETCONF, RESTCONF*, gNMI*</li> <li>• Yang Data Models</li> <li>• GuestShell (On-Box Python)*</li> </ul> <p><b>Telemetry and Visibility</b></p> <ul style="list-style-type: none"> <li>• Model-driven Telemetry</li> <li>• NETCONF dial-in, gRPC dial out*</li> </ul> <p><b>Federal Certifications*</b></p> <ul style="list-style-type: none"> <li>• FIPS, CC, UCAPL, USGV6</li> </ul>

3,5,7 Year Terms (Advantage)

3,5,7 Year Terms (Essentials)

Perpetual (Network Advantage)

Perpetual (Network Essentials)

\*Cat 9800 controller includes the Perpetual Network Stack - Network Essentials or Network Advantage  
 • Mandatory to attach Cisco DNA License for every AP joining the controller  
 • Cisco DNA License includes Wireless and Cisco DNA Center Features \*Future

Figure 9. Advantage vs. Essentials licenses

Note: It is not required to deploy Cisco DNA Center just to use one of the above packages.

The following table shows the features included in the Network Advantage and Network Essentials package.

**Table 9.** Features included in the Network Advantage and Network Essentials packages

Feature	Network Essentials	Network Advantage
<b>Essential capabilities</b> <ul style="list-style-type: none"> <li>802.1X authentications, guest access, device onboarding, infrastructure and client IPv6, Access Control Lists (ACLs), QoS, Videostream, smart defaults, Radio Resource Management (RRM), Spectrum Intelligence, Bluetooth Low Energy (BLE), Zigbee, USB, Cisco TrustSec® SXP, SSO, Dynamic QoS, analytics, ADP, OpenDNS, mDNS, IPsec, rogue management and detection, mobility</li> </ul>	✓	✓
<b>Optimized RF</b> <ul style="list-style-type: none"> <li>Flexible Radio Assignment (FRA), ClientLink, Cisco CleanAir® Advanced</li> <li>Next-Generation High Density Experience (NG-HDX), predictive/proactive RRM</li> </ul>	✓	✓
<b>Internet of Things (IoT) optimized</b> <b>Identity Pre-Shared Keys (PSK), enhanced device profilers</b>	✓	✓
<b>DevOps integration</b> <ul style="list-style-type: none"> <li>PnP agent</li> <li>NETCONF, RESTCONF, gRPC Network Management Interface protocol (gNMI)</li> <li>YANG data models</li> <li>Guest shell (on-box Python)</li> </ul>	✓	✓
<b>Federal certifications</b> <b>Federal Information Processing Standards (FIPS), CC, UCAPL, USGV6</b>	✓	✓
<b>Telemetry and visibility</b> <ul style="list-style-type: none"> <li>Model-driven telemetry</li> <li>NETCONF dial-in, gRPC dial-out</li> </ul>	✓	✓
<b>High availability and resiliency (advanced)</b> <ul style="list-style-type: none"> <li>In-Service Software Upgrades (ISSU), process restart</li> <li>Rolling AP upgrades</li> <li>Patching (CLI)</li> <li>AP service pack and device pack</li> </ul>	✗	✓
<b>Flexible network segmentation</b> <ul style="list-style-type: none"> <li>VXLAN</li> </ul>	✗	✓

The following table shows the features included in the Cisco DNA Advantage and Cisco DNA Essentials packages.

**Table 10.** Features included in the Cisco DNA Advantage and Cisco DNA Essentials packages

Feature	Cisco DNA Essentials	Cisco DNA Advantage/Premier
<b>Base automation</b> <b>Plug and Play, network site design and device provisioning</b>	✓	✓
<b>Element management</b>	✓	✓

Feature	Cisco DNA Essentials	Cisco DNA Advantage/Premier
Image management, network topology and discovery, Application Visibility and Control (AVC)		
Base assurance Health dashboard (network, client, and application), AP floor map and coverage map, predefined reports	✓	✓
Telemetry Flexible NetFlow	✓	✓
Base security Basic wireless IPS	✓	✓
Advanced automation SD-Access Location Plug and Play Automated ISE integration for guest Third-party API integration	X	✓
Assurance and analytics Guided remediation Apple iOS Insights Proactive issue detection Aironet Active Sensor tests Intelligent capture Client location heatmaps Spectrum analyzer Application performance (packet loss, latency, and jitter) App 360, AP 360, Client 360, and WLC 360 Custom reports	X	✓
Enhanced security and Internet of Things (IoT) Encrypted Traffic Analytics, advanced wireless intrusion prevention (wIPS)	X	✓
Policy-based workflow EasyQoS configuration, EasyQoS monitoring, policy-based automation	X	✓
Element management Patch lifecycle management	X	✓

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Two modes of licensing are available:

- SL: Smart Licensing simplifies and adds flexibility to licensing. It is:
  - Simple: Procure, deploy, and manage licenses easily. Devices self-register, removing the need for Product Activation Keys (PAKs).
  - Flexible: Pool license entitlements in a single account. Move licenses freely through the network, wherever you need them.
  - Smart: Manage your license deployments with real-time visibility into ownership and consumption.
- SLR mode
  - Specific License Reservation (SLR) is a feature used in highly secure networks. It provides a method for customers to deploy a software license on a device (product instance) without communicating usage information to Cisco. There will be no communication with Cisco or a satellite. The licenses will be reserved for every controller. It is node-based licensing.
- Four levels of licensing are supported on the **Cisco Catalyst 9800 Series Wireless Controllers**. The controllers can be configured to function at any one of the four levels.
  - Cisco DNA Essentials: Supports the Cisco DNA Essentials feature set.
  - Cisco DNA Advantage: Supports the Cisco DNA Advantage feature set.
  - NE: Supports the Network Essentials feature set.
  - NA: Supports the Network Advantage feature set.
- For customers who purchase Cisco DNA Essentials, Network Essentials will be supported and will continue to function even after term expiration. For customers who purchase Cisco DNA Advantage, Network Advantage will be supported and will continue to function even after term expiration.
- Initial bootup of the controller is at the Cisco DNA Advantage level.
- For questions, contact the Cisco Catalyst 9800 Series Wireless Controllers Licensing mailer group at ask-catalyst9800licensing.

### Managing licenses with Smart Accounts

Creating Smart Accounts by using the Cisco Smart Software Manager (SSM) enables you to order devices and licensing packages and also manage your software licenses from a centralized website. You can set up the Smart Account to receive daily email alerts and to be notified of expiring add-on licenses that you want to renew. A Smart Account is mandatory for Cisco Catalyst 9800 Series controllers. For more information on Smart Accounts, refer to <https://www.cisco.com/go/smartaccounts>.

## Warranty

Find warranty information on Cisco.com at the Product Warranties page.

### Cisco 1-year limited hardware warranty terms

The following are terms applicable to your hardware warranty. Your embedded software is subject to the Cisco End User License Agreement (EULA) and/or any Supplemental EULA (SEULA) or specific software warranty terms for additional software products loaded on the device.

**Duration of hardware warranty:** One (1) year

**Replacement, repair, or refund procedure for hardware:** Cisco or its service center will use commercially reasonable efforts to ship a replacement part within ten (10) working days after receipt of the RMA request. Actual delivery times may vary depending on customer location.

Cisco reserves the right to refund the purchase price as its exclusive warranty remedy.

## Ordering information

**Table 11.** Ordering information

Type	PID	Description
Controller	C9800-L-F-K9	Cisco Catalyst 9800-L (Fiber Uplink) Wireless Controller
	C9800-L-C-K9	Cisco Catalyst 9800-L (Copper Uplink) Wireless Controller
	LIC-C9800-DTLS-K9	Cisco Catalyst 9800 Series Wireless Controller DTLS License
Accessories, spares	C9800-RMNT=	Cisco Catalyst 9800 Series Wireless Controller Rack Mount Bracket
	C9800-AC-110W=	Cisco Catalyst Wireless Controller 110W AC Power Supply

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**PODROBNÝ POLOŽKOVÝ ROZPOČET: veřejná zakázka "Obnova síťových prvků ČTÚ"**

Část	Název položky	Počet ks	Cena v Kč bez DPH za 1 ks	Celková cena v Kč bez DPH	DPH (%)	Výše DPH v Kč	Celková cena v Kč vč. DPH
<b>A</b>	<b>DODÁVKA ŘEŠENÍ Obnova síťových prvků ČTÚ</b>						
A1	Síťové prvky - přepínač dle tab. SC1	2	398 218 Kč	796 436 Kč	21%	167 252 Kč	963 688 Kč
A2	Síťové prvky - přepínač dle tab. SS2	2	229 753 Kč	459 506 Kč	21%	96 496 Kč	556 002 Kč
A3	Síťové prvky - přepínač dle tab. SF3	2	286 720 Kč	573 440 Kč	21%	120 422 Kč	693 862 Kč
A4	Síťové prvky - přepínač dle tab. SE4	7	186 794 Kč	1 307 558 Kč	21%	274 587 Kč	1 582 145 Kč
A5	Síťové prvky - přepínač dle tab. ST5	7	151 985 Kč	1 063 895 Kč	21%	223 418 Kč	1 287 313 Kč
A6	Síťové prvky - přepínač dle tab. ST6	3	124 992 Kč	374 976 Kč	21%	78 745 Kč	453 721 Kč
A7	Příslušenství pro přepínače dle tab. SP7	1	518 809 Kč	518 809 Kč	21%	108 950 Kč	627 759 Kč
A8	WiFi access point dle tab. WA8	10	25 406 Kč	254 060 Kč	21%	53 353 Kč	307 413 Kč
A9	WiFi kontrolér dle tab. WC9	2	167 407 Kč	334 814 Kč	21%	70 311 Kč	405 125 Kč
A10	Systém správy síťové infrastruktury dle tab. SW10	1	51 834 Kč	51 834 Kč	21%	10 885 Kč	62 719 Kč
A11	Nástroj na monitorování sítě dle tab. MS11	1	1 507 556 Kč	1 507 556 Kč	21%	316 587 Kč	1 824 143 Kč
A12	Instalační práce	1	513 500 Kč	513 500 Kč	21%	107 835 Kč	621 335 Kč
A	<b>Servisní služby po dobu 60 měsíců</b>	<b>1</b>	<b>1 704 000 Kč</b>	<b>1 704 000 Kč</b>	<b>21%</b>	<b>357 840 Kč</b>	<b>2 061 840 Kč</b>
	<b>CENA CELKEM</b>	<b>-</b>	<b>-</b>	<b>9 460 384 Kč</b>	<b>-</b>	<b>1 986 681 Kč</b>	<b>11 447 065 Kč</b>



ID	Název	Doba trvání	Zahájení	Dokončení
1	<b>Obnova síťových prvků LAN a Wifi ČTU</b>	<b>60 dny</b>	<b>D</b>	<b>D + 60</b>
2	<b>Milníky projektu</b>	<b>59 dny</b>		
3	podpis smlouvy	0 dny	D	D
4	objednání HW	0 dny	D + 2	D + 2
5	dodání HW	0 dny	D + 20	D + 20
6	akceptace plánu výměny	0 dny	D + 15	D + 15
7	akceptace projektu	0 dny	D + 59	D + 59
8	<b>Analýzy prostředí, detailní návrh a plán provedení</b>	<b>10 dny</b>	<b>D + 5</b>	<b>D + 15</b>
9	analýza prostředí a konfigurací	3 dny	D + 5	D + 8
10	návrh plánu výměny a akceptace	5 dny	D + 10	D + 15
11	<b>Instalace/výměna jednotlivých prvků</b>	<b>29 dny</b>	<b>D + 21</b>	<b>D + 50</b>
12	Vybalení, adresace a upgrade přepínačů a WLC	4 dny	D + 21	D + 26
13	výměna jednotlivých prvků (mimo prac. Dobu)	20 dny	D + 30	D + 50
14	<b>WiFi část</b>	<b>37 dny</b>	<b>D + 8</b>	<b>D + 45</b>
15	Site Survey WiFi	3 dny	D + 8	D + 11
16	Instalace a konfigurace WIFI kontroleru	8 dny	D + 20	D + 28
17	Postinstalační site survey	5 dny	D + 40	D + 45
18	<b>Instalace a konfigurace Prime</b>	<b>15 dny</b>	<b>D + 30</b>	<b>D + 45</b>
19	<b>Instalace a konfigurace StealthWatch</b>	<b>30 dny</b>	<b>D + 20</b>	<b>D + 50</b>
20	Instalace VMWare	3 dny	D + 20	D + 23
21	Licencování	3 dny	D + 24	D + 27
22	Nastavení Netflow na prvcích	20 dny	D + 30	D + 50
23	<b>Projektové řízení</b>	<b>60 dny</b>	<b>D</b>	<b>D + 60</b>