Pirkimo sąlygų 3 priedas „Pasiūlymas“

PASIŪLYMAS

DĖL RADIJO MONTAŽO PROGRAMINĖS IR APARATINĖS ĮRANGOS PIRKIMO

2024-03-25
Šiauliai

Tiekėjo pavadinimas	TVC Solutions, UAB
Tiekėjo adresas	Dvaro g. 140, Šiauliai, 76199
Tiekėjo įmonės kodas	145213623
Tiekėjo banko rekvizitai	IBAN: LT744010044200497041 SWIFT: AGBLLT2X LUMINOR BANK AS LITHUANIAN BRANCH
Tiekėjo PVM mokėtojo kodas	LT452136219
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1. Šiuo pasiūlymu pažymime, kad:

Nuostatos dėl įsipareigojimo atitikti Pirkimo sąlygas

1.1. sutinkame su visomis Pirkimo sąlygomis, nustatytomis:

1.1.1. skelbime, paskelbtame Viešųjų pirkimų įstatymo nustatyta tvarka CVP IS interneto adresu: https://pirkimai.eviesiejipirkimai.lt (taikoma, kai apie pirkimą buvo paskelbta);

1.1.2. kituose Pirkimo dokumentuose (jų paaiškinimuose, papildymuose).

Nuostatos dėl asmens duomenų tvarkymo

1.2. suprantame, jog:

1.2.1. jei tiekėjas, pirkimo laimėjimo atveju vykdant pirkimo sutartį, netvarkys asmens duomenų Perkančiosios organizacijos vardu, t. y. netaps duomenų tvarkytoju, jis bus laikomas duomenų valdytoju, kuris turi teises ir pareigas, nustatytas 2016 m. balandžio 27 d. Europos Parlamento ir Tarybos reglamente (ES) 2016/679 dėl fizinių asmenų apsaugos tvarkant asmens duomenis ir dėl laisvo tokių duomenų judėjimo ir kuriuo panaikinama Direktyva 95/46/EB (Bendrasis duomenų apsaugos reglamentas) (toliau – Reglamentas 2016/679).

1.2.2. jei tiekėjas, pirkimo laimėjimo atveju vykdant pirkimo sutartį, tvarkys asmens duomenis Perkančiosios organizacijos vardu, jis vadovaujantis Reglamentu 2016/679 bus laikomas duomenų tvarkytoju. Tokiu atveju, tiekėjas, kurio pasiūlymas bus pripažintas laimėjusiu pirkimą, turės pasirašyti duomenų tvarkymo sutartį (patvirtiname, jog susipažinome su duomenų tvarkymo sutarties sąlygomis, taip pat Perkančiosios organizacijos asmens duomenų tvarkymo tvarkos aprašu, paskelbtu Perkančiosios organizacijos interneto svetainėje adresu https://apie.lrt.lt/valdymas/svarbus-dokumentai/asmens-duomenu-apsauga (taip pat randamu www.lrt.lt, pasirenkant skiltį „Apie LRT“, „Valdymas“, „Svarbūs dokumentai“ ir „Asmens duomenų apsauga“). Pareiškiame, jog egzistuojant šiame punkte nurodytoms aplinkybėms, sutinkame pirkimo laimėjimo atveju sudarius pirkimo sutartį taip pat sudaryti duomenų tvarkymo sutartį.

Deklaracija dėl Rusijos veiksmų destabilizuojant padėtį Ukrainoje

1.3. **(taikoma, kai pasiūlymą teikia juridinis asmuo)** be kitų Pirkimo sąlygose nustatytų reikalavimų, deklaruojame, kad mano atstovaujamas / vadovaujamas subjektas nėra įtakojamas Rusijos, kaip nurodyta **Tarybos reglamento (ES) 2022/576 2022 m. balandžio 8 d. kuriuo iš dalies keičiamas Reglamentas (ES) Nr. 833/2014 dėl ribojamųjų priemonių atsižvelgiant į Rusijos veiksmus, kuriais destabilizuojama padėtis Ukrainoje** 5k straipsnyje nustatytuose apribojimuose. Visų pirma pareiškiu, kad:

1.3.1. mano atstovaujama įmonė (ir nė viena iš bendrovių, kurios yra mūsų konsorciumo nariais) nėra įsteigta Rusijoje;

1.3.2. mano atstovaujama įmonė (ir nė viena iš įmonių, kurios yra mūsų konsorciumo nariais) nėra juridinis asmuo, subjektas ar įstaiga, kuriuose daugiau kaip 50 % nuosavybės teisių tiesiogiai ar netiesiogiai priklauso šios deklaracijos 1.3.1 punkte nurodytam subjektui;

1.3.3. nei aš, nei mano atstovaujama bendrovė nesame fiziniu ar juridiniu asmeniu, subjektu ar organizacija, veikiančia šios deklaracijos 1.3.1 arba 1.3.2 punkte nurodyto subjekto vardu ar jo nurodymu;

1.3.4. sutartis nebus paskirta vykdyti subrangovui (-ams), ar kitam (-iems) subjektui (-tams), kurių pajėgumais remiasi, kurie priskirtini šios deklaracijos 1.3.1 arba 1.3.2, arba 1.3.3 punktuose nurodytiems subjektams.

1.4. **(taikoma, kai pasiūlymą teikia fizinis asmuo)** be kitų Pirkimo sąlygose nustatytų reikalavimų, deklaruoju, kad nesu įtakojamas (-a) Rusijos, kaip nurodyta **Tarybos reglamento (ES) 2022/576 2022 m. balandžio 8 d. kuriuo iš dalies keičiamas Reglamentas (ES) Nr. 833/2014 dėl ribojamųjų priemonių atsižvelgiant į Rusijos veiksmus, kuriais destabilizuojama padėtis Ukrainoje** 5k straipsnyje nustatytuose apribojimuose. Visų pirma pareiškiu, kad:

1.4.1. nesu Rusijos pilietis (-ė) ar įsisteigęs Rusijoje;

1.4.2. neveikiu šios deklaracijos 1.4.1 punkte nurodyto subjekto vardu ar jo nurodymu;

1.4.3. sutartis nebus paskirta vykdyti subrangovui (-ams), ar kitam (-iems) subjektui (-tams), kurių pajėgumais remiamasi, kurie priskirtini šios deklaracijos 1.4.1 arba 1.4.2 punktuose nurodytiems subjektams.

Deklaracija dėl nacionalinio saugumo reikalavimų

1.5. atitinkame toliau nurodomus reikalavimus:

1.5.1. tiekėjo siūlomos prekės nekelia grėsmės nacionaliniam saugumui – vadovaujantis Lietuvos Respublikos viešųjų pirkimų įstatymo (toliau – VPĮ) 37 straipsnio 9 dalies 1 punktu, prekių gamintojas ar jį kontroliuojantis asmuo nėra registruoti (jeigu gamintojas ar jį kontroliuojantis asmuo yra fizinis asmuo – nuolat gyvenantis ar turintis pilietybę) VPĮ 92 straipsnio 14 dalyje numatytame sąraše nurodytose valstybėse ar teritorijose. Specialiųjų pirkimo sąlygų 5.4 punktas;

1.5.2. tiekėjas neturi interesų, galinčių kelti grėsmę nacionaliniam saugumui – vadovaujantis VPĮ 47 straipsnio 9 dalimi, jis pats, jo subtiekėjai ar ūkio subjektai, kurių pajėgumais remiamasi ar juos kontroliuojantys asmenys nėra registruoti (jeigu tiekėjas, jo subtiekėjas, ūkio subjektas, kurio pajėgumais remiamasi, ar kontroliuojantis asmuo yra fizinis asmuo – nuolat gyvenantis ar turintis pilietybę) VPĮ 92 straipsnio 14 dalyje numatytame sąraše nurodytose valstybėse ar teritorijose. Specialiųjų pirkimo sąlygų 5.5 punktas.

1.6. Patvirtinu, kad 1.5 punkte nurodyti duomenys yra teisingi ir aktualūs pasiūlymo pateikimo dieną.

1.7. Suprantu, kad vadovaudamasis VPĮ 39 straipsnio 4 dalimi, perkančioji organizacija bet kuriuo pirkimo procedūros metu gali paprašyti kandidatų ar dalyvių pateikti visus ar dalį dokumentų, patvirtinančių atitiktį VPĮ 37 straipsnio 9 dalies, jeigu tai būtina siekiant užtikrinti tinkamą pirkimo procedūros atlikimą.

1.8. Suprantu, kad jeigu pagal vertinimo rezultatus pasiūlymas bus pripažintas laimėjusiu, turės būti pateikti perkančiosios organizacijos nurodyti atitiktį nacionalinio saugumo reikalavimams patvirtinantys dokumentai.

Nuostatos dėl Perkančiosios organizacijos Tiekėjų etikos kodekso:

1.9. Esame susipažinę su VšĮ Lietuvos nacionalinio radijo ir televizijos tiekėjų etikos kodeksu, paskelbtu Perkančiosios organizacijos interneto svetainėje adresu https://apie.lrt.lt/valdymas/svarbus-dokumentai/kiti-dokumentai skiltyje „Kiti Dokumentai“ (taip

pat randamu www.lrt.lt, pasirenkant skiltį „Apie LRT“, „Valdymas“, „Svarbūs dokumentai“ ir „Kiti Dokumentai“).

2. Teikdami šį pasiūlymą, mes patvirtiname, kad į mūsų siūlomą kainą įskaičiuotos visos prekių pristatymo ir paslaugų suteikimo (jeigu taikoma) išlaidos ir visi mokesčiai, ir kad mes prisiimame riziką už visas išlaidas, kurias, teikdami pasiūlymą ir laikydamiesi Perkančiosios organizacijos reikalavimų, privalėjome įskaičiuoti į pasiūlymo kainą.

3. Mes siūlome šias prekes už nurodytą kainą:

Eil. Nr.	**Prekės pavadinimas****	**Mato vnt.**	**Kiekis**	**1 mato vnt. kaina EUR (be PVM)**	**PVM (%)**	**Iš viso kaina EUR (be PVM)**
1	***2***	***3***	***4***	***5***	***6***	***7 (4×5)***
1.	Serveriai su priedais ir programinė įranga (licencijos)**	Komplektas	1	107540,00	21	107540,00
Bendra pasiūlymo kaina EUR be PVM						107540,00
PVM*						22583,40
Bendra pasiūlymo kaina EUR su PVM*						130123,40

Bendra pasiūlymo kaina su PVM* 130123,40 EUR (*Vienas šimtas trisdešimt tūkstančių vienas šimtas dvidešimt trys eurai ir keturiasdešimt centų*).

*kai pagal galiojančius teisės aktus tiekėjui nereikia mokėti PVM, jis nurodo priežastis, dėl kurių nemokamas PVM (pvz. neapmokestinama, 0% tarifas ir kt.): /įrašyti, jei taikoma/.

**tiekėjas atskiras siūlomas prekes ir siūlomų prekių kainas nurodo Pirkimo sąlygų 2 priedo Techninės specifikacijos 1 lentelėje ir pateikia kartu su pasiūlymu.

4. Siūlomos prekės ir paslaugos visiškai atitinka pirkimo dokumentuose nurodytus reikalavimus.

5. Sutarties vykdymui subtiekėjus pasitelkti nenumatome

6. Pasiūlymas galioja iki termino, nustatyto pirkimo dokumentuose.

7. Kartu su pasiūlymu pateikiami šie dokumentai:

Eil. Nr.	Dokumento pavadinimas	Dokumentą sudarančių lapų skaičius	Ar dokumente yra konfidencialios informacijos? (Taip/Ne)	Paaiškinimas, kokia konkreti informacija dokumente yra konfidenciali*
1.	EBVPD	15	Ne	
2.	Įgaliojimas	1	Ne	
3.	Techninė dokumentacija	171	Ne	
4.	Techninė specifikacija	10	Ne	
5.	RC išrašas	3	Ne	
6.	RC pažyma	2	Ne	

Pastaba: *pildyti tuomet, jei bus pateikta konfidenciali informacija. Atkreipiame dėmesį, kad Lietuvos Respublikos viešųjų pirkimų įstatymo 20 straipsnyje nurodyta, kokia informacija negali būti laikoma konfidencialia

_____ _____ _____

(pareigų pavadinimas) *(tiekėjo ar jo įgalioto asmens parašas)* *(vardas pavardė)*

_____

TECHNINĖ SPECIFIKACIJA

I. Bendri reikalavimai:

1. Perkančioji organizacija siekia įsigyti serverius su priedais, programinę įrangą (licencijas) (toliau – Prekė/-ės).

2. Reikalavimai Prekėms pateikiami šioje Techninėje specifikacijoje.

3. Prekės skirtos šiems funkcionalumams įgyvendinti: virtualizacijos resursų praplėtimui.

4. Techninėje specifikacijoje vartojamos sąvokos:

4.1. Dokumentacija – gamintojo dokumentai (vartotojo vadovai, techniniai pasai, kita gamintojo teikiama informacija apie prekės parametrus) arba gamintojo internetinio puslapio nuoroda (-os), kuriuose pateikiama gamintojo informacija apie siūlomos prekės atitikimą reikalaujamam parametrui / specifikacijai.

5. **Bendri reikalavimai tiekėjui dėl Techninės specifikacijos pildymo:**

5.1. Tiekėjas turi užpildyti visus Techninės specifikacijos lentelių laukelius, kurie pažymėti „(*įrašyti*)“ (tiekėjas ištrina „(*įrašyti*)“ ir nurodo reikalaujama informaciją). Tiekėjui minėtų laukelių neužpildžius arba užpildžius netinkamai tiekėjo pasiūlymas gali būti atmestas kaip neatitinkantis Pirkimo dokumentų reikalavimų.

5.2. Tiekėjas negali palikti tuščių laukelių, kurie pažymėti „(*įrašyti*)“.

5.3. Tiekėjas negali keisti Techninės specifikacijos, t. y. tiekėjas negali keisti Techninės specifikacijos teksto (papildyti, trinti ir pan.), papildyti lentelių naujais laukais ar ištrinti esamus, nebent Techninėje specifikacijoje aiškiai nurodyta, kad tokie pakeitimai galimi. Tiekėjui atliktus minėtus pakeitimus, tiekėjo pasiūlymas gali būti atmestas, kaip neatitinkantis Pirkimo dokumentų reikalavimų.

5.4. Tiekėjas turi nurodyti konkrečius siūlomų prekių modelių pavadinimus ir gamintojus. Konkrečiai pozicijai siūloma konkretaus gamintojo konkreti prekė (modelis), jei nenurodyta kitaip. Jeigu siūloma prekės neturi konkretaus gamintojo ar modelio pavadinimo:

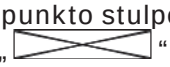
5.4.1. pateikiamas paaiškinimas dėl kokių priežasčių neįmanoma nurodyti gamintojo / modelio arba;

5.4.2. jeigu prekė modulinė:

5.4.2.1. modelio pavadinimo sudarymo būdas, arba;

5.4.2.2. modulinę prekę sudarančių atskirų prekių gamintojai ir modeliai.

6. Reikalavimai tiekėjui dėl lentelių stulpelių „Siūlomi parametrai“ pildymo:

6.1. Tiekėjas turi nurodyti atitikimą kiekvienam stulpelio „Reikalavimai“ nurodytam reikalavimui atskirai. Tiekėjas gali nenurodyti atitikimo reikalavimui tik tuo atveju, jeigu prie atitinkamo reikalavimo punkto stulpelio „Siūlomi parametrai“ eilutėje nurodyta „*/įrašyti neprivaloma/*“ arba eilutė perbraukta „  “.

6.2. Tiekėjas nurodydamas siūlomos prekės atitikimą turi nurodyti konkrečias siūlomos prekės specifikacijas / parametrus, pvz.: „ilgis 1,5 m“, o ne „ilgis ne mažiau kaip 1,25 m“

6.3. Tiekėjui vietoje konkrečių specifikacijų / parametrų nurodžius „atitinka“, „taip“ ar panašiai, toks tiekėjo pasiūlymas gali būti atmestas, kaip neatitinkantis Pirkimo dokumentų reikalavimų, jeigu reikalavimo formuluotė reikalavo nurodyti konkrečias specifikacijas kaip nurodyta 6.2 punkte.

6.4. Tiekėjas, vadovaujantis Pirkimo sąlygų 17.4 punktu, Techninėje specifikacijoje stulpelyje „Siūlomi parametrai“ nurodytą informaciją galės paaiškinti tik tuo atveju, jeigu:

6.4.1. Tiekėjas kartu su pasiūlymu pateikė Dokumentaciją ir pateiktoje Dokumentacijoje yra nurodyta informacija patvirtinanti, kad tiekėjo siūloma prekė atitinka Techninėje specifikacijoje nurodytus reikalavimus;

6.4.2. Tiekėjas pateiks paaiškinimą iš viešai prieinamos siūlomos prekės gamintojo informacijos arba gamintojo patvirtinimą, kad tiekėjo siūloma prekė atitinka Techninėje specifikacijoje nurodytus reikalavimus.

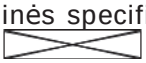
7. Reikalavimai tiekėjui dėl lentelių stulpelių „Siūlomus parametrus patvirtinantys dokumentai“ pildymo:

7.1. Tiekėjas:

7.1.1. atsakingas už Dokumentacijos pateikimą, kuri patvirtina tiekėjo siūlomos prekės atitikimą Techninės specifikacijos reikalavimams, tose eilutėse, kuriose nurodyta „/privaloma pateikti/“ – vietoje „/privaloma pateikti/“ nurodydamas prie pasiūlymo pridedamo dokumento pavadinimą / bylos pavadinimą arba nuorodą į konkretų internetinį puslapį. Perkančioji organizacija aktyviai neieškos ir netikrins Dokumentacijos (tačiau tai neatima teisės iš Perkančiosios organizacijos, kilus įtarimui dėl Dokumentacijos pateiktos informacijos teisingumo, pasitikrinti atitikimą) ir tikrins tik

Tiekėjo kartu su pasiūlymu pateiktą Dokumentaciją, jeigu Tiekėjo pateikta Dokumentacija nepatvirtins atitikimo keliamam reikalavimui, o Tiekėjas nepaaiškins Techninės specifikacijos 6.4 punkte nustatyta tvarka, kaip tiekėjo siūloma prekė atitinka keliamą reikalavimą arba Tiekėjas su pasiūlymu iš viso nepateiks Dokumentacijos – Tiekėjo pasiūlymas bus atmestas;

7.1.2. gali, tačiau neprivalo, pateikti Dokumentaciją, kuri patvirtina tiekėjo siūlomos prekės atitikimą Techninės specifikacijos reikalavimams, tose eilutėse, kuriose nurodyta „/rekomenduojama pateikti/“ – vietoje „/rekomenduojama pateikti/“ nurodydamas prie pasiūlymo pridedamo dokumento pavadinimą / bylos pavadinimą arba nuorodą į konkretų internetinį puslapį arba pažymėdamas, kad Dokumentacijos neteiks (pvz.: „X“, „neteikiame“ ar pan.) arba palikdamas eilutę neužpildytą. Jeigu Tiekėjas su pasiūlymu pasirenka neteikti Dokumentacijos Perkančioji organizacija savarankiškai ieško ir patikrina viešai prieinamą Dokumentaciją, tačiau jeigu Perkančiosios organizacijos rasta viešai prieinama Dokumentacija nepatvirtins atitikimo keliamam reikalavimui, o Tiekėjas nepaaiškins Techninės specifikacijos 6.4 punkte nustatyta tvarka, kaip tiekėjo siūloma prekė atitinka keliamam reikalavimui – Tiekėjo pasiūlymas bus atmestas;

7.1.3. įsipareigoja atitikti keliamam reikalavimui ir neteikia Dokumentacijos, o Perkančioji organizacija tikrina atitikimą Techninės specifikacijos reikalavimui tik sutarties vykdymo metu, tose eilutėse, kurios yra perbrauktos „  “, tačiau Perkančioji organizacija turi teisę paprašyti paaiškinti atitikimą Techninės specifikacijos reikalavimui pasiūlymų vertinimo metu ir paaiškinti atitikimą Techninės specifikacijos **Error! Reference source not found.** punkte nustatyta tvarka, j eigu kils abejonių dėl Tiekėjo galimybių įgyvendinti reikalavimą sutarties vykdymo metu.

7.2. Dokumentacija turi būti parengta prekės gamintojo, o ne trečiųjų šalių. Jeigu prekė sudaryta iš kitų gamintojų įrangos ar dalių gali būti teikiama tiek galutinės prekės, tiek prekės komplektuojančios dalies gamintojo Dokumentacija.

7.3. Tiekėjas prie konkretaus reikalavimo nurodo, kuri tiekėjo su pasiūlymu teikiama Dokumentacija patvirtina atitikimą nurodytam konkrečiam reikalavimui.

7.4. Perkančioji organizacija prašo tiekėjų, kad nurodant Dokumentacijos pavadinimą, kartu būtų pateikiama nuoroda į konkretų puslapį, paragrafą ir pan., kai tai yra įmanoma, sklandesniam tiekėjų pasiūlymų vertinimui.

8. Jei Prekių gamintojas nuo pasiūlymo pateikimo momento iki Prekių pristatymo termino nustoja gaminti siūlomą Prekę (ar Prekės sudedamąsias dalis), tiekėjas, gavęs rašytinį Perkančiosios organizacijos sutikimą, gali pristatyti to paties gamintojo kitą prekę, atitinkančią Techninėje specifikacijoje nurodytus Prekės (ar jos dalies) siūlomus parametrus arba geresnius nei tiekėjo Techninėje specifikacijoje nurodyti siūlomi parametrai, kartu pateikiant Prekės gamintojo patvirtinimą ar kitą dokumentą, įrodantį, kad gamintojas nebegamina Techninėje specifikacijoje nurodytos Prekės (ar jos dalies). Nesant to paties gamintojo asortimente nurodytas sąlygas atitinkančių prekių, pateikęs tai pagrindžiantį gamintojo patvirtinimą ar kitą įrodantį dokumentą, tiekėjas, gavęs perkančiosios organizacijos raštišką sutikimą, gali pristatyti kito gamintojo prekes, atitinkančias Techninėje specifikacijoje nurodytus prekių (ar jų dalies) siūlomus parametrus arba geresnius, nei tiekėjo Techninėje specifikacijoje nurodyti siūlomi parametrai.

9. Prekės turi būti komplektuojamos:

9.1. su visais Prekės gamintojo įprastoje Prekės komplektacijoje nurodytais priedais (t. y. tais priedais, kurie nurodyti Dokumentacijoje), jeigu nėra nurodyta kitaip;

9.2. su visais tinkamam Prekių veikimui reikalingais priedais – montavimo medžiagomis, priedais, kabeliais ir pan., jeigu tokie priedai reikalingi tinkamam Prekės veikimui, net jeigu tai atskirai nėra nurodyta.

10. Į pasiūlymo kainą turi būti įskaičiuotas prekių pristatymas. Tiekėjas prisiima prekių žuvimo riziką iki priėmimo – perdavimo akto pasirašymo momento.

11. Prekės, atitinkančios Techninės specifikacijos reikalavimus, turi būti pristatytos adresu S. Konarskio g. 49, 03123 Vilnius. Sutarties vykdymo metu pristatymo adresas gali būti patikslintas.

12. Prekių pristatymo terminas – 3 mėnesiai nuo sutarties įsigaliojimo. Šis terminas gali būti pratęstas ne daugiau nei vieną kartą 2 (du) mėnesiams pirkimo sutartyje nustatyta tvarka.

II. Konkretūs reikalavimai prekėms:

13. **Serveriai su priedais.** Tiekėjas turi nurodyti visus serverius ir jų priedus, sudarančius atskirus įrenginius (taip pat ir programinę įrangą, jeigu ji neįtraukta į aparatinės įrangos kainą), nurodant kiekvieno įrenginio **gamintoją**, **modelį**, **kiekį** bei **kainą** Eur be PVM. Tiekėjas užpildo tiek eilučių, kiek yra atskirų įrenginių. Reikalavimai Prekėms nurodyti 2 lentelėje.

1 lentelė.

Eil. Nr.	Įrenginys	Gamintojas	Modelis	Kiekis, vnt.	Vnt. kaina (Eur be PVM)	Iš viso (Eur be PVM)
1	*2*	*3*	*4*	*5*	*6*	*7 (5×6)*
1.	Serveris su Windows Server 2022 Datacenter licencijomis	*DELL*	*R750*	*2*	*29375,00*	*58750,00*
1.1.	VMware ESIX 8 versijos licencijų komplektas 128 (4x32Core) branduoliams 36 mėnesių laikotarpiui	*VMware*	vSphere Standard *ESIX (ESXi) 8*	*1*	*25000,00*	*25000,00*
1.2.	Dell Emc 6620B komutatorių SAN licencijų praplėtimas, 12 prievadų	*DELL EMC*	EMEA_BSERIESSWITCH_36184_VP	*2*	*6300,00*	*12600,00*
2.	Prieigos (tinklo) komutatoriai (skirti garso tinklui perduoti iš virtualizacijos)	*Luminex*	*GigaCore 30i – 24x1G – 6x10G(SFP+) – PoE++ - 2nd PSU 550W 2x GigaCore 10 Gb SMF Transceiver with DMI, SFP+*	*1*	*4250,00*	*4250,00*
3.	Dviejų AoIP formatų tiltas	*Directout*	*DOPRDG006, DONETR002, DONETD022, DOICT0136*	*1*	*6340,00*	*6340,00*
4.	Virtuali garso sąsaja	*Lawo*	*VSC*	*2*	*300,00*	*600,00*
					Iš viso EUR be PVM:	107540,00

2 lentelė. Reikalavimai serveriams su priedais

	Reikalavimai	Siūlomi parametrai	Siūlomus parametrus patvirtinantys dokumentai
1.	**Bendri reikalavimai, apimtis, sistemos duomenys:**		
1.1.	Visos siūlomos prekės turi būti naujos, nenaudotos, neatnaujintos, ne ekspozicinės.	Visos siūlomos prekės naujos, nenaudotos, neatnaujintos, ne ekspozicinės.	

1.2.	Visos siūlomos techninės įrangos elektros energiją naudojančios komponentės turi turėti CE žymėjimą.	Visos siūlomos techninės įrangos elektros energiją naudojančios komponentės turi CE žymėjimą.	
1.3.	Visos licencijos, išskyrus šios lentelės 2.10.2 punkte nurodytas VMware ESIX v8 licencijas, turi būti pateiktos LRT ir registruotos LRT vardu su neterminuotu galiojimo laikotarpiu. Licencijų, įskaitant VMware ESIX v8 licencijas, įdiegti nereikia.	Visos licencijos, išskyrus šios lentelės 2.10.2 punkte nurodytas VMware ESIX v8 licencijas, pateikiamos LRT ir registruotos LRT vardu su neterminuotu galiojimo laikotarpiu. Licencijos, įskaitant VMware ESIX v8 licencijas, neįdiegtos.	
1.4.	Siūlomos įrangos garantija – ne trumpiau 24 mėn.	Siūlomos įrangos garantija – 24 mėn.	
2.	**Serveris 2 komplektai:**		
2.1.	Serverio tipas: serveris skirtas dirbti su virtualiomis mašinomis.	Serveris skirtas dirbti su virtualiomis mašinomis.	
2.2.	Palaikomas virtualių mašinų kiekis ne mažiau 24 vienu metu.	Palaikomos (bet neapribojama) 24 virtualios mašinos vienu metu.	
2.3.	Montuojamas į 19 colių "rack" tipo spintą, ne didesnis nei 2U.	Montuojamas į 19 colių "rack" tipo spintą, 2U.	
2.4.	2 procesoriai skirti serveriams, kiekvienas iš jų:		
2.4.1.	Ne mažiau nei 32 branduolių;	32 branduolių	*poweredge-r750-technical-guide.pdf*
2.4.2.	Ne mažiau nei 64 gijų (Threads);	64 gijų (Threads);	*poweredge-r750-technical-guide.pdf*
2.4.3.	Palaikantis ne mažiau nei 64 PCI Express linijas vienu metu;	Palaiko 64 PCI Express linijas vienu metu;	*poweredge-r750-technical-guide.pdf*
2.4.4.	Palaikomas atminties kanalų kiekis ne mažiau 8;	Palaiko 8 atminties kanalus;	*poweredge-r750-technical-guide.pdf*
2.4.5.	Palaikomas atminties kanalų dažnis ne mažiau 3200 MHz;	Palaikomas atminties kanalų dažnis 3200 MHz;	*poweredge-r750-technical-guide.pdf*
2.4.6.	Surenkantis ne mažiau 67000 PassMark taškų dvigubo procesoriaus konfigūracijoje pagal https://www.cpubenchmark.net/;	Surenka 68563 PassMark taškų dvigubo procesoriaus konfigūracijoje pagal https://www.cpubenchmark.net/ datai 2024 03 07	PassMark - [Dual CPU] Intel Xeon Gold 6338 @ 2.00GHz - Price performance comparison (cpubenchmark.net)
2.5.	Operatyvinė atmintis:		
2.5.1.	Ne mažiau 8x32 GB;	8x32 GB	*poweredge-r750-technical-guide.pdf*
2.5.2.	Tipas RDIMM;	Tipas RDIMM;	*poweredge-r750-technical-guide.pdf*
2.5.3.	Ne lėčiau nei 3200 MT/s.	3200 MT/s.	*poweredge-r750-technical-guide.pdf*

2.6.	Saugojimo atmintis:		
2.6.1.	Ne mažiau nei 4x1,9 TB;	4x1,9 TB;	*poweredge-r750-technical-guide.pdf*
2.6.2.	Tipas SSD SATA;	SSD SATA;	*poweredge-r750-technical-guide.pdf*
2.6.3.	Dydis 2,5 colio;	2,5 colio;	*poweredge-r750-technical-guide.pdf*
2.6.4.	Skaitymo greitis ne mažiau 6 Gbps;	6 Gbps;	*poweredge-r750-technical-guide.pdf*
2.6.5.	Keičiamas neišjungiant serverio (Hot-plug);	Hot-plug;	*poweredge-r750-technical-guide.pdf*
2.6.6.	Diskų masyvo konfigūracija RAID1;	Diskų masyvo konfigūracija RAID1;	*perc11-ug.pdf*
2.6.7.	Integruotas RAID kontroleris;	Integruotas RAID kontroleris;	*perc11-ug.pdf*
2.6.8.	Turi būti galimybė viduje instaliuoti papildomai ne mažiau 4 vnt. 2,5 colio diskų.	Yra galimybė viduje instaliuoti papildomai 4 vnt. 2,5 colio diskų.	
2.7.	PCIe jungtys: ne mažiau 4x PCIe 4 generacijos lizdai.	*Yra* 4x PCIe 4 generacijos lizdai	
2.8.	Tinklai:		
2.8.1.	Ne mažiau 4x 10Gb SFP+ LAN jungtys;	Yra 4x 10Gb SFP+ LAN jungtys;	
2.8.2.	Ne mažiau 2x LAN 1 Gb jungtys (management);	Yra 2x LAN 1 Gb jungtys (management);	
2.8.3.	SAN Tinklas: pateikti su dvigubo (Dual Port) prievado Fibre Channel korta, 16 Gb.	Yra dvigubo (Dual Port) prievado Fibre Channel korta, 16 Gb	
2.9.	Dvigubas maitinimo šaltinis 1+1 konfigūracijoje. Keičiamas neišjungiant serverio (Hot-plug), ne mažiau 800 W galios.	Dvigubas maitinimo šaltinis 1+1 konfigūracijoje. Keičiamas neišjungiant serverio (Hot-plug), 800 W galios	
2.10.	Pateikti licencijas abiems serveriams (5p.):		
2.10.1.	Turi būti pateiktos Windows Server 2022 Datacenter licencijos (arba lygiavertės) dengiančios visus serverio procesoriaus core ir leidžiančios naudoti neribotą Windows server virtualių mašinų kiekį;	Pateikiamos Windows Server 2022 Datacenter licencijos dengiančios visus serverio procesoriaus core ir leidžiančios naudoti neribotą Windows server virtualių mašinų kiekį;	
2.10.2.	VMware ESIX v8 licencijos visiems procesoriams ir branduoliams (ne mažiau nei 4 procesoriai iš viso, kiekvienas po ne mažiau 32 branduolius), licencijų galiojimo trukmė 36 mėn.;	Pateikiamos VMware ESIX v8 licencijos visiems procesoriams ir branduoliams (iš viso 128 branduoliai), licencijų galiojimo trukmė 36 mėn.;Į licenciją įeina vSphere Standart ir vCenter Standart	

2.10.3.	Papildomos licencijos: turimų dviejų Dell Emc 6620B komutatorių SAN licencijų praplėtimas, ne mažiau 12 prievadų kiekvienam arba lygiavertės.	Pateikiamas Dell Emc 6620B komutatorių SAN licencijų praplėtimas, po 12 prievadų kiekvienam komutatoriui.	
2.11.	Pateikti su to pačio gamintojo pelyte ir klaviatūra.	Pateikiama su to pačio gamintojo pelyte ir klaviatūra.	
2.12.	Pateikti ištraukiamą rack tvirtinimo įrangą.	Pateikiama ištraukiama rack tvirtinimo įranga.	
3.	**Papildoma įranga prie serverių:**		
3.1.	**Prieigos (tinklo) komutatoriai (skirti garso tinklui perduoti iš virtualizacijos), 1 vnt.:**		
3.1.1.	Dedikuotas prievadas valdymui;	Yra dedikuotas prievadas valdymui;	
3.1.2.	IEEE 802.3af 10/100/1000BaseT Ethernet LAN prievadai ne mažiau kaip 24 vnt.;	IEEE 802.3af 10/100/1000BaseT Ethernet LAN prievadai 24 vnt.;	*Product-specification-sheet-GigaCore-30i-10G-v1.1.3-1.pdf*
3.1.3.	1GBASE Ethernet LAN prievadai keičiamiems fizinės terpės SFP+ tipo moduliams įrengti ne mažiau kaip 4 vnt.;	10GBASE / 1GBASE (*10 Gbps / 1 Gbps*) Ethernet LAN prievadai keičiamiems fizinės terpės SFP+ tipo moduliams įrengti - 6 vnt.;	*Product-specification-sheet-GigaCore-30i-10G-v1.1.3-1.pdf*
3.1.4.	PoE ne mažiau 30W per prievadą, ne mažiau 720W bendrai per komutatorių.	PoE 90W per prievadą, 1000W bendrai per komutatorių.	*Product-specification-sheet-GigaCore-30i-10G-v1.1.3-1.pdf*
3.1.5.	Komutavimo pralaidumas (Switching capacity) ne mažiau kaip 52 Gbps.	Komutavimo pralaidumas 168 Gbps	*Product-specification-sheet-GigaCore-30i-10G-v1.1.3-1.pdf*
3.1.6.	VLAN palaikymas ir spalvine indikacija per web valdiklį.	Yra VLAN palaikymas ir spalvine indikacija per web valdiklį.	
3.1.7.	MAC adresų kiekis ne mažiau 8192įrašų.	MAC adresų kiekis *16384*	*Product-specification-sheet-GigaCore-30i-10G-v1.1.3-1.pdf*
3.1.8.	Dante, AES67, Q-SYS gamyklinis palaikymas.	Yra Dante, AES67, Q-SYS gamyklinis palaikymas.	*Product-specification-sheet-GigaCore-30i-10G-v1.1.3-1.pdf*
3.1.9.	Dvigubas maitinimo šaltinis, su rezervacijos galimybe. Pateikti išorinį maitinimo bloką su specialiu laidu jei reikalingas.	Pateikiamas dvigubas maitinimo šaltinis, su rezervacijos galimybe.	
3.1.10.	Korpusas: montuojamas į 19“ komutacinę spintą, ne didesnis kaip 1U.	Korpusas: montuojamas į 19“ komutacinę spintą, 1U.	*Product-specification-sheet-GigaCore-30i-10G-v1.1.3-1.pdf*
3.1.11.	Įrenginio darbinis atsparumas aplinkos temperatūra nuo 0° iki 40° C.	Įrenginio darbinis atsparumas aplinkos temperatūranuo 0° iki 50° C.	*Product-specification-sheet-GigaCore-30i-10G-v1.1.3-1.pdf*

3.1.12.	Įrenginio darbinis atsparumas aplinkos drėgnumui ne mažiau 85 %.	Įrenginio darbinis atsparumas aplinkos drėgnumui *iki 95%*	*Product-specification-sheet-GigaCore-30i-10G-v1.1.3-1.pdf*
3.1.13.	Pateikti SFP modulius, 2 vnt., suderinamus su prieigos komutatoriumi.	Pateikiami 2 SFP moduliai, suderinami su prieigos komutatoriumi.	
3.1.14.	Jei reikalinga pateikti licencijas, nurodyti pavadinimą/tipą ir gamintoją	*Papildomos licenzijos nereikalingos*	
3.2.	**Dviejų AoIP formatų tiltas, 1 vnt.:**		
3.2.1.	Įrenginys apjungiantis du skirtingus AES67 techninio standarto AoIP protokolus.	Įrenginys apjungiantis du skirtingus AES67 techninio standarto AoIP protokolus.	
3.2.2.	Įrenginys turi būti suderinamas su pateikiamos virtualizacijos garso perdavimo protokolu ir dabar LRT naudojamu Dante AoIP protokolu.	Įrenginys suderinamas su pateikiamos virtualizacijos garso perdavimo protokolu ir dabar LRT naudojamu Dante AoIP protokolu.	
3.2.3.	Įrenginys turi gebėti perduoti garso signalą iš vieno formato į kitą izoliuotuose tinkluose, dviejų skirtingų sinchronizacijų su garso matricos funkcionalumu tarp kanalų.	Įrenginys geba perduoti garso signalą iš vieno formato į kitą izoliuotuose tinkluose, dviejų skirtingų sinchronizacijų su garso matricos funkcionalumu tarp kanalų.	
3.2.4.	Palaikomas sample rate nuo ne mažiau 44.1 kHz iki 192 kHz.	Palaikomas sample rate nuo 44.1 kHz iki 192 kHz.	https://www.directout.eu/product/prodigy-mp/
3.2.5.	Du apjungiami tinklai gali veikti nepriklausomai vienas nuo kito.	Du apjungiami tinklai gali veikti nepriklausomai vienas nuo kito.	
3.2.6.	Sąsajos ne mažiau nei: 1) 1x RJ45 AES67; 2) 1x SFP jungtis (slot), kartu pateikiamas SFP modulis; 3) 2x RJ45 Dante pora (main ir redundant funkcijos); 4) 1x Worldclock pajungimas. Pateikti SFP modulį.	Sąsajos: 1) 2x RJ45 AES67; 2) 1x SFP jungtis (slot), kartu pateikiamas SFP modulis; 3) 2x RJ45 Dante pora (main ir redundant funkcijos); 4) 1x Worldclock pajungimas. Pateikti SFP modulį.	https://www.directout.eu/product/prodigy-mp/ https://www.directout.eu/product/rav-io/ https://www.directout.eu/product/dante-io/
3.2.7.	Maitinimo šaltinis: dvigubas, rezervuojantis vienas kitą maitinimas.	Maitinimo šaltinis: dvigubas, rezervuojantis vienas kitą maitinimas.	https://www.directout.eu/product/prodigy-mp/
3.2.8.	Audio kanalų apimtis: ne mažiau nei 32 įėjimai ir išėjimai prie 96 kHz kiekvienam AoIP formatui.	Audio kanalų apimtis: 32 įėjimai ir išėjimai Dante ir 64 įėjimai ir išėjimai Ravenna prie	https://www.directout.eu/product/dante-io/

		96 kHz kiekvienam AoIP formatui.	https://www.directout.eu/product/rav-io/
3.3.	**Virtuali garso sąsaja kiekis, 2 vnt.:**		
3.3.1.	Forma: Audio signalai AES67 formato;	Audio signalai AES67 formato	
3.3.2.	Srautai: ne mažiau 8 įėjimo ir išėjimo srautai;	8 įėjimo ir išėjimo srautai;	
3.3.3.	Kanalai: ne mažiau 64 įėjimo ir išėjimo audio kanalai;	64 įėjimo ir išėjimo audio kanalai;	
3.3.4.	Tvarkyklės: ASIO ir WDM.	Tvarkyklės: ASIO ir WDM.	
3.3.5.	Suderinamumas su serveriais, aprašytais 2p.	Suderinamumas su serveriais, aprašytais 2p.	

14. Perkančioji organizacija šiuo pirkimu siekia įsigyti prekes, kurios daro mažesnį poveikį aplinkai viename ar keliuose produkto gyvavimo ciklo etapuose. Atsižvelgiant į tai, Prekės turi atitikti žemiau nurodytus aplinkos apsaugos reikalavimus, o kartu su pasiūlymu pateikiami žemiau nurodyti atitikimą aplinkos apsaugos kriterijams pagrindžiantys dokumentai (jeigu tokie dokumentai prašomi):

3 lentelė. Aplinkos apsaugos reikalavimai

Eil. Nr.	Įsigyjama prekė	Aplinkos apsaugos reikalavimas	Atitiktį reikalavimams pagrindžiantys dokumentai	Tiekėjo pateikiami įrodymai / dokumentai*
1.	Serveris (Techninės specifikacijos 2 lentelės 2 punktas)	**Siūlomas serveris** turi atitikti nustatytus jam nustatytus I tipo ekologinio ženklo reikalavimus pagal standartą LST EN ISO 14024 „Aplinkosauginiai ženklai ir aplinkosauginės deklaracijos. I tipo aplinkosauginis ženklinimas. Principai ir procedūros“ ir turi būti paženklintas I tipo ekologiniu ženklu arba kitu tiekėjo pateiktu lygiaverčiu įrodymu (pvz., EPEAT*, EU Ecolabel, Nordic Swan, Blue Angel, El Distintiu, Milieukeur, Österreichisches Umweltzeichen, NF Environnement, The Hungarian Eco-label, Polish Eco Mark-Znak EKO arba kitu I tipo ekologiniu ženklu).	Tiekėjas turi pateikti siūlomų prekių atitiktį I tipo ekologiniam ženklui įrodančius dokumentus (ar nuorodas) ar kitus lygiaverčius įrodymus, t. y., pvz., EPEAT, EU Ecolabel, Nordic Swan, Blue Angel, El Distintiu, Milieukeur, Österreichisches Umweltzeichen, NF Environnement, The Hungarian Eco-label, Polish Eco Mark-Znak EKO arba kitus I tipo ekologinio ženklo įrodymus.	DELL EMC PowerEdge R750 | EPEAT Registry

2.	Programinės įrangos (licencijų) nuoma	Pagal tvarkos aprašo, patvirtinto Lietuvos Respublikos aplinkos ministro 2011 m. birželio 28 d. įsakymo Nr. D1-508 „Dėl produktų, kurių viešiesiems pirkimams ir pirkimams taikytini aplinkos apsaugos kriterijai, sąrašo, Aplinkos apsaugos kriterijų ir Aplinkos apsaugos kriterijų, kuriuos perkančiosios organizacijos ir perkantieji subjektai turi taikyti pirkdami prekes, paslaugas ar darbus, taikymo tvarkos aprašo patvirtinimo“ 4.4.4.1. papunktyje nustatytą aplinkosauginį principą „*prekei pagaminti ir (ar) tiekti, paslaugai teikti ar darbams atlikti sunaudojama mažiau gamtos išteklių ir (ar) sudėtyje yra pakartotinai panaudotų ir (ar) perdirbtų medžiagų*“ nustatomas reikalavimas: 1) Sutarties vykdymui bus naudojamos elektroninės priemonės: programinė įranga (licencijos) perduodama elektroninėmis priemonėmis, sąskaitos faktūros teikiamos elektroniniu būdu, reikalingi dokumentai bus teikiami tik elektroniniu būdu, atsiskaitymai bus vykdomi tik elektroninėmis priemonėmis.	Sutarties vykdymui keliamas reikalavimas, todėl įrodymų kartu su pasiūlymu pateikti nereikia.	
3.	Prieigos (tinklo) komutatorius	Pagal tvarkos aprašo, patvirtinto Lietuvos Respublikos aplinkos ministro 2011 m. birželio 28 d. įsakymo Nr. D1-508 „Dėl produktų, kurių viešiesiems pirkimams ir pirkimams taikytini aplinkos apsaugos kriterijai, sąrašo, Aplinkos apsaugos kriterijų ir Aplinkos apsaugos kriterijų, kuriuos perkančiosios organizacijos ir perkantieji subjektai turi taikyti pirkdami prekes, paslaugas ar darbus, taikymo tvarkos aprašo patvirtinimo“	Sutarties vykdymui keliamas reikalavimas, todėl įrodymų kartu su pasiūlymu pateikti nereikia.	

		4.4.4.1. papunktyje nustatytą aplinkosauginį principą „*prekei pagaminti ir (ar) tiekti, paslaugai teikti ar darbams atlikti sunaudojama mažiau gamtos išteklių ir (ar) sudėtyje yra pakartotinai panaudotų ir (ar) perdirbtų medžiagų*“ nustatomas reikalavimas: Prieigos (tinkle) komutatorių sutarties vykdymui bus naudojamos elektroninės priemonės: sąskaitos faktūros teikiamos elektroniniu būdu, reikalingi dokumentai bus teikiami tik elektroniniu būdu, atsiskaitymai bus vykdomi tik elektroninėmis priemonėmis.		

Pastabos:

*Tiekėjas aplinkos apsaugos reikalavimus pagrindžiančius dokumentus turi pateikti kartu su pasiūlymu. Tiekėjas su pasiūlymu nepateikęs atitiktį reikalavimams įrodančių dokumentų tokius dokumentus galės pateikti tik tokiu atveju, jeigu atitinkami dokumentai bus parengti, arba pateiktuose dokumentuose pateikta informacija, bus parengta iki pasiūlymų pateikimo termino pabaigos ir tokia informacija prieinama viešai arba parengta prekių gamintojo, arba kito asmens turinčio teisę parengti tokius dokumentus.

III. Nacionalinio saugumo reikalavimai

15. Šis pirkimas laikomas susijusiu su nacionaliniu saugumu, todėl šio pirkimo atžvilgiu keliami specialieji reikalavimai tiekėjo siūlomoms prekėms - serveris (Techninės specifikacijos 2 lentelės 2 punktas), programinės įrangos (licencijų) nuoma, prieigos (tinklo) komutatorius, nurodytoms šioje Techninėje specifikacijoje, siekiant užtikrinti šalies nacionalinio saugumo interesus. Nacionalinio saugumo reikalavimai nurodyti Specialiųjų pirkimo sąlygų 5 skyriuje.

_____

Europos bendrasis viešųjų pirkimų dokumentas (EBVPD)

I dalis. Informacija apie pirkimo procedūrą ir perkančiąją organizaciją ar perkantįjį subjektą

Informacija apie paskelbimą

Skelbimo numeris OL S (tik tarptautiniams pirkimams):

-

Skelbimo numeris CVP IS (kur rasti?)

-

Perkančiosios organizacijos / Perkančiojo subjekto tapatybė

Oficialus pavadinimas:

Viešoji įstaiga Lietuvos nacionalinis radijas ir televizija

Šalis:

Lietuva

Informacija apie pirkimo procedūrą

Procedūros tipas

Atvira

Pavadinimas:

Radijo montažo programinės ir aparatinės įrangos pirkimas

Trumpas aprašymas:

Detali informacija pirkimo dokumentuose.

Perkančiosios organizacijos ar perkančiojo subjekto (jei taikoma) priskirtas dokumento numeris:

-

II dalis. Informacija apie ekonominės veiklos vykdytoją

A. Informacija apie ekonominės veiklos vykdytoją

Tiekėjo pavadinimas arba vardas ir pavardė (jei fizinis asmuo):

UAB TVC Solutions

Gatvė ir namo numeris:

Dvaro g. 140

Pašto kodas:
LT-76199
Miestas:
Šiauliai
Šalis:
Lietuva
Interneto adresas (jei yra):
www.tvc.tv
E. paštas:
tvc@tvc.tv
Telefonas:

Asmuo ar asmenys ryšiams:

PVM mokėtojo kodas, jei yra:
LT452136219
Jei PVM mokėtojo kodo nėra, nurodykite kitą nacionalinį identifikacinį numerį (Lietuvoje - įmonės kodą)
-
Ar ekonominės veiklos vykdytojas yra labai maža, mažoji ar vidutinė įmonė?
●Taip
○Ne
Tik tuo atveju, kai pirkimas rezervuotas: ar ekonominės veiklos vykdytojas yra globojama darbo grupė (neįgaliųjų socialinė įmonė), socialinė įmonė? Ar jis vykdys sutartį pagal globojamų darbo grupių (neįgaliųjų socialinių įmonių) užimtumo programas?
○Taip
●Ne

Jei taikoma, ar ekonominės veiklos vykdytojas įtrauktas į oficialų patvirtintų ekonominės veiklos vykdytojų sąrašą arba ar jis turi lygiavertį sertifikatą (pvz., pagal nacionalinę (išankstinę) kvalifikacijos vertinimo sistemą)? Lietuvos tiekėjai renkasi „ne“
○Taip
●Ne

- Be to, užpildykite trūkstamą informaciją IV dalies A, B, C arba D skirsniuose, atsižvelgdami į konkretų atvejį TIK jei to reikalaujama atitinkamame skelbime arba pirkimo dokumentuose:

e) Ar ekonominės veiklos vykdytojas galės pateikti sertifikatą dėl socialinio draudimo įmokų ir mokesčių mokėjimo arba pateikti informaciją, kuri leistų perkančiajai organizacijai ar perkančiajam subjektui jį gauti tiesiogiai naudojantis prieiga prie bet kurios iš valstybių narių nemokamos nacionalinės duomenų bazės?

●Taip

○Ne

Jei atitinkami dokumentai prieinami elektroniniu būdu, nurodykite:

-

Ar ekonominės veiklos vykdytojas pirkimo procedūroje dalyvauja kartu su kitais? Žymima TAIP, jei pasiūlymą teikia ūkio subjektų grupė (konsorciumas) pagal jungtinės veiklos sutartį

○Taip

●Ne

Jei pirkimas padalintas į dalis, nuoroda į pirkimo dalį (-is), dėl kurios (-ių) ekonominės veiklos vykdytojas nori dalyvauti konkurse:

-

B. Informacija apie ekonominės veiklos vykdytojo teisinius atstovus #1

- Šis skirsnis pildomas, jeigu tiekėjo vadovas įgalioja kitą asmenį pasirašyti pasiūlymą, bendrauti su pirkimo vykdytoju, įgalioja atstovauti ir pasirašyti EBVPD, bendrauti su pirkimo vykdytoju dėl EBVPD pateiktos informacijos, teikiamų kvalifikaciją ir pašalinimo pagrindų nebuvimą pagrindžiančių dokumentų, dėl pasiūlymo ir pan.

  Jei taikytina, nurodykite asmens (-ų), įgalioto (-ų) atstovauti ekonominės veiklos vykdytojui šios pirkimo procedūros tikslais, vardą ir pavardę ir adresą:

Vardas

-

Pavardė

-

Gimimo data

-

Gimimo vieta

-

Gatvė ir namo numeris:

-

Pašto kodas:

-

Miestas:

-

Šalis:

Lietuva

E. paštas:

-

Telefonas:

-

Pareigos arba statusas:

-

Prireikus pateikite išsamią informaciją apie atstovavimą (formą, aprėptį, paskirtį ir t. t.):

-

C. Informacija apie rėmimąsi kitų subjektų pajėgumais

Ar siekdamas patenkinti IV dalyje nurodytus atrankos kriterijus ir V dalyje nurodytus kriterijus bei taisykles (jei tokių yra) ekonominės veiklos vykdytojas remiasi kitų subjektų pajėgumais?

❍Taip

●Ne

D. Informacija apie subrangovus, kurių pajėgumais ekonominės veiklos vykdytojas nesiremia

- (Skirsnį reikia pildyti, tik jei šios informacijos aiškiai reikalauja perkančioji organizacija ar perkantysis subjektas.)

Ar ekonominės veiklos vykdytojas ketina kurias nors sutarties dalis subrangos sutartimi pavesti atlikti trečiosioms šalims?

❍Taip
●Ne

- Jei perkančioji organizacija ar perkantysis subjektas aiškiai prašo šios informacijos, šalia informacijos pagal šį skirsnį, pateikite pagal šios dalies A ir B skirsnius ir III dalį reikalaujamą informaciją apie kiekvieną susijusį subrangovą (subrangovų kategorijas).

III dalis. Pašalinimo pagrindai

A. Su baudžiamaisiais nuosprendžiais susiję pagrindai

Direktyvos 2014/24/ES 57 straipsnio 1 dalyje nustatyti šie pašalinimo pagrindai

A1. Dalyvavimas nusikalstamos organizacijos veikloje (VPĮ 46 str. 1 d. 1 p.)

Ar pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo, sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo nuteistas galutiniu teismo sprendimu už dalyvavimą nusikalstamos organizacijos veikloje, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo laikotarpis tebesitęsia? Kaip apibrėžta 2008 m. spalio 24 d. Tarybos pamatinio sprendimo 2008/841/TVR dėl kovos su organizuotu nusikalstamumu 2 straipsnyje (OL L 300, 2008 11 11, p. 42).

Jūsų atsakymas

❍Taip
●Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

❍Taip
●Ne

A2. Korupcija (VPĮ 46 str. 1 d. 2 p.)

Ar pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo, sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo nuteistas galutiniu teismo sprendimu už korupciją, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo

laikotarpis tebesitęsia? Kaip apibrėžta Konvencijos dėl kovos su korupcija, susijusia su Europos Bendrijų pareigūnais ar Europos Sąjungos valstybių narių pareigūnais, 3 straipsnyje (OL C 195, 1997 6 25, p. 1) ir 2003 m. liepos 22 d. Tarybos pamatinio sprendimo 2003/568/TVR dėl kovos su korupcija privačiame sektoriuje 2 straipsnio 1 dalyje (OL L 192, 2003 7 31, p. 54). Į pašalinimo pagrindus taip pat įtraukta korupcija, kaip apibrėžta perkančiosios organizacijos (perkančiojo subjekto) arba ekonominės veiklos vykdytojo nacionalinėje teisėje.

Jūsų atsakymas

❍Taip

●Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

❍Taip

●Ne

A3. Sukčiavimas (VPĮ 46 str. 1 d. 3 p.)

Ar pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo, sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo nuteistas galutiniu teismo sprendimu už sukčiavimą, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo laikotarpis tebesitęsia? Pagal Europos Bendrijų finansinių interesų apsaugos konvencijos 1 straipsnį (OL C 316, 1995 11 27, p. 48).

Jūsų atsakymas

❍Taip

●Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

❍Taip

●Ne

A4. Teroristiniai nusikaltimai arba su teroristine veikla susiję nusikaltimai (VPĮ 46 str. 1 d. 5 p.)

Ar pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo, sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo nuteistas galutiniu teismo sprendimu už teroristinius nusikaltimus arba

su teroristine veikla susijusius nusikaltimus, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo laikotarpis tebesitęsia? Kaip apibrėžta 2002 m. birželio 13 d. Tarybos pamatinio sprendimo dėl kovos su terorizmu 1 ir 3 straipsniuose (OL L 164, 2002 6 22, p. 3). Į pašalinimo pagrindus taip pat įtrauktas nusikalstamos veikos kurstymas, pagalba ar bendrininkavimas ją vykdant arba kėsinimasis ją įvykdyti, kaip nurodyta to pamatinio sprendimo 4 straipsnyje.

Jūsų atsakymas

❍Taip

●Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

❍Taip

●Ne

A5. Pinigų plovimas arba teroristų finansavimas (VPĮ 46 str. 1 d. 6 p.)

Ar pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo, sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo nuteistas galutiniu teismo sprendimu už pinigų plovimą arba teroristų finansavimą, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo laikotarpis tebesitęsia? Kaip apibrėžta 2005 m. spalio 26 d. Europos Parlamento ir Tarybos direktyvos 2005/60/EB dėl finansų sistemos apsaugos nuo jos panaudojimo pinigų plovimui ir teroristų finansavimui 1 straipsnyje (OL L 309, 2005 11 25, p. 15).

Jūsų atsakymas

❍Taip

●Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

❍Taip

●Ne

A6. Vaikų darbas ir kitos prekybos žmonėmis formos (VPĮ 46 str. 1 d. 7 p.)

Ar pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo,

sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo nuteistas galutiniu teismo sprendimu už vaikų darbą arba kitas prekybos žmonėmis formas, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo laikotarpis tebesitęsia? Kaip apibrėžta 2011 m. balandžio 5 d. Europos Parlamento ir Tarybos direktyvos 2011/36/ES dėl prekybos žmonėmis prevencijos, kovos su ja ir aukų apsaugos, pakeičiančios Tarybos pamatinį sprendimą 2002/629/TVR, 2 straipsnyje (OL L 101, 2011 4 15, p. 1).

Jūsų atsakymas

❍Taip

●Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

❍Taip

●Ne

B. Su mokesčių ar socialinio draudimo įmokų mokėjimu susiję pagrindai

Direktyvos 2014/24/ES 57 straipsnio 2 dalyje nustatytos šios pašalinimo priežastys

B1. Mokesčių mokėjimas VPĮ 46 str. 3 d.

Ar ekonominės veiklos vykdytojas pažeidė savo pareigas, susijusias su mokesčių mokėjimu, tiek šalyje, kurioje yra įsisteigęs, tiek perkančiosios organizacijos ar perkančiojo subjekto valstybėje narėje, jei tai nėra jo įsisteigimo šalis?

Jūsų atsakymas

❍Taip

●Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

❍Taip

●Ne

B2. Socialinio draudimo įmokų mokėjimas VPĮ 46 str. 3 d.

Ar ekonominės veiklos vykdytojas pažeidė savo pareigas, susijusias su socialinio draudimo įmokų mokėjimu, tiek šalyje, kurioje yra įsisteigęs, tiek perkančiosios organizacijos ar perkančiojo subjekto valstybėje narėje, jei tai nėra jo įsisteigimo šalis?

Jūsų atsakymas

❍Taip

●Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

❍Taip

●Ne

C. Su nemokumu, interesų konfliktu ar profesiniais nusižengimais susiję pagrindai

Direktyvos 2014/24/ES 57 straipsnio 4 dalyje nustatyti šie pašalinimo pagrindai

C4. Bankrotas ar restruktūrizavimas VPĮ 46 str. 6 d. 2 p.

Ar ekonominės veiklos vykdytojas yra bankrutavęs, jam iškelta restruktūrizavimo ar bankroto byla?

Jūsų atsakymas

❍Taip

●Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

❍Taip

●Ne

C5. Nemokumas VPĮ 46 str. 6 d. 2 p.

Ar ekonominės veiklos vykdytojas yra nemokus, jam taikoma nemokumo ar likvidavimo procedūra (inicijuotos ar pradėtos likvidavimo procedūros)?

Jūsų atsakymas

❍Taip

●Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

❍Taip

●Ne

C6. Susitarimas su kreditoriais VPĮ 46 str. 6 d. 2 p.

Ar ekonominės veiklos vykdytojas yra sudaręs susitarimą su kreditoriais?

Jūsų atsakymas

❍Taip

●Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

❍Taip

●Ne

C7. Bankrotui prilygstanti situacija pagal nacionalinius įstatymus VPĮ 46 str. 6 d. 2 p.

Ar ekonominės veiklos vykdytojas yra bet kokioje bankrotui prilygstančioje situacijoje, susiklosčiusioje dėl panašios nacionaliniuose įstatymuose ir kituose teisės aktuose nustatytos procedūros?

Jūsų atsakymas

❍Taip

●Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

❍Taip

●Ne

C8. Likvidatoriaus administruojamas turtas VPĮ 46 str. 6 d. 2 p.

Ar ekonominės veiklos vykdytojo turtą administruoja likvidatorius, nemokumo administratorius arba teismas?

Jūsų atsakymas

❍Taip

●Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

❍Taip

●Ne

C9. Sustabdyta verslo veikla VPĮ 46 str. 6 d. 2 p.

Ar ekonominės veiklos vykdytojo verslo veikla yra sustabdyta arba apribota?

Jūsų atsakymas

❍Taip

●Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

❍Taip

●Ne

C10. Su kitais ekonominės veiklos vykdytojais sudaryti susitarimai, kuriais siekta iškreipti konkurenciją (VPĮ 46 str. 4 d. 1 p.)

Ar ekonominės veiklos vykdytojas su kitais ekonominės veiklos vykdytojais yra sudaręs susitarimų, kuriais siekta iškreipti konkurenciją atliekamame pirkime?

Jūsų atsakymas

❍Taip

●Ne

C11. Rimti profesiniai pažeidimai VPĮ 46 str. 4 d. 7 p., VPĮ 46 str. 6 d. 3 p.

Pirkimams pradėtiems nuo 2022-01-01: Ar ekonominės veiklos vykdytojas yra padaręs rimtą profesinį pažeidimą, kaip nurodyta žemiau?:

a) yra padaręs finansinės atskaitomybės ir audito teisės aktų pažeidimą ir nuo jo padarymo dienos praėjo mažiau kaip vieni metai;**Nuo 2022-08-12 pildydamas EBVPD tiekėjas yra informuotas ir supranta, kad finansinės atskaitomybės ir audito teisės aktų pažeidimu taip pat gali būti laikomi atvejai, kai tiekėjas nepateikia privalomų finansinės atskaitomybės dokumentų Registrų centrui. Išsamiau: https://vpt.lrv.lt/lt/naujienos/finansiniu-ataskaitu-nepateikimas-gali-tapti-kliutimi-dalyvauti-viesuosiuose-pirkimuose**

b) neatitinka minimalių patikimo mokesčių mokėtojo kriterijų, nustatytų Lietuvos Respublikos mokesčių administravimo įstatymo 40^1 straipsnio 1 dalyje. Taikant šį tiekėjo pašalinimo iš pirkimo procedūros pagrindą, vadovaujamasi Lietuvos Respublikos mokesčių administravimo įstatymo 40^1 straipsnio 1 dalyje nustatytais terminais, juos skaičiuojant nuo Mokesčių administravimo įstatymo 40^1 straipsnio 1 dalyje nurodytų pažeidimų padarymo dienos, tačiau visais atvejais šie terminai negali būti ilgesni negu 3 metai;

c) yra padaręs draudimo sudaryti draudžiamus susitarimus, įtvirtinto Lietuvos Respublikos konkurencijos įstatyme ar panašaus pobūdžio kitos valstybės teisės akte, pažeidimą ir nuo jo padarymo dienos praėjo mažiau kaip 3 metai;

d) yra padaręs bet kokį kitą rimtą profesinį pažeidimą, nenurodytą aukščiau, nuo kurio padarymo dienos praėjo mažiau kaip vieni metai?

Pirkimams pradėtiems iki 2022-01-01: Ar ekonominės veiklos vykdytojas yra pripažintas kaltu dėl sunkaus profesinio nusižengimo kaip nurodyta žemiau?

I. ar ekonominės veiklos vykdytojas yra padaręs profesinį pažeidimą, kai už finansinės atskaitomybės ir audito teisės aktų pažeidimus ekonominės veiklos vykdytojui ar jo vadovui paskirta administracinė nuobauda ar ekonominė sankcija, nustatytos Lietuvos Respublikos įstatymuose ar kitų valstybių teisės aktuose, ir nuo sprendimo, kuriuo buvo paskirta ši sankcija, įsiteisėjimo dienos arba nuo dienos, kai asmuo įvykdė administracinį nurodymą, praėjo mažiau kaip vieni metai?

II. Ar ekonominės veiklos vykdytojas yra padaręs kurį nors vieną iš žemiau nurodytų rimtų profesinių pažeidimų(taikoma tik tada kai, ir tik tiek, kiek apibrėžta kituose pirkimo dokumentuose):

a) profesinės etikos pažeidimas, kai nuo ekonominės veiklos vykdytojo pripažinimo nesilaikančiu profesinės etikos normų momento praėjo mažiau kaip vieni metai;

b) konkurencijos, darbuotojų saugos ir sveikatos, informacijos apsaugos, intelektinės nuosavybės apsaugos pažeidimas, už kurį ekonominės veiklos vykdytojui ar jo vadovui yra paskirta administracinė nuobauda ar ekonominė sankcija, nustatytos Lietuvos Respublikos ar kitų valstybių įstatymuose, kai nuo sprendimo, kuriuo buvo paskirta ši sankcija, arba nuo dienos, kai asmuo įvykdė administracinį nurodymą, įsiteisėjimo dienos praėjo mažiau kaip vieni metai;

c) draudimo sudaryti draudžiamus susitarimus, įtvirtinto Lietuvos Respublikos konkurencijos įstatyme ar panašaus pobūdžio kitos valstybės teisės akte, pažeidimas, kai nuo sprendimo paskirti Konkurencijos įstatyme ar kitos valstybės teisės akte nustatytą ekonominę sankciją įsiteisėjimo dienos praėjo mažiau kaip 3 metai;

d) ekonominės veiklos vykdytojas, kuris yra fizinis asmuo, arba ekonominės veiklos vykdytojo, kuris yra juridinis asmuo, kita organizacija ar jos padalinys, vadovas, kitas valdymo ar priežiūros organo narys ar kitas asmuo, turintis (turintys) teisę atstovauti ekonominės veiklos vykdytojui ar jį kontroliuoti, jo vardu priimti sprendimą, sudaryti sandorį, arba dalyvis, turintis balsų daugumą juridinio asmens dalyvių susirinkime, yra pripažintas kaltu dėl tyčinio bankroto, kaip jis apibrėžtas Lietuvos Respublikos įmonių bankroto įstatyme ar panašaus pobūdžio kitų valstybių teisės aktuose, kai nuo teismo sprendimo įsiteisėjimo dienos praėjo mažiau kaip 3 metai?

Jūsų atsakymas

❍Taip

●Ne

C12. Interesų konfliktas dėl dalyvavimo pirkimo procedūroje (VPĮ 46 str. 4 d. 2 p.)

Ar ekonominės veiklos vykdytojas žino apie kokius nors interesų konfliktus, kaip nurodyta nacionalinėje teisėje, atitinkamame skelbime ar pirkimo dokumentuose, kylančius dėl jo dalyvavimo pirkimo procedūroje?

Jūsų atsakymas

❍Taip

●Ne

C13. Tiesioginis arba netiesioginis dalyvavimas rengiant šią pirkimo procedūrą (46 str. 4 d. 3 p.)

Ar ekonominės veiklos vykdytojas arba su juo susijusi įmonė konsultavo perkančiąją organizaciją ar perkantįjį subjektą arba kitaip dalyvavo rengiant pirkimo procedūrą?

Jūsų atsakymas

❍Taip

●Ne

C14. Sutarties nutraukimas anksčiau laiko, žala ar kitos panašios sankcijos (VPĮ 46 str. 4 d. 6 p.)

Ar ekonominės veiklos vykdytojas turėjo tokios patirties: ankstesnė viešoji sutartis, ankstesnė sutartis su perkančiuoju subjektu arba ankstesnė koncesijos sutartis buvo nutraukta anksčiau laiko; arba buvo pareikalauta atlyginti su ankstesne sutartimi susijusią žalą ar skirtos kitos panašios sankcijos?

Lietuvoje (be kita ko) - ar ekonominės veiklos vykdytojas yra įtrauktas į nepatikimų tiekėjų sąrašą ?

Jūsų atsakymas

❍Taip

●Ne

C15. Pripažinimas kaltu dėl faktų iškraipymo, informacijos nuslėpimo, negalėjimas pateikti reikalaujamų dokumentų ir su šia procedūra susijusios konfidencialios informacijos gavimas (46 str. 4 d. 4 p. ir 46 str. 4 d. 5 p.)

Ar ekonominės veiklos vykdytojas yra susijęs su vienu iš šių atvejų, kai jis :

a) buvo labai iškreipęs faktus pateikdamas informaciją (**pateikęs melagingą informaciją**), reikalingą patikrinti, ar nėra pagrindų pašalinti, arba patikrinti atitiktį atrankos kriterijams;

b) slėpė tokią informaciją;

c) delsė pateikti patvirtinamuosius dokumentus, kurių reikalavo perkančioji organizacija ar perkantysis subjektas,

d) siekė daryti neteisėtą įtaką perkančiosios organizacijos ar perkančiojo subjekto sprendimų priėmimo procesui, kad gautų konfidencialios informacijos, dėl kurios per pirkimo procedūrą įgytų nepagrįstą pranašumą, arba tyčia teikti klaidinančios informacijos, kuri gali turėti esminės įtakos sprendimams dėl pašalinimo, atrankos ar sutarties skyrimo?

Jūsų atsakymas

❍Taip
●Ne

D. Išimtinai nacionaliniai pašalinimo pagrindai

Išimtinai nacionaliniai pašalinimo pagrindai, nurodyti atitinkamame skelbime ar pirkimo dokumentuose.

D1. Išimtinai nacionaliniai pašalinimo pagrindai (VPĮ 46 str. 1 d. 4 p.)

Pirkimams pradėtiems nuo 2022-01-01:

pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo, sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo **nuteistas galutiniu teismo sprendimu už nusikalstamą bankrotą**, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo laikotarpis tebesitęsia?

Pirkimams pradėtiems iki 2022-01-01:

Ar ekonominės veiklos vykdytojas yra susijęs su vienu iš šių atvejų, kai:

a) jis **neatitinka minimalių patikimo mokesčių mokėtojo kriterijų,** nustatytų Lietuvos Respublikos mokesčių administravimo įstatymo 40^1 straipsnio 1 dalyje ir dėl to laikomas padariusiu šiurkštų profesinį pažeidimą.

b) pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo, sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo **nuteistas galutiniu teismo sprendimu už nusikalstamą bankrotą**, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo laikotarpis tebesitęsia?

Jūsų atsakymas

❍Taip
●Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

❍Taip
●Ne

IV dalis. Atrankos kriterijai

α. Visų atrankos kriterijų bendra nuoroda

Dėl atrankos kriterijų ekonominės veiklos vykdytojas pareiškia, kad

Jis atitinka visus reikalaujamus atrankos kriterijus

Jūsų atsakymas

●Taip

○Ne

Baigti

IV dalis. Baigiamieji pareiškimai

Ekonominės veiklos vykdytojai oficialiai pareiškia, kad II–V dalyse pateikta informacija yra tiksli ir teisinga ir kad ji pateikta visiškai suvokiant didelio faktų iškreipimo padarinius.

Ekonominės veiklos vykdytojai oficialiai pareiškia, kad pareikalavus gali nedelsdami pateikti nurodytus sertifikatus ir kitų formų įrodomuosius dokumentus, išskyrus tuos atvejus, kai:

a) perkančioji organizacija ar perkantysis subjektas turi galimybę atitinkamus patvirtinamuosius dokumentus tiesiogiai gauti naudodamiesi prieiga prie bet kurios iš valstybių narių nemokamos nacionalinės duomenų bazės (su sąlyga, kad ekonominės veiklos vykdytojas pateikė reikalingą informaciją (interneto adresą, išduodančiąją instituciją ar įstaigą, tikslias dokumentų nuorodas), kuri perkančiajai organizacijai ar perkančiajam subjektui leidžia tai padaryti (pareikalavus dėl tokios prieigos turi būti pridėtas atitinkamas sutikimas), arba

b) perkančioji organizacija ar perkantysis subjektas yra gavusi ir turi aktualius susijusius dokumentus iš ankstesnių (kitų) pirkimo procedūrų.

Ekonominės veiklos vykdytojai oficialiai sutinka perkančiąjai organizacijai ar perkančiajam subjektui, nurodytam I dalyje, leisti susipažinti su dokumentais, kuriais patvirtinama informacija, pateikta šio Europos bendrojo viešųjų pirkimų dokumento III ir IV dalyse, kiek tai susiję su pirkimu, nurodytu I dalyje.

Data, vieta ir, jei reikia ar būtina, parašas (-ai):

Data

07-03-2024

Vieta

Šiauliai, Lietuva

Parašas

VALSTYBĖS ĮMONĖ REGISTRŲ CENTRAS
Lvivo g. 25-101, 09320 Vilnius, tel. (8 5) 268 8262, faks. (8 5) 268 8311, el. p. info@registrucentras.lt

KOMPETENTINGŲ INSTITUCIJŲ TVARKOMŲ JUNGTINIŲ DUOMENŲ APIE VIEŠŲJŲ PIRKIMŲ PROCEDŪROJE DALYVAUJANTĮ TIEKĖJĄ (JURIDINĮ ASMENĮ) PAŽYMA

2024-02-13 Nr. 706450

Tiekėjo pavadinimas	**TVC Solutions, UAB**
Tiekėjo kontaktinė informacija:	
telefono numeris	**841520295**
faksas	**841520542**
mobilusis telefonas	**+37061473737**
elektroninio pašto adresas	**ramunas.dirmeikis@tvc.tv**
interneto svetainės adresas	**www.tvc.tv**
Buhalterio (buhalterių) ar kito (kitų) asmens (asmenų), turinčio (turinčių) teisę surašyti ir pasirašyti tiekėjo apskaitos dokumentus, vardas, pavardė	
Juridinių asmenų registras:	
kodas	**145213623**
teisinė forma	**Uždaroji akcinė bendrovė**
teisinis statusas	**Teisinis statusas neįregistruotas**
buveinė (adresas)	**Šiauliai, Dvaro g. 140, LT-76197**
Vadovo, kito valdymo ar priežiūros organo nario ar kito asmens, turinčio (turinčių) teisę atstovauti tiekėjui ar jį kontroliuoti, jo vardu priimti sprendimą, sudaryti sandorį, vardas, pavardė	
įregistravimo data	**1996-02-12**
Valstybinė mokesčių inspekcija prie Lietuvos Respublikos finansų ministerijos:	
duomenys apie tiekėjo atsiskaitymą su valstybės, savivaldybių biudžetais ir valstybės pinigų fondais	**Atsiskaitęs**
Duomenų suformavimo data	**2024-02-12**
Valstybinio socialinio draudimo fondo valdyba prie Socialinės apsaugos ir darbo ministerijos:	
duomenys apie tiekėjo atsiskaitymą su Valstybinio socialinio draudimo fondu	**Neįsiskolinęs**
Duomenų suformavimo data	**2024-02-12**
Įtariamųjų, kaltinamųjų ir nuteistųjų registras:	
duomenys apie tiekėją	**Dėl UAB TVC Solutions, kodas 145213623, per pastaruosius 5 metus nėra priimtas ir įsiteisėjęs apkaltinamasis teismo nuosprendis už nusikalstamas veikas, nurodytas Lietuvos Respublikos viešųjų pirkimų įstatymo 46 straipsnio 1 dalyje ir 3 dalyje.**
duomenys apie tiekėjo vadovą, kitą valdymo ar priežiūros organo narį ar kitą (kitus) asmenį (asmenis), turintį (turinčius) teisę atstovauti	**per pastaruosius 5 metus nėra priimtas ir įsiteisėjęs apkaltinamasis teismo nuosprendis ir jis neturi neišnykusio ar nepanaikinto teistumo už**

tiekėjui ar jį kontroliuoti, jo vardu priimti sprendimą, sudaryti sandorį	**nusikalstamas veikas, nurodytas Lietuvos Respublikos viešųjų pirkimų įstatymo 46 straipsnio 1 dalyje.**
duomenys apie tiekėjo buhalterį (buhalterius) ar kitą (kitus) asmenį (asmenis), turintį (turinčius) teisę surašyti ir pasirašyti tiekėjo apskaitos dokumentus	**per pastaruosius 5 metus nėra priimtas ir įsiteisėjęs apkaltinamasis teismo nuosprendis ir jis neturi neišnykusio ar nepanaikinto teistumo už nusikalstamas veikas, nurodytas Lietuvos Respublikos viešųjų pirkimų įstatymo 46 straipsnio 1 dalyje.**
Duomenų suformavimo data	**2024-02-13**

Pažymą išspausdino:

Juridinių asmenų registro departamento JAR Vilniaus skyriaus Vilniaus 3 Juridinių asmenų registro grupės Registratorė

A. V.

VALSTYBĖS ĮMONĖ REGISTRŲ CENTRAS
Lvivo g. 25-101, 09320 Vilnius, tel. +370 5 2688 262, el. p. info@registrucentras.lt

DUOMENŲ APIE JURIDINIO ASMENS DALYVIUS IŠRAŠAS SU ISTORIJA

2024-02-09 (10:55:02)

Kodas: **145213623**
Pavadinimas: **TVC Solutions, UAB**
Buveinės adresas: **Šiauliai, Dvaro g. 140, LT-76197**

ĮSTATINIS KAPITALAS

Eil. Nr.	Įstatinis kapitalas	Registravimo data	Akcijų klasė	Akcijų skaičius (vnt.)	Akcijos nominali vertė
1.		2020-10-15	Vardinės paprastosios akcijos		
2.		2015-07-27	Vardinės paprastosios akcijos		
3.		2014-11-10	Vardinės paprastosios akcijos		
4.		2014-06-19	Vardinės paprastosios akcijos		
5.		2007-11-12	Vardinės paprastosios akcijos		

AKCININKAI

Eil. Nr.	Akcininkas	Aktualūs / istoriniai duomenys	Nuo	Iki	Akcijų klasė	Turimų akcijų sk. (vnt.)	Akcijos nominali vertė
1.	Gesellschaft mit beschrankter Haftung "Broadcast Solutions GmbH", kodas HRB23289, Alfred Nobel Str. 5, 55411 Bingen am Rhein, Vokietija Amtsgericht Mainz *Akcininkas nuo 2020-10-22*		2020-10-22		Vardinės paprastosios akcijos		

TVC Solutions, UAB

VšĮ „Lietuvos nacionalinis radijas ir televizija“

Į G A L I O J I M A S
2024-01-08 Nr. IG.0081
Šiauliai

Aš, TVC Solutions, UAB direktorius

į g a l i o j u , TVC Solutions, UAB vardu pasirašyti CVP IS viešųjų pirkimų platformoje teikiamus pasiūlymus, EBVPD formas ir kitus dokumentus, susijusius su VšĮ „Lietuvos nacionalinis radijas ir televizija“ skelbiamais konkursais.

Įgaliojimas galioja iki 2024 m. gruodžio 31 d.

TVC Solutions, UAB
Direktorius

Buveinės adresas / Headquarter address
Dvaro g. 140 / Dvaro str. 140
Šiauliai LT-76199 / Siauliai LT-76199
Lietuva / Lithuania

Telefonas / Tel.: +370 41 520 295
Faksas / Fax: +370 41 520 542
El. paštas / E-mail: tvc@tvc.tv
Internetinis adresas / Web site: www.tvc.tv

Įmonės kodas / Reg. No.: 145213623
PVM kodas / VAT number: LT452136219

RETURN TO SEARCH

DELL EMC PowerEdge R750

Product Summary:

Product Type:	Rack-mounted Server
Registered In:	Germany
Manufacturer:	DELL EMC
EPEAT Tier:	Bronze
Registration Date:	2021-05-13
Product Status:	Active

SERVERS

All unique product identifiers existing for this product may not be listed here. If the unique product identifier you are looking for is not listed, please contact EPEAT at EPEAT@GEC.org.

EXPORT PRODUCT SUMMARY

EPEAT Tier Score Detail

For a product to be listed on the EPEAT Registry, it must, at a minimum, meet the applicable "required" criteria. Click here to see a list of the required criteria for this product category.

This product has met the necessary required criteria.

Along with required criteria, products can also meet optional criteria and score optional points. It is not required for a product to achieve any optional points.

Products that meet all required criteria and achieve **less than 50%** of the optional points are rated at **EPEAT Bronze**	Products that meet all required criteria and achieve **50 - 74%** of the optional points are rated at **EPEAT Silver**	Products that meet all required criteria and achieve **75 - 100%** of the optional points are rated at **EPEAT Gold**

The optional criteria for this product category and optional points achieved by this

product are listed below.

Optional Criteria	Scores
5. Energy Efficiency	1 / 12
6. Management of Substances	0 / 14
7. Preferable Materials Use	0 / 6
8. Product Packaging	0 / 4
9. Design for Repair, Reuse, and Recycling	0 / 10
11. Responsible End-of-Life Management	2 / 4
12. Corporate Responsibility	1 / 19
TOTAL OPTIONAL CRITERIA SCORE:	4 / 69

Please note that it is not required for a product to achieve any optional points.

Some optional criteria may not be applicable to a product. Optional criteria that are not applicable (N/A) to the product are not included in the Total Optional Criteria Score, and are not reflected above.

For any questions, comments, or feedback regarding the EPEAT Registry, please contact us.

Contact Us

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CPU Benchmarks

Over 1,000,000 CPUs Benchmarked

[Dual CPU] Intel Xeon Gold 6338 @ 2.00GHz

Price and performance details for the [Dual CPU] Intel Xeon Gold 6338 @ 2.00GHz can be found below. This is made using thousands of PerformanceTest benchmark results and is updated daily.

- The first graph shows the relative performance of the CPU compared to the 10 other common (single) CPUs in terms of PassMark CPU Mark.
- The 2nd graph shows the value for money, in terms of the CPUMark per dollar.
- The pricing history data shows the price for a single Processor. For multiple Processors, multiply the price shown by the number of CPUs.

[Dual CPU] Intel Xeon Gold 6338 @ 2.00GHz

Description:

Class: Server	**Socket:** FCLGA4189
Clockspeed: 2.0 GHz	**Turbo Speed:** 3.2 GHz
[4] **Cores:** 32 [4] **Threads:** 64	**Typical TDP:** 205 W [4]

Other names: Intel(R) Xeon(R) Gold 6338 CPU @ 2.00GHz, Intel Xeon Gold 6338 CPU @ 2.00GHz

CPU First Seen on Charts: Q4 2021

CPUmark/$Price: 21.13

Average CPU Mark

68563

Single Thread Rating: 2185
Samples: 15*
*Margin for error: Medium

+ COMPARE

Last Price Change: $3,244.60 USD Total for 2 CPUs (2023-06-02)

CPU Benchmarks

CPU Test Suite Average Results for [Dual CPU] Intel Xeon Gold 6338 @ 2.00GHz

Integer Math	397,510 MOps/Sec
Floating Point Math	214,904 MOps/Sec
Find Prime Numbers	428 Million Primes/Sec
Random String Sorting	172,927 Thousand Strings/Sec
Data Encryption	77,790 MBytes/Sec
Data Compression	1,413,565 KBytes/Sec
Physics	6,236 Frames/Sec
Extended Instructions	93,769 Million Matrices/Sec
Single Thread	2,185 MOps/Sec

From submitted results to PerformanceTest V10 as of 7th of March 2024.

CPU Mark Distribution for [Dual CPU] Intel Xeon Gold 6338 @ 2.00GHz

Submitted Baseline Distribution Graph as of 7th of March 2024

Not Enough Data from Current Version of PerformanceTest to Create Distribution Graph.

From submitted results to PerformanceTest V10 as of 7th of March 2024.

CPU Benchmarks

Merchant	Price	Purchase
amazon	$1,622.30 USD	BUY NOW!
newegg	NA	CPU Not Available, See Other Models
BEST BUY	NA	CPU Not Available, See Other Models

Note: PassMark Software may earn compensation for sales from links on this site through affiliate programs.

Pricing History

CPU Mark Relative to Top 10 Common Server CPUs

As of 7th of March 2024 - Higher results represent better performance

Processor	Average CPU Mark	
AMD Ryzen Threadripper PRO 3995WX		83,562
AMD Ryzen Threadripper PRO 5975WX		75,847
[Dual CPU] Intel Xeon Gold 6338 @ 2.00GHz		68,563

AMD Ryzen Threadripper PRO 3955WX		40,374

Intel Xeon E5-2680 v4 @ 2.40GHz		17,929
Intel Xeon E5-1650 v3 @ 3.50GHz		10,419
Intel Xeon E5-1650 v2 @ 3.50GHz		9,344
Intel Xeon E5-2620 v3 @ 2.40GHz		7,802
Intel Xeon E5-1620 v3 @ 3.50GHz		6,991

CPU Value (CPU Mark / $Price)

As of 7th of March 2024 - Higher results represent better value

Processor	CPU Mark / $Price	
Intel Xeon E5-2620 v3 @ 2.40GHz		600.63
Intel Xeon E5-2680 v4 @ 2.40GHz		239.37
Intel Xeon E5-1650 v3 @ 3.50GHz		75.22
Intel Xeon E5-1620 v3 @ 3.50GHz		65.96
AMD Ryzen Threadripper PRO 3955WX		40.75
Intel Xeon E5-1650 v2 @ 3.50GHz		39.26
AMD Ryzen Threadripper PRO 5975WX		28.09
[Dual CPU] Intel Xeon Gold 6338 @ 2.00GHz		21.13
AMD Ryzen Threadripper PRO 3975WX		20.98
AMD Ryzen Threadripper PRO 3995WX		12.17
AMD Ryzen Threadripper PRO 3945WX		NA

Single Thread Rating

As of 7th of March 2024 - Higher results represent better performance

Processor	Average Thread Rating	
AMD Ryzen Threadripper PRO 5975WX		3,310
AMD Ryzen Threadripper PRO 3945WX		2,702

AMD Ryzen Threadripper PRO 3975WX		2,659

CPU Benchmarks

[Dual CPU] Intel Xeon Gold 6338 @ 2.00GHz		2,185
Intel Xeon E5-1650 v3 @ 3.50GHz		2,124
Intel Xeon E5-1650 v2 @ 3.50GHz		2,048
Intel Xeon E5-1620 v3 @ 3.50GHz		2,015
Intel Xeon E5-2680 v4 @ 2.40GHz		1,952
Intel Xeon E5-2620 v3 @ 2.40GHz		1,690

Last 5 Baselines for [Dual CPU] Intel Xeon Gold 6338 @ 2.00GHz

Most recent listed first

Baseline		CPU Mark
BL2017047 - Feb 06 2024		64670
BL5056488 - Feb 01 2024		73754
BL5056487 - Feb 01 2024		73336
BL1865031 - Jul 20 2023		61262
BL5038631 - May 19 2023 [Excluded]		60708

Additional baselines can be obtained using Windows version of PerformanceTest's Manage Baselines feature.

Popular comparisons for Intel Xeon Gold 6338 @ 2.00GHz

As of 7th of March 2024 - Higher results represent better performance

Processor		Average CPU Mark
Intel Xeon Gold 6338 @ 2.00GHz		68,563
AMD Ryzen Threadripper PRO 5975WX vs Intel Xeon Gold 6338		75,847 *(+10.6%)*
AMD Ryzen Threadripper PRO 3975WX vs Intel Xeon Gold 6338		62,893 *(-8.3%)*
AMD EPYC 74F3 vs Intel Xeon Gold 6338		60,666 *(-11.5%)*
AMD EPYC 7543 vs Intel Xeon Gold 6338		60,132 *(-12.3%)*
AMD EPYC 7513 vs Intel Xeon Gold 6338		59,988 *(-12.5%)*
AMD		2 *(-17.9%)*

AMD EPYC 7543P vs Intel Xeon Gold 6338		66,687 *(-2.7%)*

CPU Benchmarks

AMD Ryzen Threadripper PRO 5965WX vs Intel Xeon Gold 6338		66,582 *(-2.9%)*
AMD EPYC 7443P vs Intel Xeon Gold 6338		57,139 *(-16.7%)*
AMD EPYC 7713 vs Intel Xeon Gold 6338		83,566 *(+21.9%)*
Intel Xeon w7-3465X vs Intel Xeon Gold 6338		67,041 *(-2.2%)*

Dell PowerEdge RAID Controller 11 User's Guide

PERC H755, H750, H355, and H350 Controller Series

Regulatory Model: UCPA-1101, UCPF-1100, UCPF-1110, UCPN-1100, UCSA-1111, UCSF-1100, and UCSM-1100
May 2023
Rev. A05

DELL Technologies

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your product.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

Contents

1

Dell Technologies PowerEdge RAID Controller 11

Dell Technologies PowerEdge RAID Controller 11, or PERC 11 is a series of RAID disk array controllers made by Dell for its PowerEdge servers. The PERC 11 series consists of the PERC H755 adapter, PERC H755 front SAS, PERC H755N front NVMe, PERC H750 adapter SAS, PERC H755 MX adapter, PERC H355 adapter SAS, PERC H355 front SAS, PERC H350 adapter SAS, and PERC H350 Mini Monolithic SAS cards that have the following characteristics:

- Provides reliability, high performance, and fault-tolerant disk subsystem management
- Offers RAID control capabilities including support for RAID levels 0, 1, 5, 6, 10, 50, 60
- Complies with Serial Attached SCSI (SAS) 3.0 providing up to 12 Gb/sec throughput
- Supports Dell-qualified Serial Attached SCSI (SAS), SATA hard drives, solid state drives (SSDs), and PCIe SSD (NVMe)
- Supports drive speeds of 8 GT/s and 16 GT/s at maximum x2 lane width for NVMe drives.

NOTE: Mixing disks of different speeds (7,200 RPM, 10,000 RPM, or 15,000 RPM) and bandwidth (3 Gbps, 6 Gbps, or 12 Gbps) while maintaining the same drive type (SAS or SATA) and technology (hard drive or SSD) is supported.

NOTE: Mixing NVMe drives with SAS and SATA is not supported. Also, mixing hard drives and SSDs in a virtual disk is not supported.

NOTE: PERC H750 adapter SAS, PERC H355 front SAS, PERC H355 adapter SAS, PERC H350 adapter SAS, and PERC H350 Mini Monolithic SAS do not support NVMe drives.

NOTE: RAID levels 5, 6, 50, and 60 are not supported on PERC H355 adapter SAS, PERC H355 front SAS, PERC H350 adapter SAS, and PERC H350 Mini Monolithic SAS.

NOTE: PERC H350 Mini Monolithic SAS has form factor variations (Low Profile) for specific platforms. For more information, see your platform manuals.

NOTE: For the safety, regulatory, and ergonomic information that is associated with these devices, and for more information about the Integrated Dell Remote Access Controller (iDRAC) or Lifecycle Controller (LC) remote management, see your platform documentation.

Topics:

Features of PERC H755 adapter

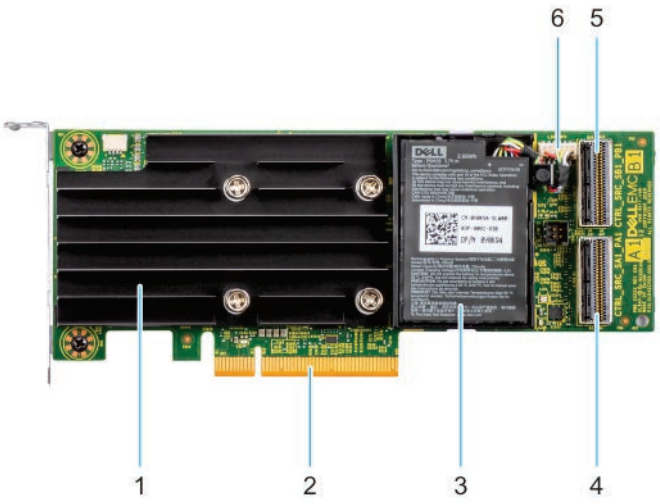

Figure 1. Features of PERC H755 adapter

1. Heatsink
2. PCIe connector
3. Battery
4. Backplane connector A
5. Backplane connector B
6. Battery cable connector

Features of PERC H755 front SAS

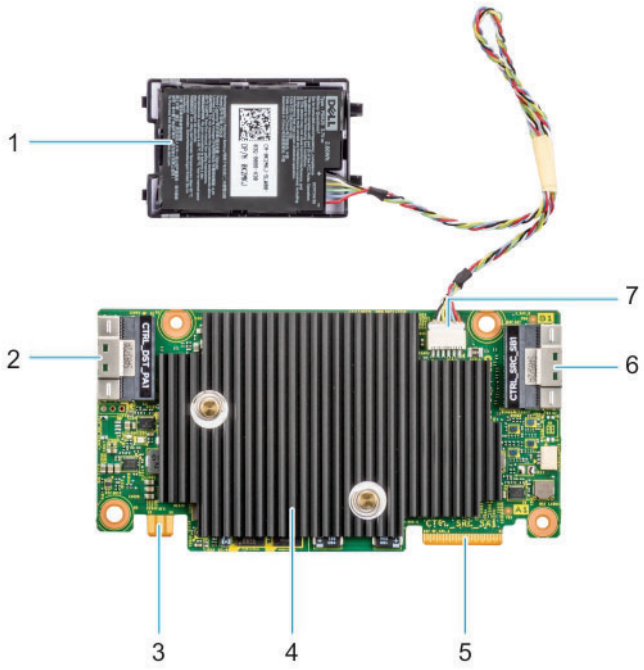

Figure 2. Features of PERC H755 front SAS

1. Battery
2. PCIe input connector
3. Power card edge connector
4. Heatsink
5. Backplane connector A
6. Backplane connector B

7. Battery cable connector

Features of PERC H755N front NVMe

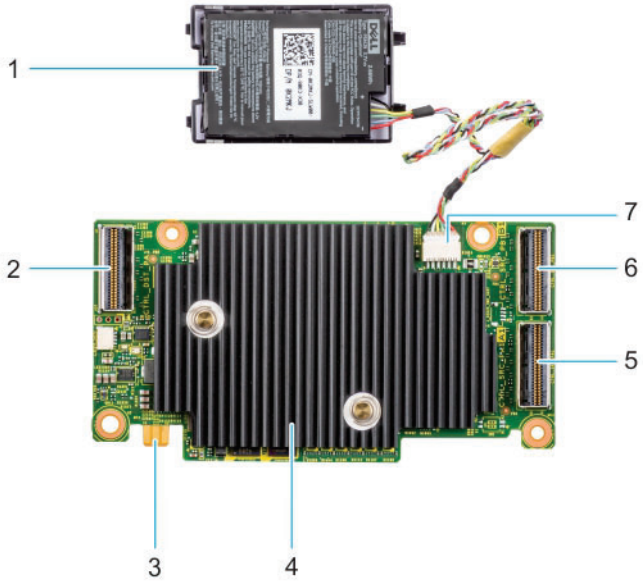

Figure 3. Features of PERC H755N front NVMe

1. Battery
2. PCIe cable connector
3. Power card edge connector
4. Heatsink
5. Backplane connector A
6. Backplane connector B
7. Battery cable connector

Features of PERC H755 MX adapter

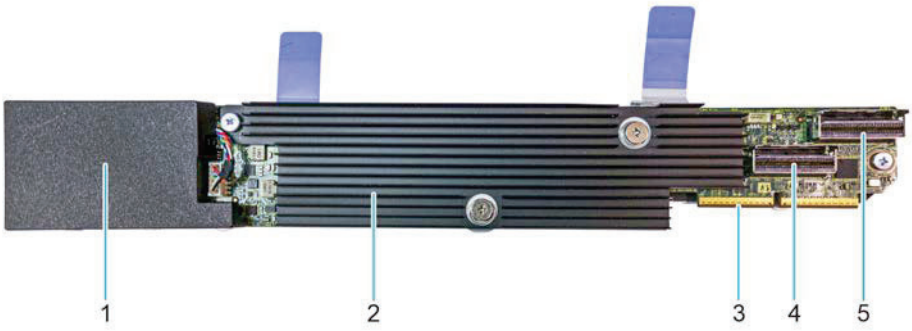

Figure 4. Features of PERC H755 MX adapter

1. Battery under cover
2. Heatsink
3. PCIe cable connector
4. Backplane connector A
5. Backplane connector B

Features of PERC H750 adapter SAS

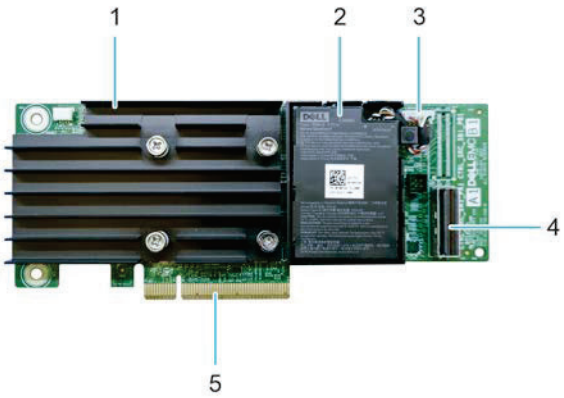

Figure 5. Features of PERC H750 adapter SAS

1. Heat sink
2. Battery
3. Battery cable connector
4. Backplane connector A
5. PCIe connector

Features of PERC H355 adapter SAS

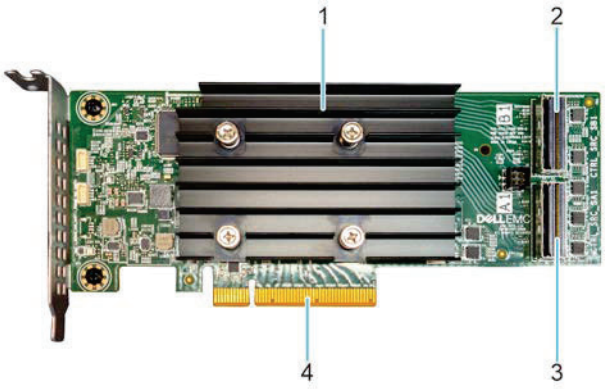

Figure 6. Features of PERC H355 adapter SAS

1. Heat sink
2. Backplane connector B
3. Backplane connector A
4. PCIe connector

Features of PERC H355 front SAS

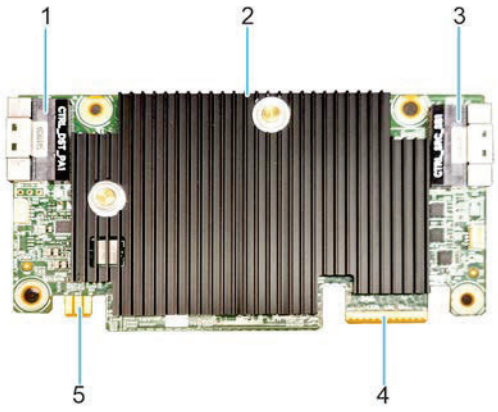

Figure 7. Features of H355 front SAS

1. PCIe input connector
2. Heat sink
3. Backplane connector B
4. Backplane connector A
5. Power card edge connector

Features of PERC H350 adapter SAS

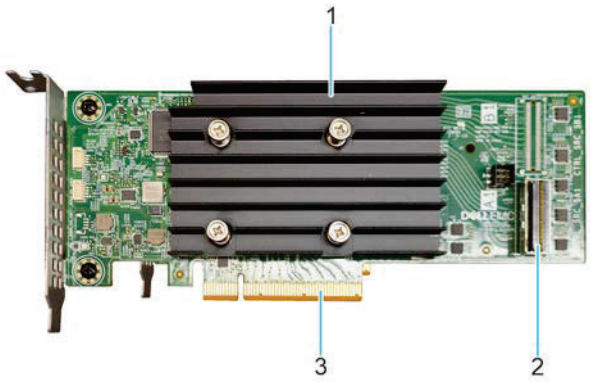

Figure 8. PERC H350 adapter SAS

1. Heat sink
2. Backplane connector A
3. PCIe connector

Features of PERC H350 Mini Monolithic SAS

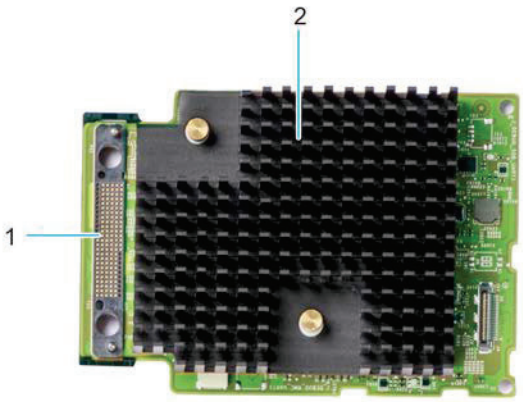

Figure 9. PERC H350 Mini Monolithic SAS

1. SAS cable connection
2. Heat sink

Operating systems supported by PERC 11 cards

See Dell Technologies Enterprise operating systems support for a list of supported operating systems by a specific server for the PERC 11 cards.

NOTE: For the latest list of supported operating systems and driver installation instructions, see the operating system documentation at www.dell.com/operatingsystemmanuals. For specific operating system service pack requirements, see the Drivers and Downloads section at www.dell.com/manuals.

Technical specifications of PERC 11 cards

The following table lists the specifications of PERC 11 cards:

Table 1. Technical specifications of PERC 11 cards

Feature	PERC H755 adapter	PERC H755 front SAS	PERC H755N front NVMe	PERC H755 MX adapter	PERC H750 adapter SAS
RAID levels	0, 1, 5, 6, 10, 50, 60	0, 1, 5, 6, 10, 50, 60	0, 1, 5, 6, 10, 50, 60	0, 1, 5, 6, 10, 50 ,60	0, 1, 5, 6, 10, 50 ,60
Non–RAID	Yes	Yes	Yes	Yes	Yes
Enclosures per port	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Processor	Broadcom RAID-on-chip, SAS3916 chipset	Broadcom RAID-on-chip, SAS3916 chipset	Broadcom RAID-on-chip, SAS3916 chipset	Broadcom RAID-on-chip, SAS3916 chipset	Broadcom RAID-on-chip, SAS3916 chipset
Battery backup unit	Yes	Yes	Yes	Yes	Yes
Local Key Management security	Yes	Yes	Yes	Yes	Yes
Controller queue depth	5120	5120	5120	5120	5120
Secure enterprise key manager security	Yes	Yes	Yes	No	Yes
Non-volatile cache	Yes	Yes	Yes	Yes	Yes
Cache memory	8 GB DDR4 2666 MT/s cache	8 GB DDR4 2666 MT/s cache	8 GB DDR4 2666 MT/s cache	8 GB DDR4 2666 MT/s cache	8 GB DDR4 2666 MT/s cache
Cache function	Write back, write through, no read ahead, and read ahead	Write back, write through, no read ahead, and read ahead	Write back, write through, no read ahead, and read ahead	Write back, write through, no read ahead, and read ahead	Write back, write through, no read ahead, and read ahead
Max no of VDs in RAID mode	240	240	240	240	240
Max no of disk groups	240	240	240	240	240
Max no of VDs per disk group	16	16	16	16	16
Hot swap devices supported	Yes	Yes	Yes	Yes	Yes
Autoconfig	Yes	Yes	Yes	Yes	Yes
Hardware XOR engine	Yes	Yes	Yes	Yes	Yes
Online capacity expansion	Yes	Yes	Yes	Yes	Yes
Dedicated and global hot spare	Yes	Yes	Yes	Yes	Yes
Drives types	3 Gbps SATA, 6 Gbps SATA/SAS, and 12 Gbps SAS,	3 Gbps SATA, 6 Gbps SATA/SAS, and 12 Gbps SAS	Gen3 (8 GT/s) and Gen4 (16 GT/s) NVMe	3 Gbps SATA, 6 Gbps SATA/ SAS, and 12	3 Gbps SATA, 6 Gbps SATA/SAS, and 12 Gbps SAS

Table 1. Technical specifications of PERC 11 cards (continued)

Feature	PERC H755 adapter	PERC H755 front SAS	PERC H755N front NVMe	PERC H755 MX adapter	PERC H750 adapter SAS
	Gen3 (8 GT/s), and Gen4 (16 GT/s) NVMe			Gbps SAS, Gen3 (8 GT/s), and Gen4 (16 GT/s) NVMe	
VD strip size	64 KB, 128 KB, 256 KB, 512 KB, 1 MB	64 KB, 128 KB, 256 KB, 512 KB, 1 MB	64 KB, 128 KB, 256 KB, 512 KB, 1 MB	64 KB, 128 KB, 256 KB, 512 KB, and 1 MB	64 KB, 128 KB, 256 KB, 512 KB, 1 MB
PCIe support	Gen 4	Gen 4	Gen 4	Gen 4	Gen 4
SAS/SATA maximum drive support	• Without SAS Expander: 16 drives per controller • With SAS Expander: Limited by platform offerings	• Without SAS Expander: 16 drives per controller • With SAS Expander: Limited by platform offerings	Not applicable	Limited by platform: 8 drives per controller	• Without SAS Expander: 8 drives per controller • With SAS Expander: Limited by platform offerings
NVMe maximum drive support	• Without PCIe Switch Expander: 8 drives per controller • With PCIe Switch Expander: Limited by platform offerings	Not applicable	• Without PCIe Switch Expander: 8 drives per controller • With PCIe Switch Expander: Limited by platform offerings	Limited by platform:8 drives per controller	Not applicable

NOTE: PERC H755 adapter and PERC H755 MX supports either SAS, SATA, or NVMe drives depending on the backplane/server configuration.

NOTE: PERC controller supports only conventional magnetic recording (CMR) drives, and does not support shingled magnetic recording (SMR) drives.

NOTE: PERC H755 family of controllers currently support SEKM starting with firmware version 52.14.0-3901.

NOTE: For information about the number of drives in a disk group per virtual disk, see Summary of RAID levels

NOTE: As 14G PowerEdge Servers do not support Gen 4 speeds, PERC H750 adapter SAS will downtrain to Gen 3 speeds.

Feature	PERC H355 adapter SAS	PERC H355 front SAS	PERC H350 adapter SAS	PERC H350 Mini Monolithic SAS
RAID levels	0, 1, 10	0, 1, 10	0, 1, 10	0, 1, 10
Non–RAID	Yes	Yes	Yes	Yes
Enclosures per port	Not applicable	Not applicable	Not applicable	Not applicable
Processor	Broadcom RAID-onchip, SAS3816 chipset	Broadcom RAID-onchip, SAS3816 chipset	Broadcom RAID-onchip, SAS3816 chipset	Broadcom RAID-onchip, SAS3816 chipset
Battery backup unit	No	No	No	No
Local Key Management security	No	No	No	No

Feature	PERC H355 adapter SAS	PERC H355 front SAS	PERC H350 adapter SAS	PERC H350 Mini Monolithic SAS
Controller queue depth	1536	1536	1536	1536
Secure enterprise key manager security	No	No	No	No
Non-volatile cache	No	No	No	No
Cache memory	Not applicable	Not applicable	Not applicable	Not applicable
Cache function	Write through, no read ahead	Write through, no read ahead	write through, no read ahead	write through, no read ahead
Max no of VDs in RAID mode	32	32	32	32
Max no of disk groups	32	32	32	32
Max no of VDs per disk group	16	16	16	16
Hot swap devices supported	Yes	Yes	Yes	Yes
Autoconfig	Yes	Yes	Yes	Yes
Hardware XOR engine	Yes	Yes	Yes	Yes
Online capacity expansion	Yes	Yes	Yes	Yes
Dedicated and global hot spare	Yes	Yes	Yes	Yes
Drives types	3 Gbps SATA, 6 Gbps SATA/SAS, and 12 Gbps SAS, Gen3 (8 GT/s)	3 Gbps SATA, 6 Gbps SATA/SAS, and 12 Gbps SAS, Gen3 (8 GT/s)	3 Gbps SATA, 6 Gbps SATA/SAS, and 12 Gbps SAS, Gen3 (8 GT/s)	3 Gbps SATA, 6 Gbps SATA/SAS, and 12 Gbps SAS, Gen3 (8 GT/s)
VD strip size	64 KB	64 KB	64 KB	64 KB
PCIe support	Gen 4	Gen 4	Gen 4	Gen 4
SAS/SATA maximum drive support	• Without SAS Expander: 16 • With SAS Expander: Limited by platform offering	• Without SAS Expander: 16 • With SAS Expander: Limited by platform offering	• Without SAS Expander: 8 drives per controller • With SAS Expander: Limited by platform offering	• Without SAS Expander: 8 drives per controller • With SAS Expander: Limited by platform offering
NVMe maximum drive support	Not applicable	Not applicable	Not applicable	Not applicable

NOTE: As 14G PowerEdge Servers do not support Gen 4 speeds, PERC H350 adapter SAS and PERC H350 Mini Monolithic SAS will down train to Gen 3 speeds.

Thermal specifications

PERC 11 Controllers have an operating temperature range of 0C to 55C. System ambient temperatures may be less than or greater than these values.

NOTE: PERC Controllers may raise erroneous Battery, Disk, and Controller temperature errors if the controller is operating below the operational temperature range.

2

Applications and User Interfaces supported by PERC 11

PERC 11 card Management applications include the Comprehensive Embedded Management (CEM), Dell OpenManage Storage Management, The Human Interface Infrastructure (HII) configuration utility, and The PERC Command Line Interface (CLI). They enable you to manage and configure the RAID system, create and manage multiple disk groups, control and monitor multiple RAID systems, and provide online maintenance.

Topics:

Comprehensive Embedded Management

Comprehensive Embedded Management (CEM) is a storage management solution for Dell systems that enables you to monitor the RAID and network controllers installed on the system using iDRAC without an operating system installed on the system.

Using CEM enables you to do the following:

- Monitor devices with and without an operating systems installed on the system
- Provide a specific location to access monitored data of the storage devices and network cards
- Allows controller configuration for all PERC 11 cards

NOTE: If you boot the system to HII (F2) or Lifecycle Controller (F10), then you cannot view the PERC cards on the CEM UI. The PERC cards are displayed on the CEM UI only after the system boot is complete.

NOTE: It is not recommended that you create more than 8 VDs simultaneously with CEM.

Dell OpenManage Storage Management

Dell OpenManage Storage Management is a storage management application for Dell systems that provides enhanced features for configuring locally attached RAID disk storage. The Dell OpenManage storage management application enables you to perform controller and enclosure functions for all supported RAID controllers and enclosures from a single graphical or Command Line Interface (CLI). The User Interface (UI) is wizard-driven with features for novice and advanced users, and detailed online help. Using the Dell OpenManage storage management application, you can protect your data by configuring data-redundancy, assigning hot spares, or rebuilding failed physical disks. The fully featured CLI, which is available on select operating systems, allows you to perform RAID management tasks either directly from the console or through scripting.

NOTE: For more information, see the *Dell OpenManage Storage Management User's Guide* at www.dell.com/openmanagemanuals.

Human Interface Infrastructure Configuration Utility

The Human Interface Infrastructure (HII) configuration utility is a storage management application integrated into the system BIOS <F2>. It is used to configure and manage your Dell PowerEdge RAID Controller (PERC) virtual disks, and physical disks. This utility is independent of the operating system.

NOTE: The BIOS configuration utility <Ctrl> <R> is not supported on PERC 11 cards.

The PERC Command Line Interface

The PERC Command Line Interface (CLI) is a storage management application. This utility allows you to set up, configure, and manage your Dell PowerEdge RAID Controller (PERC) by using the Command Line Interface (CLI).

NOTE: For more information, see *Dell EMC PowerEdge RAID Controller CLI Reference Guide* at www.dell.com/storagecontrollermanuals.

3

Features of PowerEdge RAID Controller 11

Topics:

Controller features

This section lists the following controller features supported on Dell Technologies PowerEdge RAID Controller 11 cards in detail:

- Non-Volatile Memory Express
- Opal Security Management
- Hardware Root of Trust
- 1 MB I/O
- Auto Configure RAID 0
- Disk roaming
- FastPath
- Non–RAID disks
- Physical disk power management
- Profile Management
- Secure firmware update
- Snapdump

Non-Volatile Memory Express

Non-Volatile Memory Express (NVMe) is a standardized, high-performance host controller interface and a storage protocol for communicating with non-volatile memory storage devices over the peripheral component interconnect express (PCIe) interface standard. The PERC 11 controller supports up to 8 direct-attach NVMe drives. The PERC 11 controller is a PCIe endpoint to the host, a PowerEdge server, and configured as a PCIe root complex for downstream PCIe NVMe devices connected to the controller.

NOTE: The NVMe drive on the PERC 11 controller shows up as a SCSI disk in the operating system, and the NVMe command line interface will not work for the attached NVMe drives.

Conditions under which a PERC supports an NVMe drive

- In NVMe devices the namespace identifier (NSID) with ID 1, which is (NSID=1) must be present.
- In NVMe devices with multiple namespace(s), you can use the drive capacity of the namespace with NSID=1.
- The namespace with NSID=1 must be formatted without protection information and cannot have the metadata enabled.
- PERC supports 512-bytes or 4 KB sector disk drives for NVMe devices.

Drive repair for NVMe initialization failure

If an NVME drive fails to initialize, the drive that is connected to PERC can be corrected in HII. The NVME initialization errors in the drives are listed as correctable and non-correctable errors in HII.

Repair drives with correctable NVMe initialization errors

Repair the drives with correctable NVMe initialization errors in HII to enable the drives to work properly.

About this task

Repairs can lead to permanent data loss in drives. Also, certain types of repairs can take a long time.

Steps

1. Log in to HII.
2. Go to **Main Menu** > **Hardware Components** > **Enclosure Management.**
   The drives with correctable and non-correctable errors are listed.
3. Select the drive and click **Repair**.
   If the repair is successful, the drive is listed under physical drives and removed from the correctable error list. If the drive has other correctable errors, the drive is listed again in the correctable errors list.
4. If the repair is not successful, click **Repair** again.

   NOTE: In case you want to stop the repair, stop the repair from the **Ongoing repairs** list.

   If the error is still not resolved or if the drive has other non-correctable errors, the drive is moved to the non-correctable error list.

Opal Security Management

Opal Security Management of Opal SED drives requires security key management support. You can use the application software or The Integrated Dell Remote Access Controller (iDRAC) to generate the security key that is set in the Opal drives and used as an authentication key to lock and unlock the Opal drives.

Hardware Root of Trust

Hardware RoT (RoT) builds a chain of trust by authenticating all the firmware components prior to its execution, and it permits only the authenticated firmware to perform and be flashed. The controller boots from an internal boot ROM (IBR) that establishes the initial root of trust and this process authenticates and builds a chain of trust with succeeding software using this root of trust.

1 MB I/O

PERC 11 controllers support a 1 MB I/O feature; if the capacity of I/O frame is greater than 1 MB, the I/O frame is broken into smaller chunks.

Autoconfigure RAID 0

The Autoconfigure RAID 0 feature creates a single drive RAID 0 on each hard drive that is in the ready state. For more information, see Auto Configure RAID 0.

NOTE: The Autoconfigure RAID 0 feature is not supported on PERC H355 adapter SAS, PERC H355 front SAS, PERC H350 adapter SAS, and PERC H350 Mini Monolithic SAS.

Autoconfigure behavior

The autoconfigure behavior automatically configures unconfigured drives during reboot and hot insertion. Unconfigured drives are configured according to the settings; but the configured drives remain unaffected. PERC 11 supports **Off and Non–RAID** settings.

Table 2. Autoconfigure behavior settings

Settings	Description
Off	Autoconfigure behavior is turned off.
Non–RAID	Unconfigured drives are configured as non–RAID disk during boot or during hot insertion; all the configured drives remain unaffected.
Off to Non–RAID disk	Unconfigured drives are converted to non–RAID disks; all the configured drives remain unaffected.
Non–RAID disk to Off	Unconfigured drives remain unconfigured good; all the configured drives remain unaffected.

NOTE: PERC H355 front SAS, PERC H355 adapter SAS, PERC H350 adapter SAS, and PERC H350 Mini Monolithic SAS converts an unconfigured good drive to non-RAID only if the drive has never been used before by that specific PERC.

Disk roaming

Disk roaming is when a physical disk is moved from one cable connection or backplane slot to another on the same controller. The controller automatically recognizes the relocated physical disks and logically places them in the virtual disks that are part of the disk group. If the physical disk is configured as a non–RAID disk, then the relocated physical disk is recognized as a non–RAID disk by the controller.

CAUTION: It is recommended that you perform disk roaming when the system is turned off.

CAUTION: Do not attempt disk roaming during RAID level migration (RLM) or online capacity expansion (OCE). This causes loss of the virtual disk.

Using disk roaming

About this task

Perform the following steps to use disk roaming:

Steps

1. Turn off the power to the system, physical disks, enclosures, and system components.
2. Disconnect power cables from the system.
3. Move the physical disks to desired positions on the backplane or the enclosure.
4. Perform a safety check. Make sure the physical disks are inserted properly.
5. Turn on the system.

Results

The controller detects the RAID configuration from the configuration data on the physical disks.

FastPath

FastPath is a feature that improves application performance by delivering high I/O per second (IOPs) for solid-state drives (SSDs). The PERC 11 series of cards support FastPath.

To enable FastPath on a virtual disk, the cache policies of the RAID controller must be set to write-through and no read ahead. This enables FastPath to use the proper data path through the controller based on command (read/write), I/O size, and RAID type. For optimal solid-state drive performance, create virtual disks with strip size of 64 KB.

Non–RAID disks

A non–RAID disk is a single disk to the host, and not a RAID volume. The only supported cache policy for non–RAID disks is Write-Through.

Physical disk power management

Physical disk power management is a power-saving feature of PERC 11 series cards. The feature allows disks to be spun down based on disk configuration and I/O activity. The feature is supported on all rotating SAS and SATA disks, and includes unconfigured and hot-spare disks. The physical disk power management feature is disabled by default. You can enable the feature in the Dell Open Manage Storage Management application or in the Human Interface Infrastructure (HII) configuration utility. For more information on HII configuration and physical disk power management, see Enabling physical disk power management. For more information on using the Dell Open Manage Storage Management application, see the Dell OpenManage documentation at www.dell.com/openmanagemanuals.

Profile Management

PERC 11 supports the PD240 and PD64 profiles. It defines controller queue depth and the maximum number of physical and virtual disks.

Table 3. Supported profile on PERC 11

Feature	PD240	PD64
Controller	PERC H755 front SAS, PERC H755 MX adapter, and PERC H750 adapter SAS	PERC H355 front SAS, PERC H355 adapter SAS, PERC H350 adapter SAS, and PERC H350 Mini Monolithic SAS
Maximum virtual disk supported	240	32
Controller queue depth	5120	1536

Secure firmware update

This feature provides a cryptographic method of updating the firmware using an RSA encryption-decryption algorithm.

Only Dell-certified firmware is supported on your PERC controller.

Snapdump

The Snapdump feature provides the Dell support team with the debug information which can help to find the cause of firmware failure. In the instance of firmware failures, the firmware collects the logs and information at the time of failure, which are stored in a compressed file called a snapdump.

Snapdumps are also generated manually to provide additional debug information. When a snapdump is generated, it is stored in the controller's cache memory. This means in the event of a power loss the controller will offload the snapdump as part of its cache preservation mechanism. Snapdumps are preserved by default through four reboots before its deleted.

To generate a snapdump, change the snapdump, delete a snapdump, and to download a stored snapdump settings, see *Dell PowerEdge RAID Controller CLI Reference Guide* at www.dell.com/storagecontrollermanuals.

Virtual disk features

This section lists the following virtual disk features supported on PERC 11 cards in detail:

- Virtual disk read cache policies
- Virtual disk write cache policies
- Virtual disk migration

- Virtual disk initialization
- Reconfiguration of virtual disks
- Background operations

Virtual disk write cache policy

The write cache policy of a virtual disk determines how the controller handles writes to the virtual disk.

Table 4. Write cache policies

Feature	Description
Write-back	The controller sends a data transfer completion signal to the host when the controller cache has received all the data in a transaction. The controller then writes the cached data to the storage device in the background. **NOTE:** The default cache setting for virtual disks is Write-back caching. Write-back caching is also supported for single drive RAID 0 virtual disks.
Write-through	The controller sends a data transfer completion signal to the host system when the disk subsystem has received all the data in a transaction. **NOTE:** Certain data patterns and configurations perform better with a write-through cache policy.

NOTE: All RAID volumes are presented as write-through to the operating system (Windows and Linux) independent of the actual write cache policy of the virtual disk. PERC cards manage the data in cache independently of the operating system or any applications.

NOTE: Use the Dell OpenManage storage management application or the HII Configuration Utility to view and manage virtual disk cache settings.

Conditions under which write-back is employed

Write-back caching is used under all conditions in which the battery is present and in good condition.

Conditions under which forced write-back with no battery is employed

CAUTION: It is recommended that you use a power backup system when forcing write-back to ensure there is no loss of data if the system suddenly loses power.

Write-back mode is available when you select force write-back with no battery. When forced write-back mode is selected, the virtual disk is in write-back mode even if the battery is not present.

Virtual disk read cache policy

The read policy of a virtual disk determines how the controller handles reads to that virtual disk.

Table 5. Read policies

Feature	Description
Read ahead	Allows the controller to read sequentially ahead of requested data and to store the additional data in cache memory, anticipating that the data is required soon. This speeds up reads for sequential data, but there is slight improvement when accessing random data.
No read ahead	Disables the read ahead capability.

NOTE: Adaptive read ahead is no longer supported. Selecting adaptive read ahead is equivalent to selecting the read ahead option.

Virtual disk migration

The PERC 11 series supports migration of virtual disks from one controller to another without taking the target controller offline. The controller can import RAID virtual disks in optimal, degraded, or partially degraded states. You cannot import a virtual disk that is offline. When a controller detects a configured physical disk, it marks the physical disk as foreign, and generates an alert indicating that a foreign disk was detected.

Disk migration pointers:

- Supports migration of virtual disks from H740P, H745, H745P MX, and H840 to the PERC 11 series except for H345.
- Supports migration of volumes that are created within the PERC 11 series.
- Does not support migration from the PERC 11 series to PERC H345, H740P, H745, H745P MX, and H840.
- Does not support migration from PERC H330, H730, and H830 to the PERC 11 series.

NOTE: The source controller must be offline before performing the disk migration.

NOTE: Importing non–RAID drives and uneven span RAID 10 virtual disks from PERC 9 to PERC 11 is not supported.

NOTE: Disks cannot be migrated to older generations of PERC cards.

NOTE: Importing secured virtual disks is supported as long as the appropriate local key management (LKM) is supplied or configured.

NOTE: Virtual disk migration from PERC H755 adapter, PERC H755 front SAS, PERC H755N front NVMe, PERC H750 adapter SAS, PERC H755 MX adapter to PERC H350 adapter SAS, PERC H350 Mini Monolithic SAS,PERC H355 front SAS, and PERC H355 adapter SAS is not supported.

CAUTION: Do not attempt disk migration during RLM or online capacity expansion (OCE), this causes loss of the virtual disk.

Virtual disk initialization

PERC 11 series controllers support two types of virtual disk initialization:

- Full initialization
- Fast initialization

CAUTION: Initializing virtual disks erases files and file systems while keeping the virtual disk configuration intact.

Full initialization

Performing a full initialization on a virtual disk overwrites all blocks and destroys any data that previously existed on the virtual disk. Full initialization of a virtual disk eliminates the need for the virtual disk to undergo a Background Initialization (BGI). Full initialization can be performed after the virtual disk is created.

You can start a full initialization on a virtual disk by using the Slow Initialize option in the Dell OpenManage storage management application. For more information on using the HII Configuration Utility to perform a full initialization, see Configure virtual disk parameters.

NOTE: If the system reboots during a full initialization, the operation aborts and a BGI begins on the virtual disk.

Fast initialization

A fast initialization on a virtual disk overwrites the first and last 8 MB of the virtual disk, clearing any boot records or partition information. The operation takes only 2–3 seconds to complete, but it is followed by BGI, which takes a longer time to complete. To perform a fast initialization using the HII Configuration Utility, see Configure virtual disk parameters.

NOTE: During full or fast initialization, the host cannot access the virtual disk. As a result, if the host attempts to access the virtual disk while it is initializing, all I/O sent by the host will fail.

NOTE: When using iDRAC to create a virtual disk, the drive undergoes fast initialization. During this process all I/O requests to the drive will respond with a sense key of **"Not Ready"** and the I/O operation will fail. If the operating system attempts to read from the drive as soon as it discovers the drive, and while the fast initialization is still in process, then the I/O operation fails and the operating system reports an I/O error.

Reconfigure virtual disks

An online virtual disk can be reconfigured in ways that expands its capacity and changes its RAID level.

NOTE: Spanned virtual disks such as RAID 50 and 60 cannot be reconfigured.

NOTE: Reconfiguring virtual disks typically impacts disk performance until the reconfiguration operation is complete.

Online Capacity Expansion (OCE) can be done in following ways:

1. If there is a single virtual disk in a disk group and free space is available, the capacity of a virtual disk can be expanded within that free space. If multiple virtual disks exist within a common disk group, the capacities of those virtual disks cannot be expanded.
   NOTE: Online capacity expansion is allowed on a disk group with a single virtual disk that begins at the start of the physical disk. It is not allowed when there is a free space at the beginning of a disk.
2. Add additional physical disks to a virtual disk to increase its capacity.
3. After replacing all array members with larger drives than the original members, use the PERC CLI utility to expand the existing virtual disk to a larger size using the expandarray parameter. For more information, see Dell PowerEdge RAID Controller Command Line Interface Reference Guide.

RAID level migration (RLM) refers to changing a virtual disk's RAID level. Both RLM and OCE can be done simultaneously so that a virtual disk can simultaneously have its RAID level that is changed and its capacity increased. When an RLM or an OCE operation is complete, a reboot is not required.

CAUTION: Do not attempt disk migration during RLM or OCE operations. This causes loss of the virtual disk.

NOTE: If an RLM or an OCE operation is in progress, then an automatic drive rebuild or copyback operation will not start until the operation is complete.

NOTE: If the controller already contains the maximum number of virtual disks, you cannot perform a RAID level migration or capacity expansion on any virtual disk.

NOTE: The controller changes the write cache policy of all virtual disks to write-through until the RLM or OCE operation is complete.

NOTE: You cannot initiate an OCE or an RLM on any virtual disk on the controller where a virtual disk with an ID of 239 exists.

See the following table for a list of RLM or OCE options: The source RAID level column indicates the virtual disk RAID level before the RLM or OCE operation and the target RAID level column indicates the RAID level after the RLM or OCE operation.

Table 6. RAID level migration

Source RAID Level	Target RAID Level	Number of Physical Disks (Beginning)	Number of Physical Disks (End)	Capacity Expansion Possible	Description
RAID 0	RAID 0	1 or more	2 or more	Yes	Increases capacity by adding disks.
RAID 0	RAID 1	1	2	Yes	Converts a non-redundant virtual disk into a mirrored virtual disk by adding one disk.
RAID 0	RAID 5	1 or more	3 or more	Yes	Adds distributed parity redundancy; at least one disk must be added.
RAID 0	RAID 6	1 or more	4 or more	Yes	Adds dual distributed parity redundancy; at least two disks must be added.
RAID 1	RAID 0	2	2 or more	Yes	Removes redundancy while increasing capacity.
RAID 1	RAID 5	2	3 or more	Yes	Maintains redundancy while adding capacity.
RAID 1	RAID 6	2	4 or more	Yes	Adds dual distributed parity redundancy and adds capacity.
RAID 5	RAID 0	3 or more	2 or more	Yes	Converts to a non-redundant virtual disk and reclaims disk space that is used for distributed parity data; one disk can be removed.
RAID 5	RAID 5	3 or more	4 or more	Yes	Increases capacity by adding disks.
RAID 5	RAID 6	3 or more	4 or more	Yes	Adds dual distributed parity redundancy; at least one disk needs to be added.
RAID 6	RAID 0	4 or more	2 or more	Yes	Converts to a non-redundant virtual disk and reclaims disk space that is used for distributed parity data; two disks can be removed.
RAID 6	RAID 5	4 or more	3 or more	Yes	Removes one set of parity data and reclaims disk space used for it; one disk can be removed.
RAID 6	RAID 6	4 or more	5 or more	Yes	Increases capacity by adding disks.
RAID 10	RAID 10	4 or more	6 or more	Yes	Increases capacity by adding disks; an even number of disks must be added.

NOTE: You cannot perform a RAID level migration and expansion on RAID levels 50 and 60.

Background operations

Background initialization

Background initialization (BGI) is an automated process that writes parity or mirror data on newly created virtual disks. BGI does not run on RAID 0 virtual disks. You can control the BGI rate in the Dell OpenManage storage management application. Any change to the BGI rate does not take effect until the next BGI is performed.

NOTE:

- You cannot disable BGI permanently. If you cancel BGI, it automatically restarts within five minutes.
- Unlike full or fast initialization of virtual disks, background initialization does not clear data from the physical disks.
- Consistency Check (CC) and BGI typically cause some loss in performance until the operation completes.
- PERC H355 adapter SAS, PERC H355 front SAS, PERC H350 adapter SAS, and PERC H350 Mini Monolithic SAS background operations will not run until the operating system boots.

Consistency check and BGI perform similar functions in that they both correct parity errors. However, CC reports data inconsistencies through an event notification, while BGI does not. You can start CC manually, but not BGI.

Consistency checks

Consistency Check (CC) is a background operation that verifies and corrects the mirror or parity data for fault tolerant virtual disks. It is recommended that you periodically run a consistency check on virtual disks.

You can manually start a CC using the HII Configuration Utility or the Dell OpenManage storage management application. You can schedule a CC to run on virtual disks using the Dell OpenManage storage management application. To start a CC using the HII Configuration Utility, see Perform consistency check.

NOTE: CC or BGI typically causes some loss in performance until the operation completes.

CC and BGI both correct parity errors. However, CC reports data inconsistencies through an event notification, while BGI does not. You can start CC manually, but not BGI.

Hard drive features

This section lists the following hard drive features supported on PERC 11 cards in detail:

- Self-Encrypting Disks (SED)
- Instant Secure Erase (ISE)
- 4 KB sector disk drives

Self-Encrypting Disks

Select PERC 11 cards support self-encrypting disks (SEDs) for protection of data against loss or theft of SEDs. For information about cards supported, see Technical specifications. Protection is achieved by the use of encryption technology on the drives. There is one security key per controller. You can manage the security key using local key management (LKM) or OpenManage Secure Enterprise Key Manager also referred as Secure Enterprise Key Manager (SEKM). The controller use the security key to lock and unlock access to encryption-capable physical disks. To take advantage of this feature, you must:

- Have SEDs in your system, and
- Create a security key.

PERC cannot use SEDs that are secured by a non-PERC entity. Ensure that the SED is reprovisioned in an applicable manner by that non-PERC entity before connecting to PERC.

For more information, see the Security key and RAID management section.

NOTE: You cannot enable security on non-optimal virtual disks.

NOTE: PERC 11 supports Trusted Computing Group Enterprise (TCG) Security Subsystem Classes (SSC) SAS or SATA SED drives and TCG Opal SSC NVMe drives.

Instant secure erase

Instant Secure Erase (ISE) drives use the same encryption technology as SED drives but do not allow the encryption key to be secured. The encryption technology allows the drive to be re-purposed and securely erased using the cryptographic erase function.

NOTE: ISE drives do not provide protection against theft.

4 KB sector disk drives

PERC 11 controllers support 4 KB sector disk drives, which enables you to efficiently use the storage space.

Before installing Windows on 4 KB sector disk drives, see Windows operating system installation errors.

NOTE: Mixing 512–byte native and 512–byte emulated drives in a virtual disk is allowed, but mixing 512–byte and 4 KB native drives in a virtual disk is not allowed.

NOTE: 4 K is only supported in UEFI mode and not legacy BIOS.

NOTE: 4 K devices do not appear under the select boot device option. For more information, see Enable boot support.

Fault tolerance

The PERC 11 series supports the following:

- Self-Monitoring and Reporting Technology (SMART)
- Patrol read
- Physical disk failure detection
- Controller cache
- Battery Transparent Learn Cycle

The next sections describe some methods to achieve fault tolerance.

The SMART feature

The SMART feature monitors certain physical aspects of all motors, heads, and physical disk electronics to help detect predictable hard drive failures. Data on SMART compliant hard drives can be monitored to identify changes in values and determine whether the values are within threshold limits. Many mechanical and electrical failures display some degradation in performance before failure.

A SMART failure is also referred to as predicted failure. There are numerous factors that are predicted physical disk failures, such as a bearing failure, a broken read/write head, and changes in spin-up rate. In addition, there are factors that are related to read/write surface failure, such as seek error rate and excessive bad sectors.

NOTE: For detailed information about SCSI interface specifications, see t10.org and for detailed information about SATA interface specifications, see t13.org.

NOTE: PERC H355 adapter SAS, PERC H355 front SAS, PERC H350 adapter SAS, and PERC H350 Mini Monolithic SAS controllers do not monitor predictive failures for non-RAID disks.

Automatic Replace Member with predicted failure

A replace member operation can occur when there is a SMART predictive failure reporting on a physical disk in a virtual disk. The automatic replace member is initiated when the first SMART error occurs on a physical disk that is part of a virtual disk. The target disk needs to be a hot spare that qualifies as a rebuild disk. The physical disk with the SMART error is marked as failed only after the successful completion of the replace member. This prevents the array from reaching degraded state.

If an automatic replace member occurs using a source disk that was originally a hot spare (that was used in a rebuild), and a new disk is added and set as a target disk for the replace member operation, the hot spare drive will revert to the hot spare state after the replace member operation successfully completes.

NOTE: To enable automatic replace member, use the Dell storage management application.

Patrol Read

The Patrol read feature is designed as a preventative measure to ensure physical disk health and data integrity. Patrol read scans and resolves potential problems on configured physical disks. The Dell storage management applications can be used to start patrol read and change its behavior.

The following is an overview of patrol read behavior:

- Patrol read runs on all disks on the controller that are configured as part of a virtual disk, including hot spares.
- Patrol read does not run on physical disks that are not part of a virtual disk or are in Ready state.
- The amount of controller resources dedicated to patrol read operations adjusts based on the number of outstanding disk I/O operations. For example, if the system is processing a large number of I/O operations, then patrol read uses fewer resources to allow the I/O to take a higher priority.
- Patrol read does not run on disks that are involved in any of the following operations:
  - Rebuild
  - Replace member
  - Full or background initialization
  - CC
  - RLM or OCE

  NOTE: By default, patrol read automatically runs every seven days on configured SAS and SATA hard drives.

For more information about patrol read, see the Dell OpenManage documentation at www.dell.com/openmanagemanuals.

Physical disk failure detection

If a disk fails and it is replaced with a new disk, the controller will automatically start a rebuild on the new disk. See, Configured slot behavior. Automatic rebuilds can also occur with hot spares. If you have configured hot spares, the controller will automatically try to use them to rebuild the degraded virtual disk.

Using persistent hot spare slots

NOTE: The persistent hot spare slot feature is disabled by default.

The PERC 11 series can be configured so that the system backplane or storage enclosure disk slots are dedicated as hot spare slots. This feature can be enabled using the Dell storage management application.

Once enabled, any slots with hot spares configured automatically become persistent hot spare slots. If a hot spare disk fails or is removed, a replacement disk that is inserted into the same slot automatically becomes a hot spare with the same properties as the one it is replacing. If the replacement disk does not match the disk protocol and technology, it does not become a hot spare.

For more information on persistent hot spares, see the Dell OpenManage documentation at www.dell.com/openmanagemanuals.

Configured slot behavior

This feature is similar to persistent hot spare slot behavior. If a redundant VD is configured to the system and if a drive is replaced, the configured slot will automatically rebuild or copyback on the inserted drive regardless of the data on the drive. This operation will overwrite the data on the drive.

Table 7. Drive state/operation

Drive state/operation	Unconfigured slot	Slot configured in VD
Insert unconfigured drive into the system	Ready	Rebuild or copyback start

Table 7. Drive state/operation (continued)

Drive state/operation	Unconfigured slot	Slot configured in VD
Insert configured drive into the system	Foreign	• Rebuild or copyback start • Original drive data lost
Insert configured locked drive into the system (unlockable)	Foreign	Cryptographic Erase (If configured VD is not secured) • Rebuild or copyback start • Original drive data lost
Insert locked drive into the system (non-unlockable)	Foreign locked	Foreign locked

Physical disk hot swapping

Hot swapping is the manual replacement of a disk while the PERC 11 series cards are online and performing their normal functions. The following requirements must be met before hot swapping a physical disk:

- The system backplane or enclosure must support hot swapping for the PERC 11 series cards.
- The replacement disk must be of the same protocol and disk technology. For example, only a SAS hard drive can replace a SAS hard drive and only a NVMe drive can replace a NVMe drive.

Using replace member and revertible hot spares

The replace member functionality allows a previously commissioned hot spare to revert to a usable hot spare. When a disk failure occurs within a virtual disk, an assigned hot spare, dedicated, or global, is commissioned and begins rebuilding until the virtual disk is optimal. After the failed disk is replaced in the same slot and the rebuild to the hot spare is complete, the controller automatically starts to copy data from the commissioned hot spare to the newly inserted disk. After the data is copied, the new disk is a part of the virtual disk and the hot spare is reverted to being a ready hot spare. This allows hot spares to remain in specific enclosure slots. While the controller is reverting the hot spare, the virtual disk remains optimal. The controller automatically reverts a hot spare only if the failed disk is replaced with a new disk in the same slot. If the new disk is not placed in the same slot, a manual replace member operation can be used to revert a previously commissioned hot spare.

NOTE: A replace member operation typically causes a temporary impact to disk performance. Once the operation completes, performance returns to normal.

Controller cache

The PERC 11 series of cards contain local DRAM on the controllers. This DRAM can cache I/O operations for Write Back, Read Ahead virtual disks to improve the performance.

NOTE: Virtual disks consisting of SSDs may not see a difference in performance using controller cache and may benefit by Fastpath.

I/O workload that is slow to HDDs, such as random 512 B and 4 kB, may take some time to flush cached data. Cache is flushed periodically but for configuration changes or system shutdown, the cache is required to be flushed before the operation can be completed. It can take several minutes to flush cache for some workloads depending on the speed of the HDDs and the amount of data in the cache.

The following operations require a complete cache flush:

- Configuration changes (add or delete VDs, VD cache setting changes, foreign configuration scan, and import)
- System reboot or shutdown
- Abrupt power loss causing cache preservation

NOTE: The iDRAC or OpenManage periodically scans for the foreign configurations when the foreign disks are present. This action degrades the performance. If a foreign disk is present, it is recommended that you import, clear, or remove the foreign disk to prevent an impact on the performance.

Controller cache preservation

The controller is capable of preserving its cache in the event of a system power outage or improper system shutdown. The PERC 11 series controller is attached to a battery backup unit (BBU) that provides backup power during system power loss to preserve the controller's cache data.

Cache preservation with non–volatile cache

The non–volatile cache (NVC) allows controller cache data to be stored indefinitely. If the controller has data in the cache memory during a power outage or improper system shutdown, a small amount of power from the battery is used to transfer the cache data to non-volatile flash storage where it remains until power is restored and the system is booted. If the cache preservation process is interrupted by power-on, the controller may request an extra reset during the boot to complete the process. The system displays a message during boot as `Dell PERC at Bus <X> Dev <Y> has requested a system reset. System will reboot in 5 seconds`.

Recovering cache data

About this task

Complete these steps if a system power loss or improper system shutdown has occurred.

Steps

1. Restore the system power.
2. Boot the system.
3. When preserved cache exists on the controller, an error message is shown. For more information about how to recover cache, see Preserved Cache State.

Battery Transparent Learn Cycle

A transparent learn cycle is a periodic operation that calculates the charge that is remaining in the battery to ensure that there is sufficient energy. The operation runs automatically, and causes no impact to the system or controller performance.

The controller automatically performs the transparent learn cycle (TLC) on the battery to calibrate and gauge its charge capacity once every 90 days. The operation can be performed manually if required.

NOTE: Virtual disks stay in write-back mode, if enabled, during transparent learn cycle. When the TLC completes, the controller sets the next TLC to +90 days.

Transparent Learn Cycle completion time

The time frame for completion of a learn cycle is a function of the battery charge capacity and the discharge and charge currents used. Typical time completion for a transparent learn cycle is between 4 to 8 hours. If the learn cycle is interrupted mid cycle, it begins at a new cycle.

Conditions for replacing the battery

The PERC battery is marked failed when the state or health of the battery is declared bad. If the battery is declared failed, then all the virtual disks in write-back mode transitions to write-through mode, and the firmware runs learn cycles in subsequent reboots until the battery is replaced. On replacing the battery, virtual disk transitions to write-back mode.

Linux operating system device enumeration

Virtual disks and non-RAID disks are presented to the operating system as SCSI devices. The operating system enumerates these devices based on the SCSI target device ID.

Enumeration order for PERC H355 adapter SAS, PERC H355 front SAS, PERC H350 adapter SAS, and PERC H350 Mini Monolithic SAS

1. Non-RAID disks are enumerated first.
2. Virtual disks (VDs) are enumerated second, based on virtual disk target ID.

   Target IDs are assigned to the VDs in the ascending order when they are created. The first created VD is assigned the lowest available target ID, and the last created VD is assigned the highest available target ID. The first created VD is discovered first by the operating system.

   NOTE: The PERC H355 adapter SAS, PERC H355 front SAS, PERC H350 adapter SAS, and PERC H350 Mini Monolithic SAS non-RAID disks may not appear in the slot order.

Enumeration order for PERC H755 front SAS, PERC H755 front SAS, PERC H755N front NVMe, PERC H750 adapter SAS, and PERC H755 MX adapter

1. Non-RAID disks are enumerated first based on slot ID.
2. Virtual disks (VDs) are enumerated, second based on the virtual disk target ID.

   Target IDs are assigned to the VDs in the descending order when they are created. The first created VD is assigned the highest available target ID, and the last created VD is assigned the lowest available target ID. Therefore, the last created VD is discovered first by the operating system.

   NOTE: Operating system enumeration may not be in this order if virtual disks or non-RAID disks are created while the operating system is running. The operating system may name devices based on the order in which they were created resulting in the operating system enumeration changing after reboot. It is recommended to reboot the system for the final device enumeration after creating any virtual disks or non-RAID disks.

4

Install and remove a PERC 11 card

Topics:

Safety instructions

NOTE: To avoid injury, do not lift the system on your own. Get others to assist you.

WARNING: Opening or removing the system cover while the system is turned on may expose you to a risk of electric shock..

CAUTION: Do not operate the system without the cover in place for a duration exceeding five minutes. Operating the system without the system cover in place can result in component damage.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

CAUTION: To ensure proper operation and cooling, all system bays and fans must be always populated with a component or a blank.

NOTE: It is recommended that you always use an antistatic mat and antistatic strap while working on components inside the system.

NOTE: While replacing the hot swappable PSU, after next server boot; the new PSU automatically updates to the same firmware and configuration of the replaced one. For more information about the Part replacement configuration, see the *Lifecycle Controller User's Guide* at https://www.dell.com/idracmanuals

NOTE: While replacing faulty storage controller/FC/NIC card with the same type of card, after you power on the system; the new card automatically updates to the same firmware and configuration of the faulty one. For more information about the Part replacement configuration, see the *Lifecycle Controller User's Guide* at https://www.dell.com/idracmanuals

NOTE: For detailed information on cabling the cards, see the system-specific owner's manual at Installation and Service Manual available at https://www.dell.com/poweredgemanuals

Before working inside your system

Steps

1. Power off the system and all attached peripherals.
2. Disconnect the system from the electrical outlet, and disconnect the peripherals.
3. If applicable, remove the system from the rack.
   For more information, see the *Rail Installation Guide* relevant to your rail solutions at www.dell.com/poweredgemanuals.
4. Remove the system cover.

After working inside your system

Steps

1. Replace the system cover.
2. If applicable, install the system into the rack.
   For more information, see the *Rail Installation Guide* relevant to your rail solutions at www.dell.com/poweredgemanuals.
3. Reconnect the peripherals and connect the system to the electrical outlet, and then power on the system.

Remove the PERC H755 adapter

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.

   NOTE: Perform a graceful shutdown of the system to ensure data in the cache is moved to the disk before the controller is removed.

2. Open the system.
3. Locate the PERC card in the expansion riser on the system board.

   CAUTION: To prevent damage to the card, you must hold the card by its edges only.

4. Unfasten and lift the riser from the system board. Remove the PERC card.
5. Disconnect any cables connected to the card:
   a. Press down and hold the metal tab on the cable connector.
   b. Pull the cable out of the connector.

6. Replace the storage controller card and reconnect the data cables before placing them in the riser. For more information on installing the card, see Install PERC H755 adapter.
7. Reinstall the riser on the system board and fasten the riser.
8. Close the system.
9. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

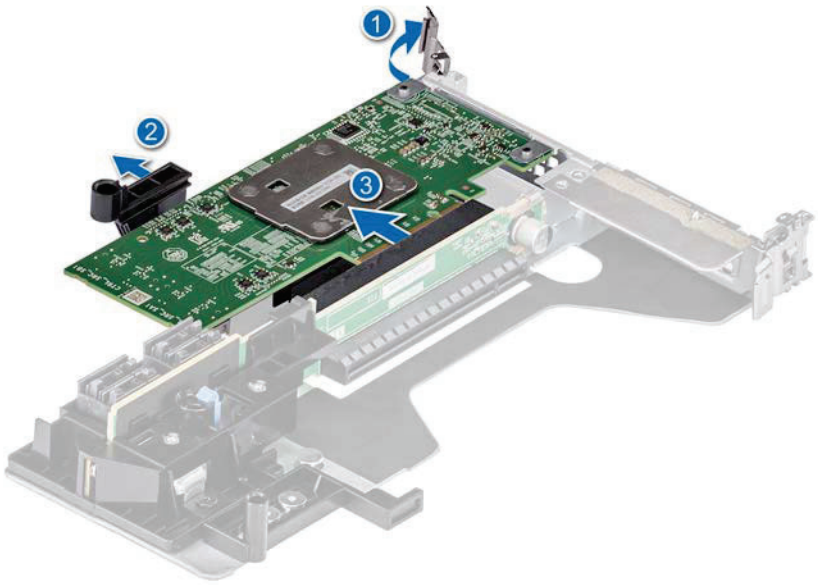

Figure 10. Remove the PERC H755 adapter

Install the PERC H755 adapter

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system.
3. Align the card-edge connector with the connector on the system board.

   CAUTION: To prevent damage to the card, you must hold the card by its edges only.

4. Press the card-edge down until the card is fully seated.
5. Connect the data cable connectors to the card.
6. Route the data cable through the channel on the inner side of the chassis to the backplane.
7. Attach the connector to the corresponding connector on the backplane as labeled on the controller.
8. Close the system.
9. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

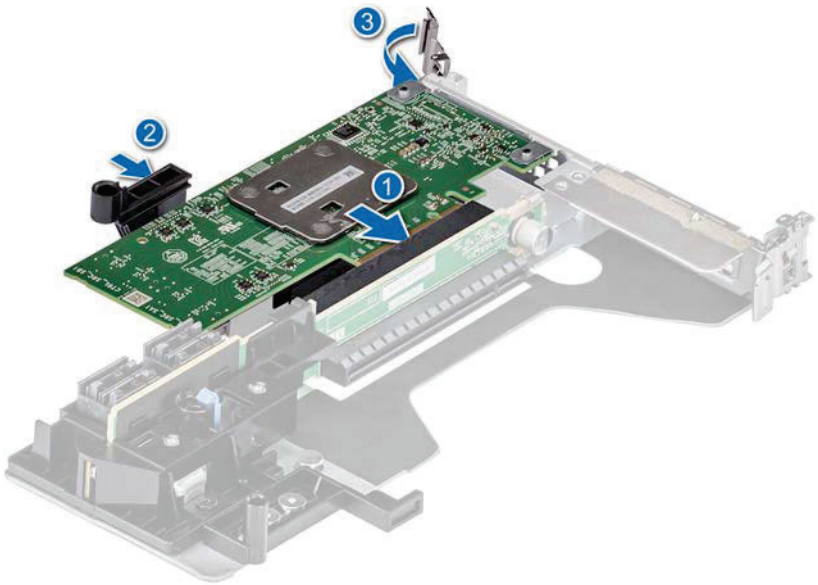

Figure 11. Install the PERC H755 adapter

Remove the PERC H755 front SAS card

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.

   NOTE: Perform a graceful shutdown of the system to ensure data in the cache is moved to the disk before the controller is removed.

2. Open the system.
3. Locate the PERC card in the controller carrier at the front of the system.

   CAUTION: To prevent damage to the card, you must hold the card by its edges only.

4. Unscrew the fasteners on the controller carrier and slide the carrier away from the backplane, disconnecting the controller from the backplane.

   If you are removing a PERC H755 front SAS controller in the upside down orientation, you must remove both the backplane and the controller at the same time because of the limited clearance available:

   a. Uninstall all drives from the backplane.
   b. Disconnect all cables between the PERC and the backplane.
   c. Lift the backplane and PERC from the system.

5. Disconnect any cables connected to the card:
   a. Press down and hold the metal tab on the cable connector.
   b. Pull the cables out of the connector.
6. Remove the PERC controller from the controller carrier.

7. Insert the replacement controller into the carrier and secure it with the appropriate screws.
8. Take the replacement storage controller and reconnect the cables before reconnecting it to the backplane.

   If you are removing a PERC H755 front SAS controller in the upside down orientation, reattach the PERC controller to the backplane first before reinstalling the backplane into the system. For more information on installing the card, see Install PERC H755 front SAS card.
9. Close the system.
10. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

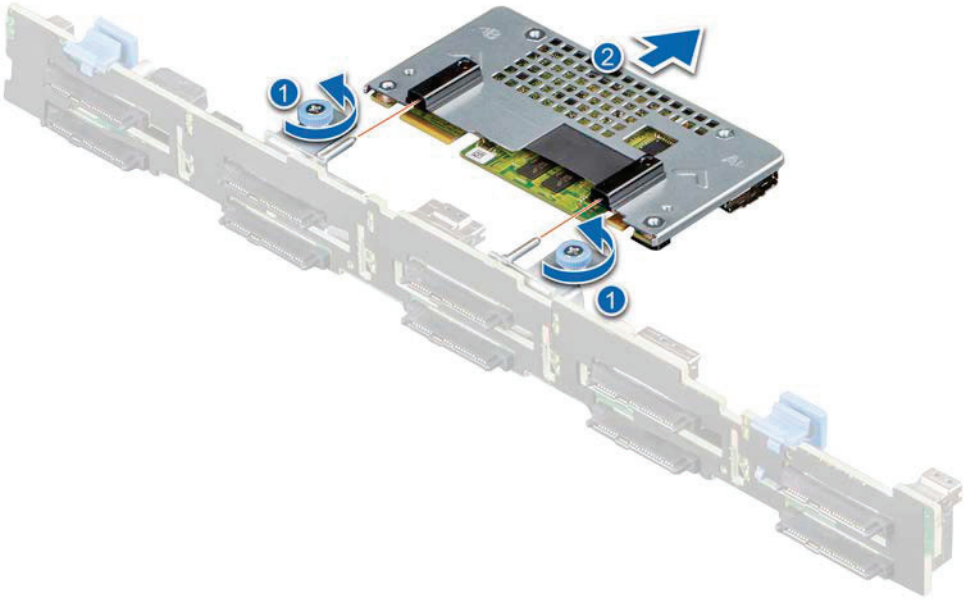

Figure 12. Remove the PERC H755 front SAS card

Install the PERC H755 front SAS card

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

NOTE: Perform a graceful shutdown of the sled to ensure that data in the cache is moved to the disk before the controller is removed.

2. Open the system.
3. Connect the PERC card to the carrier and ensure that the screws are properly fastened in place.

CAUTION: To prevent damage to the card, hold the card by its edges only.

4. Align the carrier with the guide pins until the controller is securely seated.
5. Slide the card into the connector until it is fully seated in the connector. Tighten the screws on the carrier that connect to the chassis to secure the carrier.
6. Connect the cable connectors to the card.

NOTE: Ensure that you connect the cable according to the connector labels on the cable. The cable does not function properly if reversed.

7. Close the system.
8. Reconnect the system to its electrical outlet and turn on the system and any attached peripherals.

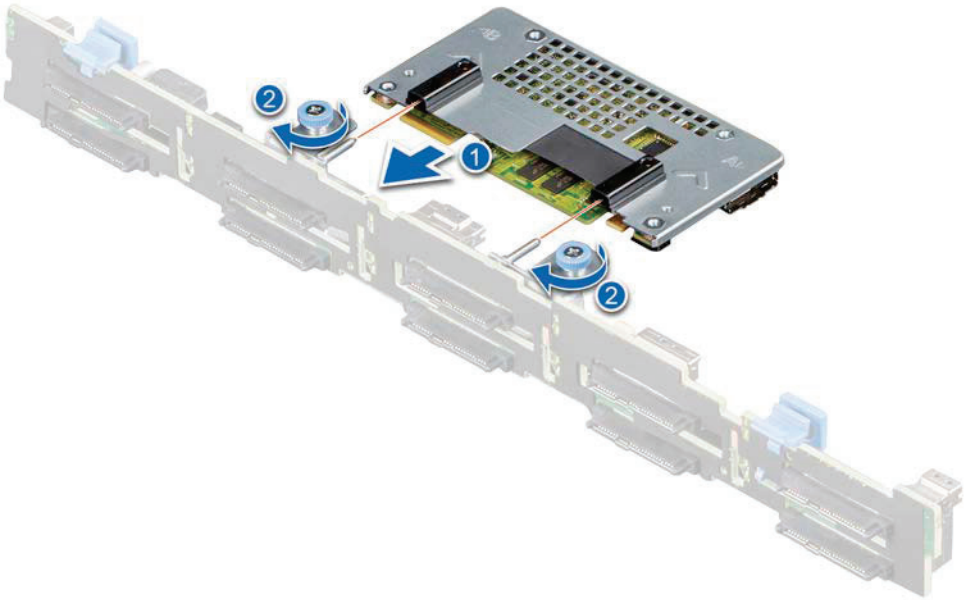

Figure 13. Install the PERC H755 front SAS card

Remove the PERC H755N front NVMe card

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or

telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.

   NOTE: Perform a graceful shutdown of the system to ensure that data in the cache is moved to the disk before the controller is removed.

2. Open the system.
3. Locate the PERC card in the controller carrier at the front of the system.

   CAUTION: To prevent damage to the card, you must hold the card by its edges only.

4. Unscrew the fasteners on the controller carrier, and slide the carrier away from the backplane to disconnect the controller from the backplane.

   If you are removing a PERC H755N front NVMe controller in the upside down orientation, you must remove both the backplane and the controller at the same time because of the limited clearance available:

   a. Uninstall all drives from the backplane.
   b. Disconnect all cables between the PERC and the backplane.
   c. Lift the backplane and PERC from the system.

5. Disconnect any cables connected to the card:
   a. Press down and hold the metal tab on the cable connector.
   b. Pull the cable out of the connector.
6. Remove the PERC controller from the controller carrier.
7. Insert the replacement controller into the carrier and secure it with the appropriate screws.
8. Take the replacement storage controller and reconnect the cable before reconnecting it to the backplane.

   If you are removing a PERC H755 front NVMe controller in the upside down orientation, reattach the PERC controller to the backplane first before reinstalling the backplane into the system. For more information on installing the card, see Installing the PERC H755N front NVMe card.

9. Close the system.
10. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

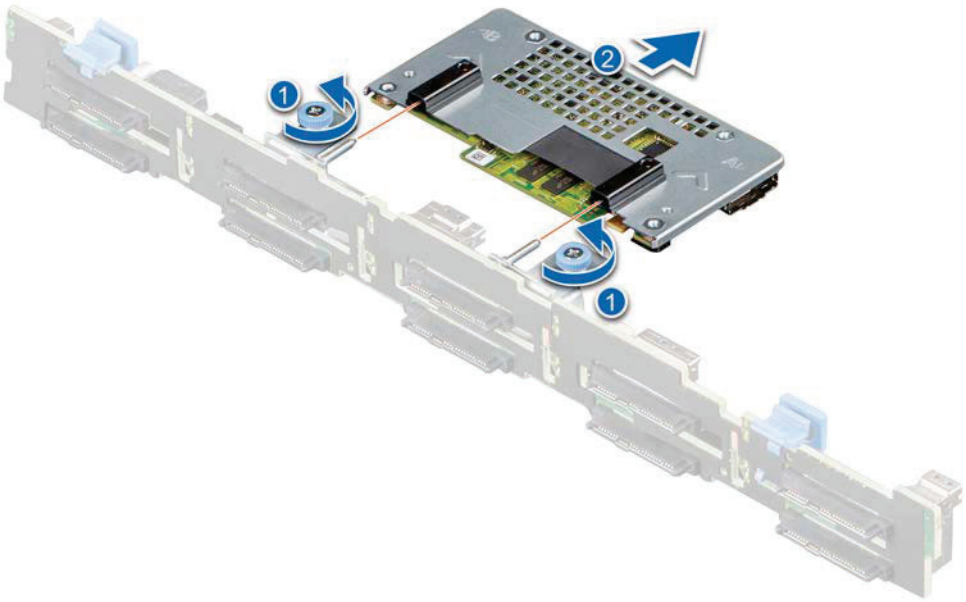

Figure 14. Remove the PERC H755N front NVMe card

Install the PERC H755N front NVMe card

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

   NOTE: Perform a graceful shutdown of the sled to ensure that data in the cache is moved to the disk before the controller is removed.

2. Open the system.
3. Connect the PERC card to the carrier and ensure the screws are properly fastened in place.

   CAUTION: To prevent damage to the card, hold the card by its edges only.

4. Align the carrier with the guide pins until the controller is securely seated.

5. Slide the card until it is fully seated in the connector. Tighten the screws on the carrier that connect to the chassis to secure the carrier.
6. Connect the cable connectors to the card.

   NOTE: Ensure that you connect the cable according to the connector labels on the cable. The cable does not function properly if reversed.

7. Close the system.
8. Reconnect the system to its electrical outlet and turn on the system and any attached peripherals.

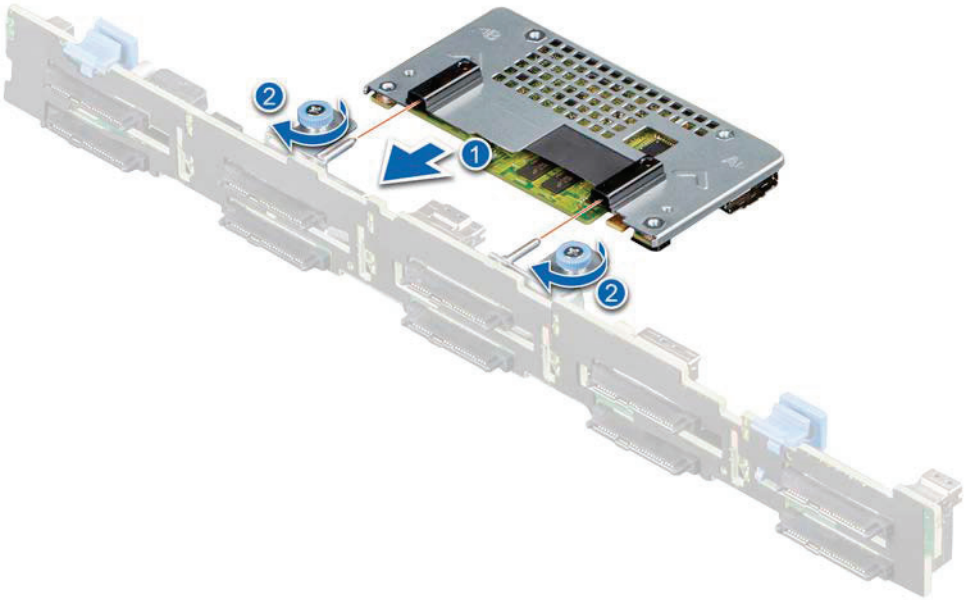

Figure 15. Install the PERC H755N front NVMe card

Remove the PERC H755 MX adapter

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

CAUTION: To prevent damage to the card, hold the card by its edges only.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the sled, including any attached peripherals, and remove the sled from the MX chassis.

   NOTE: Perform a graceful shutdown of the system to ensure that data in the cache is moved to the disk before the controller is removed.

2. Open the sled.
3. Locate the PERC card on the system board.

   CAUTION: To prevent damage to the card, hold the card by its edges only.

4. Using the blue tab, rotate the lever of the controller.
5. Pull the release lever upward to disengage the controller from the connector.
6. Disconnect the cable from the card. To disconnect the cable:
   a. Press and hold the metal tab on the cable connector.
   b. Pull the cable out of the connector.
7. Lift the card from the system board.
8. Replace the storage controller card and connect the cable. For information on installing the card, see Install the PERC H755 MX adapter.
9. Close the sled.
10. Insert the sled into the MX chassis and turn on the system and any attached MX chassis peripherals.

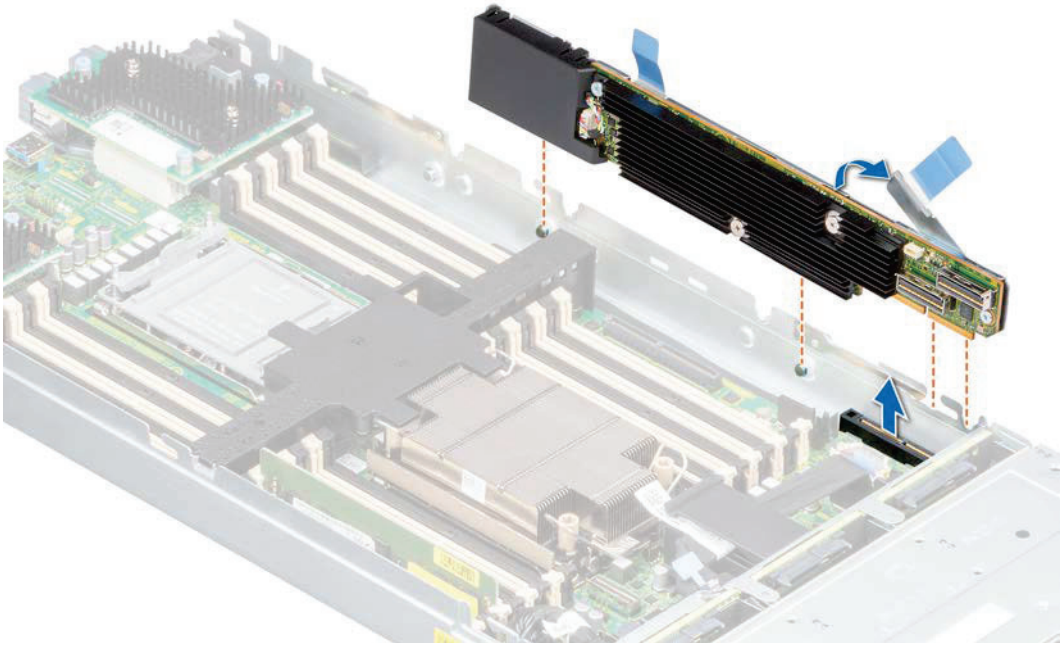

Figure 16. Remove the PERC H755 MX adapter

Install the PERC H755 MX adapter

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or

telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the sled and any attached peripherals, and remove the sled from the MX chassis.
2. Open the sled.
3. Connect the backplane data cable connector to the card.

   NOTE: Ensure that you connect the cable according to the connector labels on the cable. The cable does not function properly if reversed.

4. Align the bracket notches with the tabs on the sides of the sled chassis and align the PERC card connector with the connector on the system board.

   CAUTION: To prevent damage to the card, hold the card by its edges only.

5. Press the PERC card into the connector until it is firmly seated.
6. Press the release lever to secure the card to the sled.

   NOTE: The pin on the release lever secures the card to the chassis of the sled.

7. Route the data cable through the clip on the card and through the channel on the inner side of the chassis.
8. Attach the connector to the corresponding connector on the backplane as labeled in the controller.
9. Close the sled.
10. Insert the sled into the MX chassis and turn on the system and any attached MX chassis peripherals.

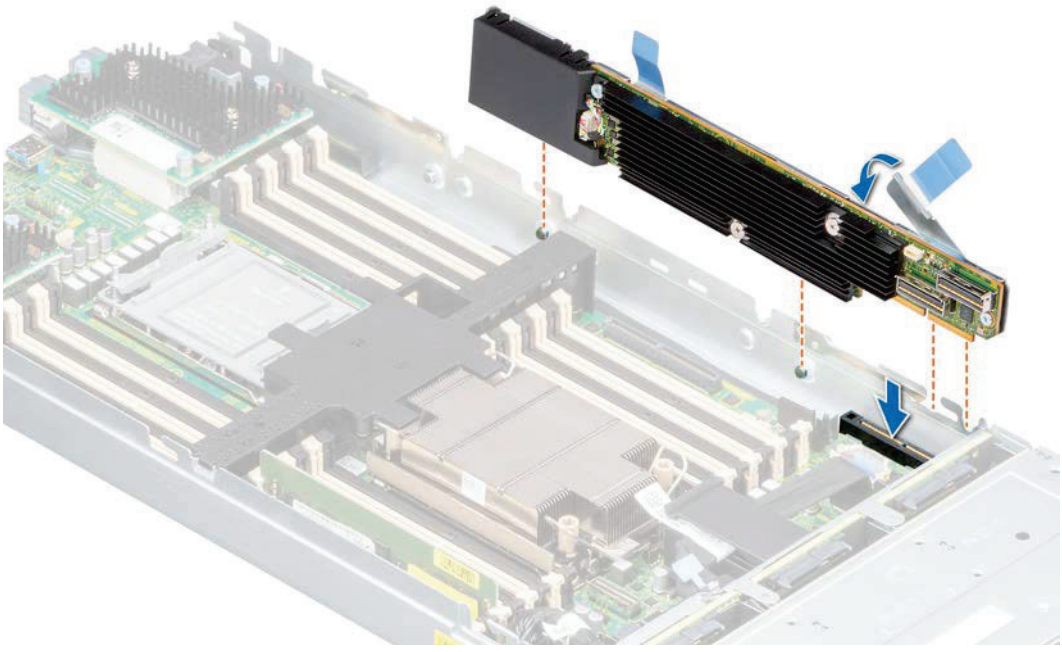

Figure 17. Install the PERC H755 MX adapter

Remove the PERC H750 adapter SAS

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.
2. Open the system.
3. Locate the PERC card on the system board.

   CAUTION: To prevent damage to the card, you must hold the card by its edges only.

4. Lift the card to remove it from the connector on the system board.
5. Disconnect the SAS cables connected to the card:
   a. Press down and hold the metal tab on the SAS cable connector.
   b. Pull the SAS cable out of the connector.
6. Replace the storage controller card and connect the cable. For more information on installing the card, see Install the H750 adapter SAS.
7. Close the system.
8. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

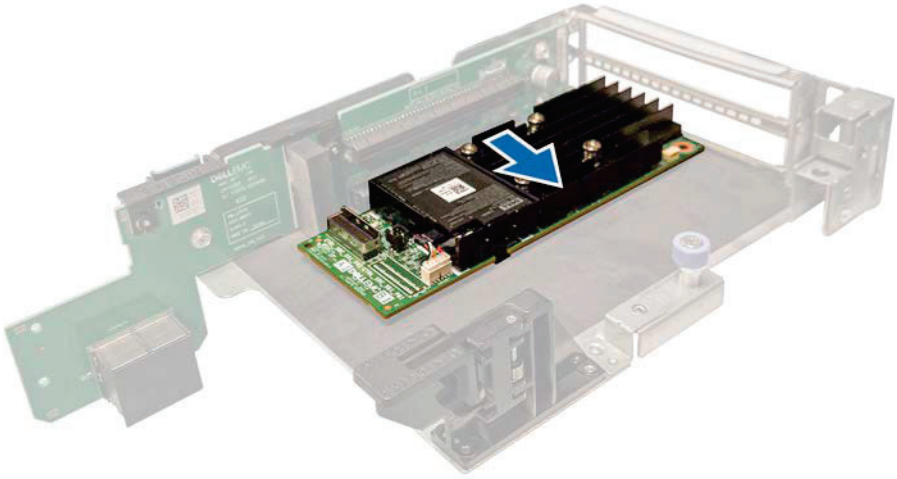

Figure 18. Remove PERC H750 adapter SAS

Install the PERC H750 adapter SAS

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system.
3. Align the card-edge connector with the connector on the system board.

   CAUTION: To prevent damage to the card, you must hold the card by its edges only.

4. Press the card-edge down until the card is fully seated.
5. Connect the SAS data cable connector to the card.

   NOTE: Ensure that you connect the cable according to the connector labels on the cable. The cable does not function properly if reversed.

6. Route the SAS data cable through the channel on the inner side of the chassis to the backplane.
7. Attach the connector labeled SAS A to connector SAS A on the backplane.
8. Close the system.
9. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

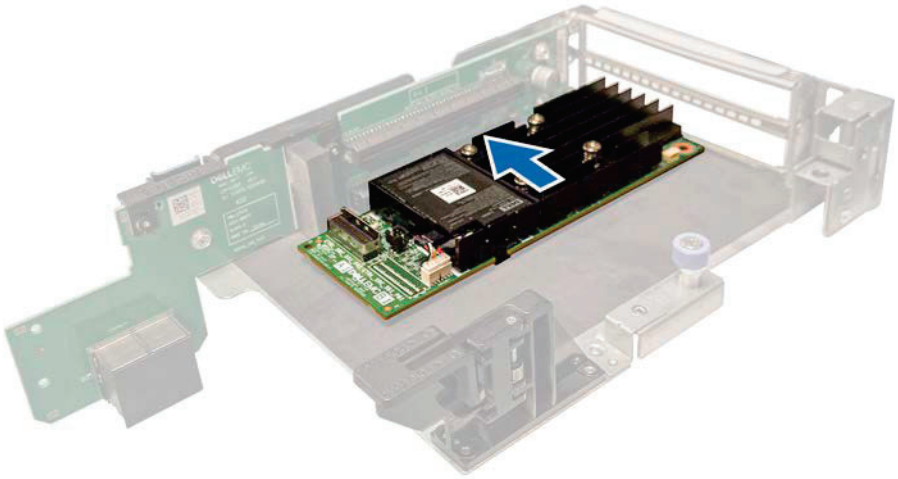

Figure 19. Install PERC H750 adapter SAS

Remove the PERC H355 adapter SAS

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.
2. Open the system.

3. Locate the PERC card in the expansion riser on the system board.

   CAUTION: To prevent damage to the card, you must hold the card by its edges only.

4. Unfasten and lift the riser from the system board. Remove the PERC card.
5. Disconnect any SAS cables connected to the card:
   a. Press down and hold the metal tab on the SAS cable connector.
   b. Pull the SAS cable out of the connector.
6. Replace the storage controller and reconnect the SAS cable before placing them in the riser. For more information on installing the card, see Install the PERC H355 adapter.
7. Reinstall the riser on the system board and fasten the riser.
8. Close the system.
9. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

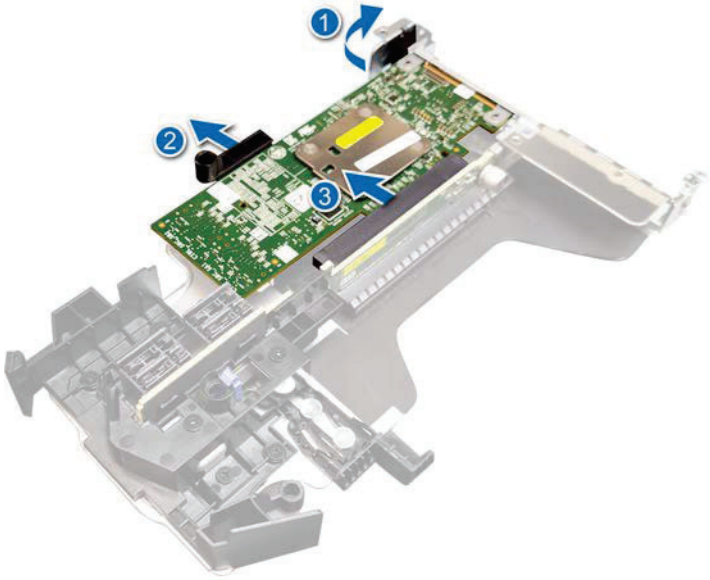

Figure 20. Remove the PERC H355 adapter SAS

Install the PERC H355 adapter SAS

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system.
3. Align the card-edge connector with the connector on the system board.

CAUTION: To prevent damage to the card, you must hold the card by its edges only.

4. Press the card-edge down until the card is fully seated.
5. Connect the SAS data cable connectors to the card.

   NOTE: Ensure that you connect the cable according to the connector labels on the cable. The cable does not function properly if reversed.

6. Route the SAS data cable through the channel on the inner side of the chassis to the backplane.
7. Attach the connector labeled SAS A to connector SAS A on the backplane, and attach the connector labeled SAS B to connector SAS B on the backplane.
8. Close the system.
9. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

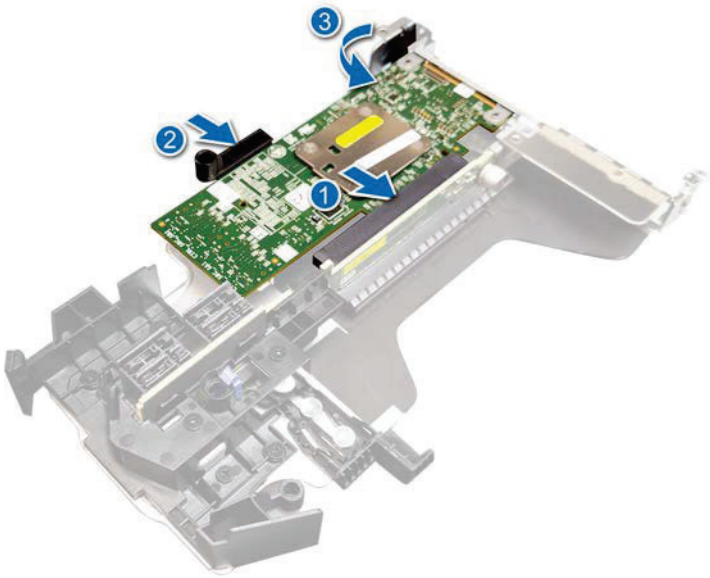

Figure 21. Install the PERC H355 adapter SAS

Remove the PERC H355 front SAS

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.

   NOTE: Perform a graceful shutdown of the system to ensure data in the cache is moved to the disk before the controller is removed.

2. Open the system.

3. Locate the PERC card in the controller carrier at the front of the system.

   CAUTION: To prevent damage to the card, you must hold the card by its edges only.

4. Unscrew the fasteners on the controller carrier and slide the carrier away from the backplane, disconnecting the controller from the backplane.

   If you are removing a PERC H355 front SAS controller in the upside down orientation, you must remove both the backplane and the controller at the same time because of the limited clearance available:

   a. Uninstall all drives from the backplane.
   b. Disconnect all cables between the PERC and the backplane.
   c. Lift the backplane and PERC from the system.

5. Disconnect any cables connected to the card:
   a. Press down and hold the metal tab on the cable connector.
   b. Pull the cables out of the connector.
6. Remove the PERC controller from the controller carrier.
7. Insert the replacement controller into the carrier and secure it with the appropriate screws.
8. Take the replacement storage controller and reconnect the cables before reconnecting it to the backplane.

   If you are removing a PERC H355 front SAS controller in the upside down orientation, reattach the PERC controller to the backplane first before reinstalling the backplane into the system. For more information on installing the card, see Install the PERC H355 front.
9. Close the system.
10. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

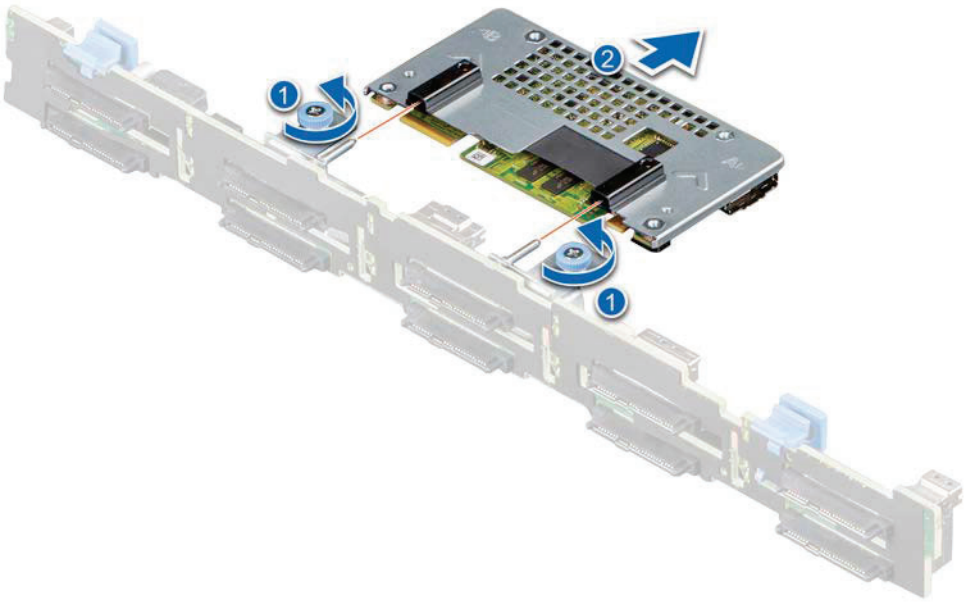

Figure 22. Remove the PERC H355 front SAS

Install the PERC H355 front SAS card

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

   NOTE: Perform a graceful shutdown of the sled to ensure that data in the cache is moved to the disk before the controller is removed.

2. Open the system.
3. Connect the PERC card to the carrier and ensure that the screws are properly fastened in place.

   CAUTION: To prevent damage to the card, hold the card by its edges only.

4. Align the carrier with the guide pins until the controller is securely seated.
5. Slide the card into the connector until it is fully seated in the connector. Tighten the screws on the carrier that connect to the chassis to secure the carrier.
6. Connect the cable connectors to the card.

   NOTE: Ensure that you connect the cable according to the connector labels on the cable. The cable does not function properly if reversed.

7. Close the system.
8. Reconnect the system to its electrical outlet and turn on the system and any attached peripherals.

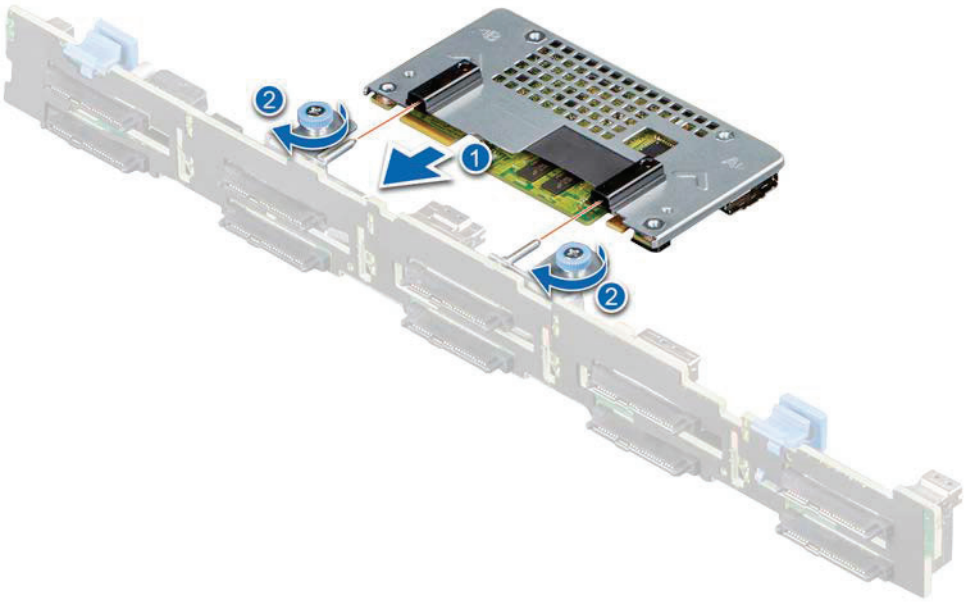

Figure 23. Install the PERC H755 front SAS card

Remove the PERC H350 adapter SAS

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.
2. Open the system.
3. Locate the PERC card on the system board.

   CAUTION: To prevent damage to the card, you must hold the card by its edges only.

4. Lift the card to remove it from the connector on the system board.
5. Disconnect the SAS cables connected to the card:
   a. Press down and hold the metal tab on the SAS cable connector.
   b. Pull the SAS cable out of the connector.

6. Replace the storage controller card and connect the cable. For more information on installing the card, see Install the PERC H350 adapter.
7. Close the system.
8. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

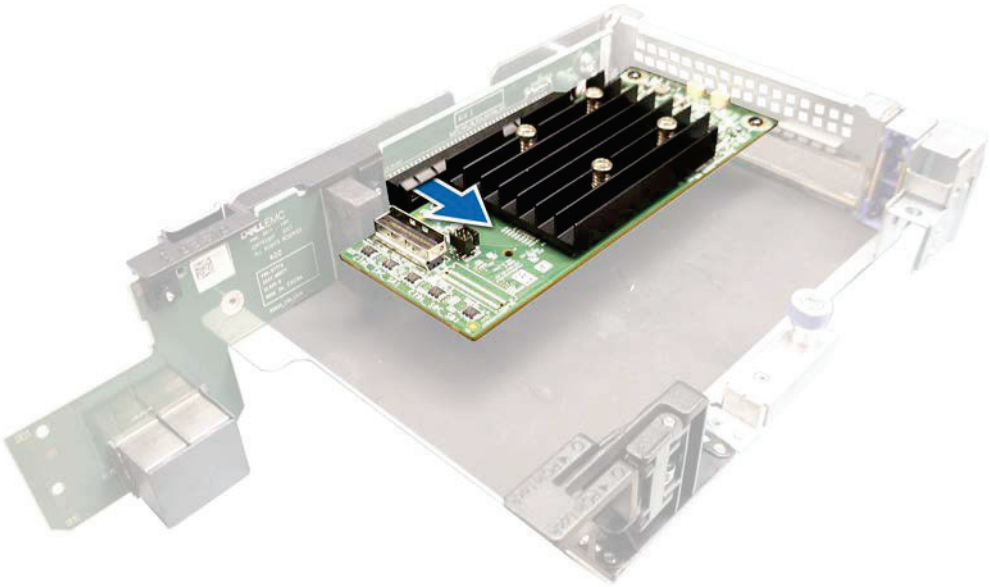

Figure 24. Remove the PERC H350 adapter SAS

Install the PERC H350 adapter SAS

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Steps

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system.
3. Align the card-edge connector with the connector on the system board.

   CAUTION: To prevent damage to the card, you must hold the card by its edges only.

4. Press the card-edge down until the card is fully seated.
5. Connect the SAS data cable connector to the card.

   NOTE: Ensure that you connect the cable according to the connector labels on the cable. The cable does not function properly if reversed.

6. Route the SAS data cable through the channel on the inner side of the chassis to the backplane.
7. Attach the connector labeled SAS A to connector SAS A on the backplane.
8. Close the system.
9. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

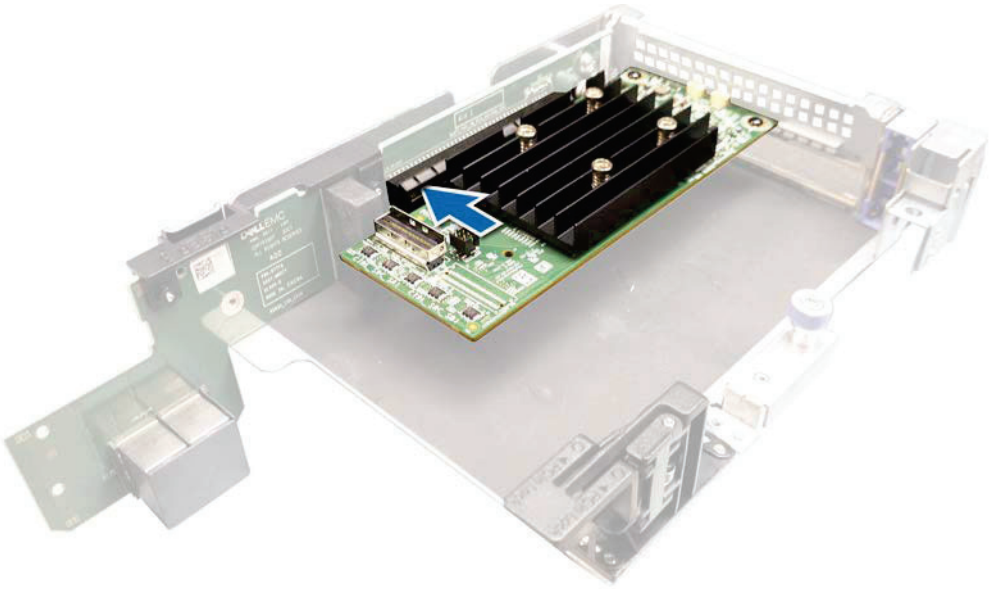

Figure 25. Install the PERC H350 adapter SAS

Remove PERC H350 Mini Monolithic SAS

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

Steps

1. Using Phillips #2 screwdriver, loosen the screws that secure the storage controller cable to the connector on the system board.
2. Lift the storage controller cable to disconnect it from the connector on the system board.

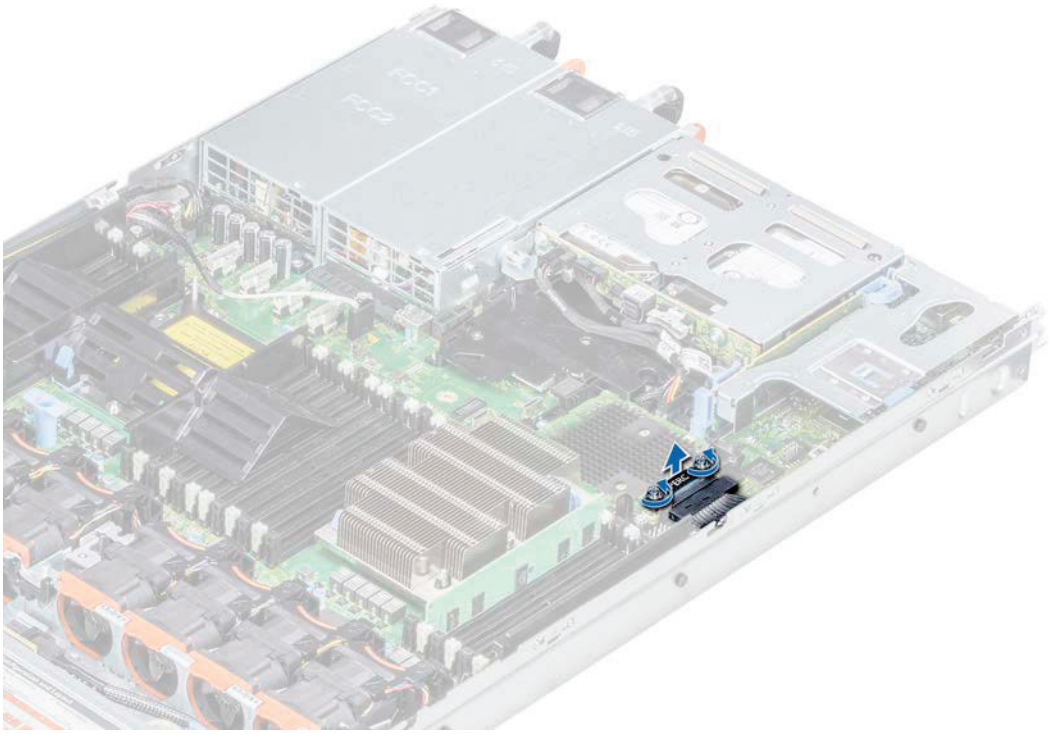

Figure 26. Remove the cable

3. Lift one end of the card and angle it to disengage the card from the card holder on the system board.
4. Lift the card out of the system.

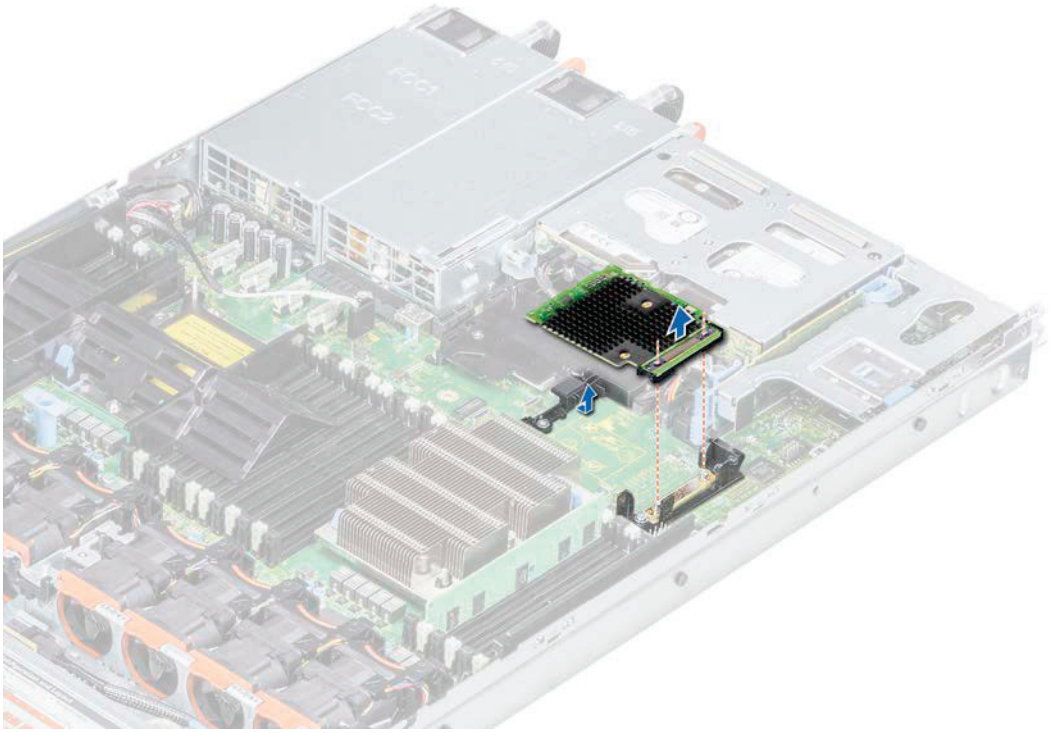

Figure 27. Remove the PERC H350 Mini Monolithic SAS

Install PERC H350 Mini Monolithic SAS

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

Steps

1. Angle the integrated storage controller card and align the end of the card with the storage controller card connector on the system board.
2. Lower the connector side of the storage controller card into the storage controller card connector on the system board.

   NOTE: Ensure that the slots on the system board align with the screw holes on the storage controller card connector.

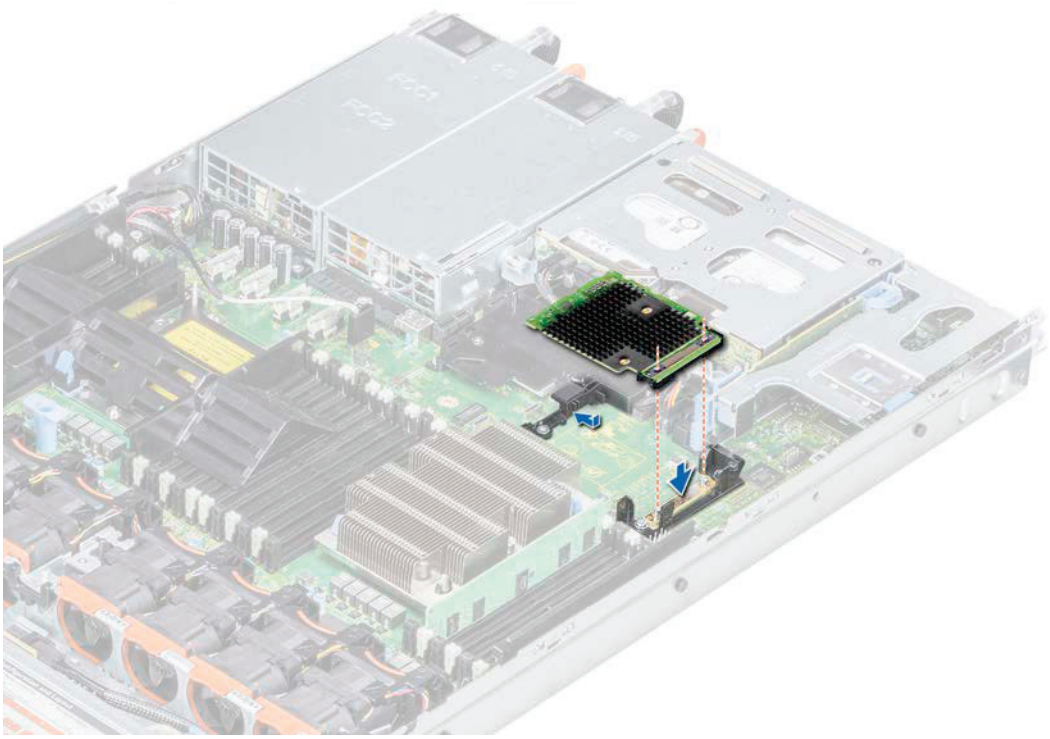

Figure 28. Install PERC H350 Mini Monolithic SAS

3. Route the storage controller card cable along with the wall of the system.
4. Align the screws on the integrated storage controller card cable with the screw holes on the connector.
5. Using Phillips #2 screwdriver, tighten the screws to secure the integrated storage controller card cable to the card connector on the system board.

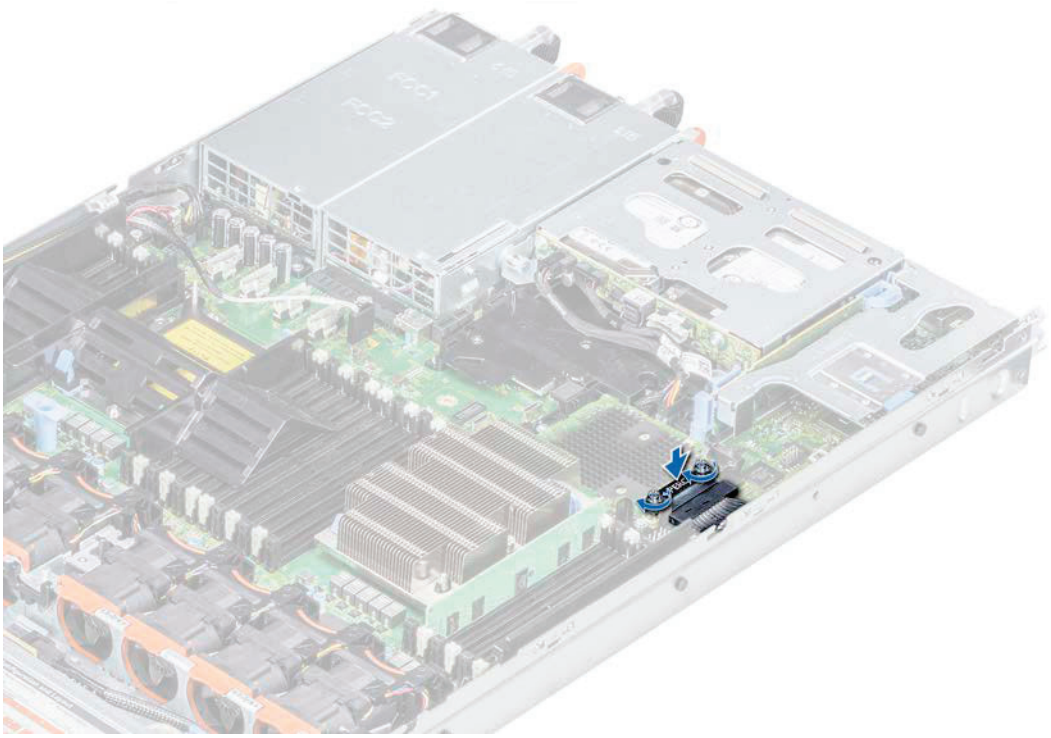

Figure 29. Install the cable

5

Driver support for PERC 11

The PERC 11 series require software drivers to operate with the supported operating systems.

This chapter contains the procedures for installing the drivers for the PERC 11 cards.

NOTE: The driver for PERC 11 for VMware ESXi is packaged within the VMware ESXi ISO image downloaded from Dell. For more information, see the VMware documentation at www.dell.com/virtualizationsolutions. It is not recommended to have drivers from controllers prior to PERC 11 on the same system.

The two methods for installing a driver discussed in this chapter are:

- **Installing a driver during operating system installation:** Use this method if you are performing a new installation of the operating system and want to include the drivers.
- **Updating existing drivers:** Use this method if the operating system and the PERC 11 family of controllers are already installed and you want to update to the latest drivers.

Topics:

Creating the device driver media

Use one of the following two methods to create the device driver media:

- Downloading Drivers From The Dell Support Website
- Downloading Drivers From The Dell Systems Service And Diagnostic Tools Media

Download and save PERC 11 drivers from the support site

About this task

To download drivers from the Dell Support website:

Steps

1. Go to www.dell.com/support/home.
2. Enter the service tag of your system in the **Choose by Service Tag to get started** field or select **Choose from a list of all Dell products**.
3. Select the **System Type**, **Operating System**, and **Category** from the drop-down list.
   The drivers that are applicable to your selection are displayed.
4. Download the drivers that you require to a USB drive, CD, or DVD.
5. During the operating system installation, use the media that you created to load the driver. For more information on reinstalling the operating system, see the relevant section for your operating system later in this guide.

Download and save PERC 11 drivers from the Dell Systems Service and Diagnostic Tools

About this task

To download drivers from the **Dell Systems Service and Diagnostic Tools** media:

Steps

1. Insert the **Dell Systems Service and Diagnostics Tools** media in your system.
   The **Welcome to Dell Service and Diagnostic Utilities** screen is displayed.
2. Select your system model and operating system.
3. Click **Continue**.
4. From the list of drivers displayed, select the driver you require.
5. Select the self-extracting ZIP file and click **Run**.
6. Copy the driver to a CD, DVD, or USB drive.
7. Repeat steps 1 to 6 for all the drivers you require.

Windows driver installation

Before you install the Windows driver for PERC 11, you must first create a device driver media.

- Read the Microsoft **Getting Started** document that shipped with your operating system.
- Ensure that your system has the latest BIOS, firmware, and driver updates. If required, download the latest BIOS, firmware, and driver updates from www.dell.com/support/home.
- Create a device driver media using one of the methods listed below:
  - USB drive
  - CD
  - DVD

Install PERC 11 driver while newly installing the Windows Server 2016 and later

About this task

To install the driver:

Steps

1. Boot the system using the Windows Server 2016, or newer media.
2. Follow the on-screen instructions until you reach **Where do you want to install Windows Server 2016 or later** window and then select **Load driver**.
3. As prompted, insert the installation media and browse to the appropriate location.
4. Select a PERC 11 series card from the list.
5. Click **Next** and continue installation.

Install PERC 11 driver on which the Windows Server 2016 is already installed and later

About this task

Perform the following steps to configure the driver for the RAID controller on which the Windows Server 2016 is already installed:

Steps

1. Turn off the system.
2. Install the new RAID controller in the system.
   For detailed instructions on installing the RAID controller in the system, see Install and remove a PERC 11 card.
3. Turn on the system.
   The **Found New Hardware Wizard** screen displays the detected hardware device.
4. Click **Next**.

5. On the **Locate device driver** screen, select **Search for a suitable driver for my device** and click **Next**.
6. Browse and select the drivers from the **Locate Driver Files** screen.
7. Click **Next**.
   The wizard detects and installs the appropriate device drivers for the new RAID controller.
8. Click **Finish** to complete the installation.
9. Reboot the system when prompted.

Update PERC 11 driver that runs on Windows Server 2016 and later

Prerequisites

NOTE: Close all applications on your system before you update the driver.

Steps

1. Insert the media containing the driver.
2. Select **Start** > **Settings** > **Control Panel** > **System.**
   The **System Properties** screen is displayed.
   NOTE: The path to **System** might vary depending on the operating system family.
3. Click the **Hardware** tab.
4. Click **Device Manager**.
   The **Device Manager** screen is displayed.
   NOTE: The path to **Device Manager** might vary depending on the operating system family.
5. Expand **Storage Controllers** by double-clicking the entry or by clicking on the plus (+) symbol next to **Storage Controllers**.
6. Double-click the RAID controller for which you want to update the driver.
7. Click the **Driver** tab and click **Update Driver**.
   The screen to update the device driver wizard is displayed.
8. Select **Install from a list or specific location**.
9. Click **Next**.
10. Follow the steps in the wizard and browse to the location of the driver files.
11. Select the INF file from the drive media.
12. Click **Next** and continue the installation steps in the wizard.
13. Click **Finish** to exit the wizard and reboot the system for the changes to take place.
    NOTE: Dell provides the Dell Update Package (DUP) to update drivers on systems running Windows Server 2016 and newer operating system. DUP is an executable application that updates drivers for specific devices. DUP supports command line interface and silent execution. For more information, see https://www.dell.com/support.

Linux driver installation

The driver update disk (DUD) images are created only for those operating system releases in which the native (in-box) driver is insufficient for installation. In the event that an operating system is being installed with a corresponding DUD image, see, Installing or updating the RPM driver package with KMOD support. If not, proceed with using the native device driver and then skip to the topic Installing or Updating the RPM Driver Package With KMP Support.

NOTE: The driver update disk (DUD) images are created only for those operating system releases in which the native (in-box) driver is insufficient for installation. In the event that an operating system is being installed with a corresponding DUD image, follow the instructions below.

NOTE: To view the complete list of boot loader options, see the installation guide of your operating system.

NOTE: If using out-of-box drivers with RHEL 7 and higher, a tainted kernel message will be displayed in the log. RedHat does not provide a mechanism to sign external drivers for RHEL.

Install or update a RPM driver package using the KMOD support

Prerequisites

NOTE: This procedure is applicable for Red Hat Enterprise Linux 7.x and higher.

About this task

Perform the following steps to install the RPM package with KMOD support:

Steps

1. Uncompress the gzipped tarball driver release package.
2. Install the driver package using the command: `rpm –ihv kmodmegaraid_ sas-<version>.rpm`.

   NOTE: Use `rpm -Uvh <package name>` when upgrading an existing package.

3. If the previous device driver is in use, you must reboot the system for the updated driver to take effect.
4. Verify the loaded driver version by running the following command: `modinfo megaraid_sas`.

Install or update a RPM driver package using the KMP support

Prerequisites

NOTE: This procedure is applicable for SUSE Enterprise Linux 15.x.

About this task

Perform the following steps to install the RPM package with KMP support:

Steps

1. Uncompress the gzipped tarball driver release package.
2. Install the driver package using the command: `rpm –ihv kmpmegaraid_ sas- <version>.rpm`.

   NOTE: Use `rpm -Uvh <package name>` when updating an existing package.

3. If the previous device driver is in use, you must reboot the system for the updated driver to take effect.
4. Verify the loaded driver version by running the following command: `modinfo megaraid_sas`.

Upgrading the Kernel

About this task

When upgrading to a new kernel, you must reinstall the DKMS-enabled driver packages. Perform the following steps to update or install the driver for a new kernel:

Steps

1. At a **terminal** window, type the following: `dkms build -m <module_name> – v <module version> – k <kernel version>` `dkms install -m <module_name> – v <module version> – k <kernel version>`.
2. To check if the driver is successfully installed in the new kernel, type: `dkms status`.
   A message similar to the following is displayed: `<driver name>, <driver version>, <new kernel version>: installed`.
3. If the previous device driver is in use, you must restart the system for the updated driver to take effect.

Load the driver while installing an operating system

Steps

1. Perform the following operations to install driver media:
   - PERC Linux driver ISO:
     a. Download the PERC Linux driver package from the Dell Support site.
     b. Extract two base directories from the tar.gz package (**tar.gz** > **tar** > **base directories**).
     c. Extract the ISO file that is available in the zipped **disks-x** directory. For example, **RHEL79/disks-1/megaraid_sas-07.719.03.00_el7.9-1.x86_64.iso.gz > megaraid_sas-07.719.03.00_el7.9-1.x86_64.iso**
     d. Mount the ISO to the Server, burn the ISO to a CD or DVD or copy the ISO file to a USB. The USB has to match with the ISO.
   - LC driver pack:
     a. Install the LC driver pack.
     b. Boot the life-cycle controller and go through the operating system deployment wizard.
2. Boot to the installer.
3. In the Installation screen, press E.
4. Perform the following operation:
   - If the operating system is Red Hat Enterprise Linux 7 or RHEL 8, the CLI displays the syntax `vmlinuz`. Enter **inst.dd**.

     For example, when you are prompted with the command `vmlinuz intrd=initrd.img inst.stage2=hd:LABEL=RHEL-7.0\x20x86_64 quiet inst.dd`.
   - If the operating system is SLES 15, the CLI displays the syntax `linuxefi..` Enter **dud=1**.

     For example, when you are prompted with the command `linuxefi/boot/x86_64/loader/linux splash=silent dud=1`.

   NOTE: Boot parameters may vary based on the operating system version. See operating system installation manuals for exact boot parameter syntax.
5. Attach the driver media (ISO, USB).
6. Press F10 to boot to the operating system.
   A screen is displayed prompting you to select the driver media (USB, CD, ISO, and so on).
7. When prompted, select the driver media.
   If applicable select the PERC driver `...megaraid_sas...`

   NOTE: Ensure that the driver is selected with an X symbol.
8. The driver should be extracted or loaded.
9. Before proceeding or exiting the driver select menu, disconnect the driver media.

   NOTE: Ensure that you disconnect the driver media so that the drivers are loaded successfully. If the installation media is deleted, reattach it.
10. Press C or exit to go to the installation.

6

Firmware

This section provides information about downloading and installing the firmware using Dell Update Package (DUP).

Topics:

Update firmware controller using Dell Update Package (DUP)

Steps

1. Navigate to www.dell.com/support/home.
2. Locate your controller.
3. Download the DUP.
   a. For Window/iDRAC update, download Windows executable file.
   b. For Linux update, download **.bin** file.

   NOTE: For VMware, firmware should be updated through iDRAC or the PERC CLI utility.
4. Install the DUP.
   a. For Windows, run the executable in Windows environment.
   b. For Linux, run **.bin** file in Linux environment.
   c. For iDRAC, navigate to **system iDRAC** > **Maintenance** > **System Update**, upload Windows executable, and then install.

7

Manage PERC 11 controllers using HII configuration utility

The Human Interface Infrastructure (HII) configuration utility is a storage management application integrated into the System BIOS <F2>. It is used to configure and manage the controller(s), virtual disks, and physical disks. This utility is independent of the operating system.

Topics:

Enter the PERC 11 HII configuration utility

About this task

Perform the following steps to boot to the HII configuration utility:

Steps

1. Turn on the system.
2. While the system startup, press <F2> to enter **System Setup**.
3. Click **Device Settings**.
   Device Settings screen lists all the RAID controllers in the system.

   To access the management menu for the controller, use the arrow keys or the mouse.

   NOTE: For more information in all the options, click Help that is available on the top right-hand corner of the browser screen. Help information for individual option menus can also be viewed by scrolling down on each option.

   NOTE: Some of the options within the HII configuration utility are not present if the controller does not support the corresponding feature. Options may also be grayed out if the feature is not applicable to the current configuration.

Exit the PERC 11 HII configuration utility

About this task

To exit the HII configuration utility, perform the following steps:

Steps

1. Click **Finish** at the bottom-right corner on the **System Setup Main Menu** screen.
   Displays a warning message to confirm your choice.
2. Click **Yes** to exit the HII configuration utility.

Navigate to Dell PERC 11 configuration utility

Steps

1. Enter the UEFI configuration Utility. See Enter the PERC 11 HII configuration utility.
   The **Device Settings** screen displays a list of NIC ports and the RAID controllers.
2. To enter PERC 11 configuration utility, click the appropriate PERC controllers.
   The **Dashboard view** screen is displayed.

View the HII Configuration utility dashboard

The first screen that is displayed when you access the HII Configuration Utility is the **Dashboard View** screen. The following table provides detailed information about the options available on the **Dashboard View** screen.

Table 8. Dashboard view screen

Dashboard view options	Description
Main menu	Displays the following configuration options: • Configuration Management • Controller Management • Virtual Disk Management • Physical Disk Management • Hardware Components
Help	Provides context sensitive help message.
Properties	Displays the following information about the controller: • Status — displays the status of the controller. • Backplane — displays information about the number of backplanes connected to the controller. • BBU — displays information about the availability of Battery Backup Unit (BBU). • Enclosure — displays information about the number of enclosures connected to the controller. • Physical Disks — displays information about the number of physical disks connected to the controller. • Disk Groups — displays information about the number of disk groups connected to the controller. • Virtual Disks — displays information about the number of virtual disks connected to the controller.
View server profile	Displays HII Spec version supported on the system and also displays the following menu options for controller components: • Controller Management • Hardware Components • Physical Disk Management • Virtual Disk Management
Actions	Displays the following options: • Configure — displays configuration options that are supported by the controller. • Set Factory Defaults — restore factory default values for all controller properties.
Background operations	Displays if virtual disk or physical disk operations are in progress.

Configuration management

Auto Configure RAID 0

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Configuration Management** > **Auto Configure RAID 0**.
3. Select **Confirm** and click **Yes** to continue.
   A RAID 0 Virtual disk is created on all physical disks that are in Ready state.

Create virtual disks

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See, Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Configuration Management** > **Create Virtual Disk**.
   The following list of options are displayed for you to define the virtual disk parameters:

Option	Description
Create Virtual Disk	Allows you to create virtual disk selecting the RAID level, physical disks, and virtual disk parameters
Select RAID level	Allows you to choose the RAID level of your choice
Secure Virtual Disk	If you want to create a secured virtual disk, select **Secure Virtual Disk**. **NOTE:** The Secure Virtual Disk option is enabled by default, only if the security key has been configured. Only SED physical disks are listed.
Select Physical Disks From	Allows you to select one of the physical disk capacities: • **Unconfigured Capacity**: creates a virtual disk on unconfigured physical disks. • **Free Capacity**: utilizes unused physical disk capacity that is already part of a disk group.
Select Physical Disks	If you want to select the physical disks from which the virtual disks are being created, click **Select Physical Disks**. This option is displayed if you select **Unconfigured Capacity** as your physical disk capacity.
Select Disk Groups	If you want to select the disk groups from which the virtual disks are being created, click **Select Disk Group**. This option is displayed if you select **Free Capacity** as your physical disk capacity.
Configure Virtual Disk Parameters	Allows you to set the virtual disk parameters when creating the virtual disk. For more information, see Configuring virtual disk parameters.

3. Click **Create Virtual Disk**.
   The virtual disk is created successfully.
   NOTE: Ensure that you restart the system after creating a new Non-RAID or Virtual Disk on drives that previously had boot partitions.

Configure virtual disk parameters

Steps

1. Create a virtual disk, see Creating the virtual disks.
   The **Configure Virtual Disk Parameters** section is displayed on the **Create Virtual Disk** screen.
2. In the **Configure Virtual Disk Parameters** section, you can set the following virtual disk parameters:

Table 9. Configure virtual disk parameters

Virtual disk parameters	Description
Virtual Disk Name	Allows you to enter the name for the virtual disk **NOTE:** Allowed characters are A-Z, a-z, 0-9, underscore (_), and hyphen (-) only.
Virtual Disk Size	Displays the maximum capacity available for the virtual disk
Virtual Disk Size Unit	Displays the virtual disk storage space in megabytes, gigabytes, and terabyte.
Strip Element Size	Allows you to select the strip element size The disk striping involves partitioning each physical disk storage space in stripes of the following sizes: 64 KB, 128 KB, 256 KB, 512 KB, and 1 MB. By default, the strip element size is set to 256 KB.
Read Policy	Displays the controller read policy You can set the read policy to: ● No read ahead—specifies that the controller does not use read ahead for the current virtual disk. ● Read ahead—specifies that the controller uses read ahead for the current virtual disk. Read ahead capability allows the controller to read sequentially ahead of requested data and store the additional data in the cache memory, anticipating that the data is required soon. By default, the read cache policy is set to read ahead.
Write Policy	Displays the controller write cache policy You can set the write policy to: ● Write through—the controller sends a data transfer completion signal to the host when the disk subsystem has received all the data in a transaction. ● Write back—the controller sends a data transfer completion signal to the host when the controller cache has received all the data in a transaction. By default, the write policy is set to Write Back.
Disk Cache	Allows you to set the disk cache policy to default, enable, or disable. By default, the disk cache is set to default.
Default Initialization	Displays the virtual disk initialization options. You can set the default initialization to: ● No — The virtual disk is not initialized. ● Fast — The first 8 MB of the virtual disk is initialized. ● Full — The entire virtual disk is initialized. For more information, see Virtual disk initialization. By default, the default initialization is set to No.

Create profile based virtual disk

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Configuration Management** > **Creating Profile Based Virtual Disk**.
   The following list of RAID modes are displayed:
   - Generic RAID 0
   - Generic RAID 1
   - Generic RAID 5
   - Generic RAID 6
   - File Server

- Web/Generic Server
- Database

3. Based on the RAID mode selected, one or more the physical disk selection criteria is displayed.
4. From the **Physical Disk Selection Criteria** drop-down box, select a criterion based your requirement.
   The Profile Parameters of the selected option is displayed.
5. Click **Create Virtual Disk**.
6. Select **Confirm** and click **Yes** to continue.
   The virtual disk is created with the parameters of the profile selected.

View disk group properties

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Configuration Management** > **View Disk Group Properties**.
   The list of disk group properties are displayed:

Properties	Descriptions
Capacity Allocation	Displays all the virtual disks associated with the specific disk group. It also provides information about the available free space
Secured	Displays whether the disk group is secured or not

Convert to Non–RAID disk

Prerequisites

To convert a physical disk to non–RAID disk from the HII Configuration Utility, perform the following steps:

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Configuration Management** > **Convert to Non–RAID Disk**.
   The list of physical disks appears.
3. Select the physical disk to convert to Non–RAID disk.
4. Click **Ok**.
   A screen appears asking if you are sure you want to perform the operation.
5. Select the **Confirm** option.
6. Click **Yes**.
   The operation is successful.

Delete configurations

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Configuration Management** > **Clear Configuration**.
   A screen is displayed asking if you are sure you want to perform the operation.
3. **CAUTION: It is recommended that you back up data stored on the virtual disks and hot spare disks on the controller before deleting the virtual drive.**

   Select **Confirm** and click **Yes** to continue.
   The virtual disks and hot spare disks available on the controller are deleted successfully.

Controller management

Clear controller events

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Management**.
3. Click **Clear Controller Events**.
   A screen is displayed asking if you are sure you want to clear the controller events.
4. Select **Confirm** and click **Yes** to continue.

Save controller events

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Management**.
3. Click **Save Controller Events**.
   A screen is displayed asking if you want to replace the existing file name.
4. Select **Confirm** and click **Yes** to continue.

Save debug log

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Management**.
3. Click **Save Debug Log**.
   A screen is displayed indicating that the operation is successful.
4. Click **Ok**.

Enable security

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Management**.
3. Click **Enable security**, select **Local Key Management**.
4. Click **Ok**.
5. If you want to use the passphrase generated by the controller, click **Suggest Passphrase** and **Confirm** the passphrase by re-entering.
   The operation is successful.
6. Select **I Recorded the Security Settings For Future Reference**, click **Enable Security**.
   A screen is displayed indicating that the security will be enabled on this controller if you proceed.
7. Select **Confirm** and click **Yes** to continue.
   The operation is successful and click **Ok**.

Disable security

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.

2. Click **Main Menu** > **Controller Management** > **Advanced Controller Management**.
3. Click **Disable security**.
   A screen is displayed asking if you are sure you want to disable security.
4. Select **Confirm** and click **Yes** to continue.
   The operation is successful and click **Ok**.

Change security settings

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Management**.
3. Click **Change Security Settings**, select **Change Current Security Settings**.
4. Click **Ok**.
5. If you want to use the passphrase generated by the controller, click **Suggest Passphrase** and **Confirm** the passphrase by re-entering.
   The operation is successful.
6. Click **Save Security Settings**.
7. Select **Confirm** and click **Yes** to continue.
   The operation is successful and click **Ok**.

Restore factory default settings

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Set Factory Defaults**.
   A screen is displayed asking you to confirm the operation.
3. Select **Confirm** and click **Yes** to continue.

Auto configure behavior

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Management > Manage Controller Mode**.
   You can view the current Controller Mode.
3. Click **Manage Controller Mode**.
   If required, you can view or change the hard drive settings for the controller. The possible options are:
   - **Off** and **Non–RAID Disk**
4. Click **Apply Changes** to save the changes.
5. Select **Confirm** and click **Yes** to continue.

   NOTE: This feature is not supported on PERC H355 adapter SAS, PERC H355 front SAS, PERC H350 Mini Monolithic SAS, and PERC H350 adapter SAS.

Manage controller profile

About this task

View the details of the profile and choose the desired profile, if supported. To view the properties of the controller profiles:

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.

2. Click **Main Menu** > **Controller Management** > **Advanced Controller Management** > **Manage Controller Profiles**.
   The current profile and profile properties are displayed.

Advanced controller properties

Set the patrol read mode

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Properties**.
3. Click **Patrol Read**.
   The following options are displayed:
   - Start—Starts patrol read for the selected controller.
   - Suspend—Suspends the ongoing patrol read operation on the controller.
   - Resume—Resumes the suspended patrol read operation.
   - Stop—Stops patrol read for the selected controller.
4. Set the **Mode** to **Auto**, **Manual**, or **Disabled**.
5. Click **Apply Changes**.

Enable physical disk power management

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Properties**.
3. Click **Physical Disk Power Management**.
   The following list of options is displayed:
   - Time Interval for Spin Down—allows the user to specify the delay time before a disk is spun down.
   - Spin Down Hot Spare—allows you to enable or disable the spin down of hot spare disks.
   - Spin Down Unconfigured Good—spin down of un-configured disks.
4. Select the applicable options and click **Apply Changes**.
   The changes made are saved successfully.

Configure hot spare drives

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Properties**.
3. Click **Spare**.
   The following list of options are displayed:
   - Persistent Hot Spare—allows you to enable or disable the ability to have same system backplane or storage enclosure disk slots dedicated as hot spare slots.
   - Allow Replace Member with Revertible Hot Spare—allows you to enable or disable the option to copy the data form a hot spare disk to physical disk.
   - Auto Replace Member on Predictive Failure—allows you to enable or disable the option to start a Replace Member operation if a predictive failure error is detected on a physical disk.
4. Select the applicable option and click **Apply Changes**.
   The changes made are saved successfully.

Set task rates

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Properties**.
3. Click **Task Rates**.
   The following options are displayed:
   - Background Initialization (BGI) Rate
   - Consistency Check Rate
   - Rebuild Rate
   - Reconstruction Rate
4. You can make the necessary changes and then click **Apply Changes**.
   The task rates operation is completely successfully.

Properties of Enterprise Key Management (EKM)

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Properties**.
3. Click **Enterprise Key Management**.
   The properties of Enterprise Key Management is displayed.

Controller properties

Auto import foreign configuration

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Properties**.
3. In the **Controller Properties** section, set the **Auto Import Foreign Configuration** option to **Enabled** or **Disabled**.
4. Click **Apply Changes**.

Disable auto import

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Properties**.
3. In the **Controller Properties** section, set the **Auto Import Foreign Configuration** option to **Disabled**.
4. Click **Apply Changes**.
   The auto import is disabled successfully.

Enable auto import

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Properties**.
3. In the **Controller Properties** section, set the **Auto Import Foreign Configuration** option to **Enabled**.
4. Click **Apply Changes**.
   The auto import is enabled successfully.

Select boot mode

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Properties**.
3. In the **Controller Properties** section, select boot mode from the **Boot Mode** drop-down box.
   The following lists of boot mode options appear:

   Table 10. Boot mode options

Option	Description
Stop on errors	The system stops during boot for errors which require attention from the user to rectify the issue.
Pause on errors	System pauses during boot to show errors but continue boot after it times out. Only critical events with an infinite timeout halt boot and require the user's attention to correct the issue.

   NOTE: In UEFI BIOS mode, errors with timeouts do not appear during boot. It is designed to arise only in legacy BIOS mode.

   NOTE: By default, the boot mode option is set to pause on errors.

4. Click **Apply Changes**.
   The boot mode operation is completed successfully.

Abort the consistency check

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Properties**.
3. In the **Controller Properties** section, set the **Abort Consistency Check on Error** option to **Enabled** or **Disabled**.
4. Click **Apply Changes**.
   The option to abort the consistency check operation on a redundant virtual disk is enabled if there is any inconsistency found in the data.

Preboot trace buffer

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Properties**.
3. In the **Controller Properties** section, set the **Preboot Trace Buffer** option to **Enabled** or **Disabled**.
4. Click **Apply Changes**.

Clear the cache memory

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Properties**.
3. Click **Cache and Memory** > **Discard Preserved Cache**.
   The preserved cache is cleared successfully.

Enable boot support

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management**.
3. From the **Select Boot Device** drop-down box, select the primary bootable device.

   In **Select Boot Device**, you will not be able to view 4 K sector drives. To view all the virtual disks created, navigate to the **Virtual Disk Management** screen in HII. For more information, see Virtual disk management.

   If no boot device is selected, the first virtual disk will be set as the boot device on the next reboot. A Non–RAID disk is auto-selected as the boot device, if the controller does not have any virtual disks present.

   NOTE: **Select Boot Device** is only applicable in legacy BIOS mode.

   NOTE: 4 K sector drives boot support is only available in UEFI mode and managed by the boot loader.
4. Click **Apply Changes**.
   Boot support is enabled for the selected controller.

Virtual disk management

Virtual disk numbering

Virtual disks are numbered in descending order beginning with the highest, ID 239.

View virtual disk properties

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Virtual Disk Management**.
   All the virtual disks associated with the RAID controller are displayed.
3. To view the properties, click on the virtual disk. You can view the following properties of the Virtual disk:

Table 11. Virtual disk properties

Option	Description
Operation	List of operations you can perform on the selected virtual disk. The options are: • Blink • Unblink • Delete Virtual Disk • Reconfigure Virtual Disks • Fast Initialization • Slow Initialization
Name	Indicates the name of the virtual disk.
RAID level	Indicates the RAID level of the virtual disk.
Status	Indicates the status of the virtual disk. The possible options are: • Optimal • Degraded • Offline • Failed
Size	Indicates the size of the virtual disk.

View physical disks associated with a virtual disk

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Virtual Disk Management**.
   All the virtual disks associated with the RAID controller are displayed.
3. Click on a virtual disk.
   The properties of the virtual disk are displayed.
4. Click **View Associated Physical Disks**.
   All the physical disks that are associated with the virtual disk are displayed.
5. From the **Associated Physical Disks** section, select the physical disk.
6. Click **View Physical Disk Properties** to view the physical disk properties.

View advanced properties of a virtual disk

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Virtual Disk Management**.
   All the virtual disks associated with the RAID controller are displayed.
3. Click the virtual disk.
   The properties of the virtual disk are displayed.
4. Click **Advanced...**.
   You can view the following additional properties of the virtual disk:

Table 12. Advanced properties of the virtual disk

Option	Description
Logical sector size	Indicates the logical sector size of this virtual disk.
Strip element size	Indicates the strip element size for the virtual disk.
Secured	Indicates whether the virtual disk is secured or not.
Bad blocks	Indicates whether the virtual disk has corrupted blocks.

Configure virtual disk policies

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Virtual Disk Management**.
   All the virtual disks associated with the RAID controller are displayed.
3. Click **Advanced...**.
   You can view the following virtual disk policies:

Table 13. Virtual disk policies

Option	Description
Current write cache	Indicates the current write cache policy for the virtual disk.
Default write cache	Allows selection of the write cache policy for the virtual disk. The possible options are: • Write Through • Write Back • Force Write Back
Read cache policy	Allows selection of the read cache policy for the virtual disk. The possible options are:

Table 13. Virtual disk policies (continued)

Option	Description
	• No Read Ahead • Read Ahead
Disk cache	Allows selection of the disk cache policy for the virtual disk. The possible options are: • Default (Disk Default) • Enable • Disable

4. Click **Apply Changes**.
   The changes made are saved successfully.

Configure Virtual Disks

When configuring the virtual disks, you should consider the workload intended; RAID 1: for simple boot disk; RAID 5 or 6: for file or web servers (sequential reads/writes of files); RAID 10: for transactional database (small random reads and writes).

Virtual disks configured on hard drives should use the controller default cache setting of Write Back and Read Ahead.

Virtual disks configured on SSDs can use the same controller defaults settings as hard drives. Most users perform a copy of OS files or a data base to the new array. This setting provides optimum performance in this configuration.

Once the copy is complete, the array can be used as it is depending on the number and type of SSDs. It is recommended to enable FastPath by changing the controller's Write cache policy to Write Through and the Read cache policy to No Read Ahead. FastPath is developed to achieve the best random read/write performance from SSDs.

Only IO block sizes smaller than the virtual disk's stripe size are eligible for FastPath. In addition, there should be no background operations (rebuild, initialization) running on the virtual disks. FastPath is disabled if there is active background operation.

NOTE: RAID 50, and RAID 60 virtual disks cannot use FastPath.

NOTE: The Physical Disk Power Management feature is not applicable to FastPath-capable virtual disks.

Perform expand virtual disk operation

Prerequisites

To enable expand virtual disk feature from the HII Configuration Utility, perform the following steps:

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Virtual Disk Management**.
   The list of virtual disks is displayed.
3. Select the virtual disk.
4. From the **Operations** drop-down menu, select **Expand Virtual Disk**.

   NOTE: You can view the Expand Virtual Disk feature only if there is free space available in the associated disk group.

5. Click **Go**.
6. To expand virtual disk, enter the percentage of available capacity, and then click **Ok**.
   A screen is displayed asking if you are sure you want to perform the operation.
7. Select the **Confirm** option.
8. Click **Yes**.
   The expand virtual disk operation is completed successfully.

Perform consistency check

Prerequisites

To enable consistency check from the HII Configuration Utility, perform the following steps:

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Virtual Disk Management**.
   The list of virtual disks is displayed.
3. Select the virtual disk.

   NOTE: Consistency check cannot be run on RAID 0 virtual disks.

4. From the **Operations** drop-down menu, select **Check Consistency**.
5. Click **Go**.
   A screen is displayed asking if you are sure you want to perform the operation.
6. Select the **Confirm** option.
7. Click **Yes**.
   The consistency check operation is completed successfully.

Physical disk management

View physical disk properties

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Physical Disk Management**.
   All the physical disks that are associated with the RAID controller are displayed.
3. To view the properties, click the physical disk.

Table 14. Physical disk properties

Option	Description
Operation	The list of operations you can perform on the selected physical disk. The options are: • Blink • Unblink • Assign global hot spare • Cryptographic erase • Convert to non–RAID disk
Device ID	Unique identifier of the physical disk.
Backplane ID	Backplane ID in which the physical disk is located in for PERC H755 adapter, PERC H755 front SAS, PERC H755N front NVMe, PERC H750 adapter SAS, PERC H755 MX adapter, PERC H355 adapter SAS, PERC H355 front SAS, PERC H350 adapter SAS , and PERC H350 Mini Monolithic SAS
Slot number	The drive bay in which the physical disk is located for the corresponding backplane or enclosure to which the controller is connected.
Status	Status of the physical disk.
Size	Size of the physical disk.
Type	Type of the physical disk.
Model	Model of the physical disk.

Table 14. Physical disk properties (continued)

Option	Description
Serial number	Serial of the physical disk.

4. To view additional properties of the physical disk, click **Advanced...**.

Table 15. Advanced physical disk properties

Option	Description
Logical sector size	Logical sector size of the selected physical disk
Physical sector size	Physical sector size of the selected physical disk
SMART status	SMART status of a physical disk
Revision	Firmware version of the physical disk
WWID	Unique identifier used to identify the device
Multipath	Multipath of the controller
Physical disk power state	Power condition (On or Power Save) of the physical disk
Disk cache setting	Disk cache setting **NOTE:** Disk cache for SATA Gen3 drives is disabled by default.
Disk protocol	Type of hard disk used
Device speed	Speed of the physical disk
Negotiated link speed	Negotiated link speed of the device
PCIe capable link width	N/A for SAS/SATA drives
PCIe negotiated link width	N/A for SAS/SATA drives
Encryption capable	Encryption capability of the physical disk
Encryption supported	Encryption capability enabled at the controller level
Secured	Security status of the physical disk
Cryptographic erase capable	Cryptographic erase capability of the physical disk

Cryptographic erase

Cryptographic erase is a process to erase all data permanently on an encryption-capable and unconfigured physical disk, and reset the security attributes.

Prerequisites

- The non-RAID and virtual disks associated with the drive are deleted.
- The disks are not hot spares.

About this task

The Cryptographic erase feature is supported only on Instant Secure Erase (ISE) and Self Encrypting Drives (SED) drives.

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Physical Disk Management**.
   The list of physical disks is displayed.
3. Select a physical disk.
4. From the **Operations** drop-down menu, select **Cryptographic Erase**.

NOTE: If the drive installed is ISE or SED capable only then the Cryptographic erase option is displayed.

5. Click **Go**.
   A screen is displayed asking if you are sure you want to perform the operation.
6. Select the **Confirm** option.
7. Click **Yes**.
   The Cryptographic erase operation is completed successfully.

Physical disk erase

Prerequisites

To use the Physical Disk Erase feature from the HII Configuration Utility, perform the following steps:

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Physical Disk Management**.
   The list of physical disks is displayed.
3. Select a physical disk.
4. From the **Operations** drop-down menu, select **Physical Disk Erase**.

   NOTE: If the drive installed is neither SED or ISE capable, then only the Physical Disk Erase option is displayed.

5. Click **Go**.
   A screen is displayed asking if you are sure you want to perform the operation.
6. Select the **Confirm** option.
7. Click **Yes**.
   The physical disk erase operation is completed successfully.

Assigning a global hot spare

Prerequisites

To assign a global hot spare from the HII Configuration Utility, perform the following steps:

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Physical Disk Management**.
   The list of physical disks is displayed.
3. Select the physical disk.
4. From the **Operations** drop-down menu, select **Assign Global Hot Spare**.
5. Click **Go**.
   A screen is displayed asking if you are sure you want to perform the operation.
6. Select the **Confirm** option.
7. Click **Yes**.
   The global hot spare disk is created successfully.

Assigning a dedicated hot spare

Prerequisites

To assign a dedicated hot spare from the HII Configuration Utility, perform the following steps:

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Physical Disk Management**.
   The list of physical disks is displayed.
3. Select the physical disk.
4. From the **Operations** drop-down menu, select **Assign Dedicated Hot Spare**.
5. Click **Go**.
   A screen is displayed asking if you are sure you want to perform the operation.
6. Select the **Confirm** option.
7. Click **Yes**.
   The dedicated hot spare disk is created successfully.

Convert to RAID capable

Prerequisites

To convert a non–RAID disk to RAID capable disk from the HII Configuration Utility, perform the following steps:

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Physical Disk Management**.
   The list of physical disks appears.
3. Select the physical disk.
4. From the **Operations** drop-down menu, select **Convert to RAID capable**.
5. Click **Go**.
   A screen appears asking if you are sure you want to perform the operation.
6. Select the **Confirm** option.
7. Click **Yes**.
   The operation is successful.

Convert to Non–RAID disk

Prerequisites

To convert a physical disk to non–RAID disk from the HII Configuration Utility, perform the following steps:

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Physical Disk Management**.
   The list of physical disks appears.
3. Select the physical disk.
4. From the **Operations** drop-down menu, select **Convert to Non–Raid disk**.
5. Click **Go**.
   A screen appears asking if you are sure you want to perform the operation.
6. Select the **Confirm** option.
7. Click **Yes**.
   The operation is successful.

Hardware components

View battery properties

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Hardware Components** > **Battery Management**.
   The battery and capacity information are displayed.
3. You can view the following properties of the battery:

Table 16. Battery properties

Field	Description
Type	Displays the type of battery available.
Status	Displays the current status of the battery.
Temperature	Displays the current temperature of the battery and also indicates whether the temperature is normal or high.
Charge	Displays the available charge of the battery in percentage.

4. Displays click **Advanced...**.
   The additional advanced properties of the physical battery are displayed.
5. You can view the following advanced properties of the battery:

Table 17. Advanced battery properties

Field	Description
Status	Displays whether the current status of the battery is learning, degraded, or failed.
Voltage	Displays whether the voltage status of the battery is normal or high.
Current	Displays power consumption of the battery in milliamps (mA).
Full capacity	Displays the maximum charge capacity of the battery.
Remaining capacity	Displays the current charge capacity of the battery.
Expected margin of error	Displays expected margin of error.
Completed discharge cycles	Displays the completed discharge cycles.
Learn mode	Displays the condition of the battery. The learn cycle is a periodic operation that calculates the charge that is remaining in the battery to ensure there is sufficient energy.

View physical disks associated with an enclosure

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Hardware Components** > **Enclosure Management**.
3. From the **Select Enclosure** field, choose the enclosure for which you need to view the physical disks.
   All the physical disks that are associated with the virtual disk are displayed.
4. Click the **Attached Physical Disks** drop-down box.
   All the physical disks that are associated with the selected enclosure are displayed.

Security key management in HII configuration utility

The Dell OpenManage storage management application and the **HII Configuration Utility** of the controller allow security keys to be created and managed as well as create secured virtual disks. The following section describes the menu options specific to security key management and provide detailed instructions to perform the configuration tasks. The contents in the following section apply to the **HII Configuration Utility**. For more information on the management applications, see Applications and User Interfaces supported by PERC 11 .

- The **Controller Management** screen displays controller information and action menus. You can perform the following security-related actions through the controller management menu:
  - **Security Key Management**—Creates or changes the local key management (LKM) security key. Deletes the local key management (LKM) or secure enterprise key manager (SEKM) security key.
- The **Virtual Disk Management** screen displays physical disk information and action menus. You can perform the following security related actions through the virtual disk management menu:
  - **Secure Disk Group**—Secures all virtual disks in disk group.
  - **Create secure virtual disk**—Creates a new virtual disk that is secured with the security key on the controller.
- The **Physical Disk Management** screen displays physical disk information and action menus. You can perform the following security-related actions through the physical disk management menu:
  - **Secure non–RAID disk**—Secures the non–RAID disk with the controller security key.
  - **Cryptographic Erase**—Permanently erases all data on the physical disk and resets the security attributes.

For more information on the Physical Disk Management screen and the Virtual Disk Management screen, see Physical disk management and Virtual disk management.

8

Security key and RAID management

Topics:

Security key implementation

The PERC 11 series of cards support self-encrypting disk (SED) for protection of data against loss or theft of SEDs. Protection is achieved by the use of encryption technology on the drives. There is one security key per controller. You can manage the security key using local key management (LKM) or OpenManage Secure Enterprise Key Manager, also referred as Secure Enterprise Key Manager (SEKM). The LKM key can be escrowed in to a file using Dell OpenManage Storage Management application. The security key is used by the controller to lock and unlock access to encryption-capable physical disks. In order to take advantage of this feature, you must:

1. Have SEDs in your system.
2. Create a security key.

Local Key Management

You can use Local Key Management (LKM) to generate the key ID and the passphrase that is required to secure the virtual disk. You can secure virtual disks, change security keys, and manage secured foreign configurations using this security mode.

NOTE: LKM mode is not supported on PERC H355 adapter SAS, PERC H350 adapter SAS, PERC H355 front SAS, and PERC H350 Mini Monolithic SAS.

Create a security key

About this task

NOTE: There is no passphrase backup option when you create a security key; you need to remember your passphrase.

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Management** > **Enable Security**.
3. Select the **Security Key Management** mode as **Local Key Management**.
4. Click **Ok**.
5. In the **Security Key Identifier** field, enter an identifier for your security key.

NOTE: The Security Key Identifier is a user supplied clear text label used to associate the correct security key with the controller.

6. If you want to use the passphrase generated by the controller, click **Suggest Passphrase**.
   Assigns a passphrase suggested by the controller automatically.
7. In the **Passphrase** field, enter the passphrase.

   NOTE: Passphrase is case-sensitive. You must enter minimum 8 or maximum 32 characters. Ensure that the characters contain at least one number, one lower case letter, one upper case letter, and one non-alphanumeric character.

8. In the **Confirm** field, re-enter the passphrase to confirm.

   NOTE: If the Passphrase entered in the Passphrase and Confirm fields do not match, then you are prompted with an error message to enter the passphrase again.

9. Select the **I recorded the Security Settings for Future Reference** option.
10. Click **Enable Security**.
    The Security Key is created successfully.

Change Security Settings

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Management** > **Change Security Settings.**
3. Select security identifier:
   a. To change the **Security key Identifier** enter a new key identifier in **Enter a New Security Key identifier** text box.
   b. To keep existing key identifier, select **Use the existing Security Key Identifier** check box.
4. Enter the existing passphrase.
5. Set passphrase:
   a. To change the security passphrase, enter a new passphrase in the **Enter a New Passphrase** text box. Re-enter the new passphrase to confirm.
   b. To keep the existing passphrase, select **Use the existing passphrase**.
6. Select **I recorded the Security Settings for Future Reference**.
7. Click **Save Security Settings**.
8. Select **Confirm** and then click **Yes**.
   Security settings changed successfully.

Disable security key

About this task

NOTE: Disabling Security Key is active if there is a security key present on the controller.

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Controller Management** > **Advanced Controller Management** > **Disable Security**.
   You are prompted to confirm whether you want to continue.
3. Select the **Confirm** option.
4. Click **Yes**.
   The security key is disabled successfully.

   NOTE: All virtual disks must be deleted or removed to disable security.

   WARNING: Any un-configured secured disks in the system will be repurposed.

Create a secured virtual disk

About this task

To create a secured virtual disk, the controller must have a security key established first. See Create a security key.

NOTE: Combining SAS and SATA hard drives within a virtual disk is not supported. Also, combining hard drives and olid-state drives (SSDs) within a virtual disk is not supported. Mixing of NVMe drives is not supported.

After the security key is established, perform the following steps:

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Configuration Management** > **Create Virtual Disk**.
   For more information, see Create virtual disks.
3. Select the **Secure Virtual Disk** option.
4. Click **Create Virtual Disk**.
   The secure virtual disk is created successfully.

Secure a non-RAID disk

In HII, secure a non-RAID disk by using the security key of the controller.

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Physical Disk Management**.
   The list of Non-RAID disks is displayed.
3. Select a non-RAID disk.
4. From the **Operations** drop-down menu, select **Secure Non-RAID Disk**.

Secure a pre-existing virtual disk

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Virtual Disk Management**.
   The list of virtual disks is displayed.
3. Select a virtual disk.
4. From the **Operations** drop-down menu, select **Secure Virtual Disk**.

   NOTE: The virtual disks can be secured only when the virtual disks are in Optimal state.

Import a secured non-RAID disk

If you are inserting a non-RAID disk into a system that has a controller key different from the security key on the drive, the security key from the system in which it was initially secured must be provided in HII.

Prerequisites

NOTE: The controller must have an existing security key before importing a secured non-RAID disk.

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.

2. Click **Main Menu** > **Configuration Management** > **Manage Foreign Configurations**.
3. Click **Enter Passphrase for Locked Disks**.
   A screen is displayed asking if you are sure you want to perform the operation.
4. Enter **Passphrase** if importing non-RAID disk with a different passphrase.
5. Select the **Confirm** option.
6. Click **Yes**.

   NOTE: If **Auto-Configure** for non-RAID Disks is enabled, the disk becomes a non-RAID disk. Else, it is unconfigured.

Import a secured virtual disk

Prerequisites

NOTE: The controller must have an existing security key before importing secured foreign virtual disk.

Steps

1. Enter the **Dell PERC 11 Configuration Utility**. See Navigate to Dell PERC 11 configuration utility.
2. Click **Main Menu** > **Configuration Management** > **Manage Foreign Configurations** > **Preview Foreign Configurations**.
3. Click **Import Foreign Configuration**.
   A screen is displayed asking if you are sure you want to perform the operation.
4. Enter **Passphrase** if importing virtual disk with a different passphrase.
5. Select the **Confirm** option.
6. Click **Yes**.
   The foreign configuration is imported successfully.

Dell Technologies OpenManage Secure Enterprise Key Manager

This feature allows the PERC to receive a security key from a remote server instead of saving the key on a local controller. This protects data on secured disks under the PERC if the disks or entire system is stolen. Refer to the www.dell.com/idracmanuals for more information on configuring OpenManage Secure Enterprise Key Manager, as well as Secure Sockets Layer (SSL) or Transport Layer Security (TLS) related configuration.

NOTE: Downgrade of PERC firmware to a firmware that does not support enterprise key management while enterprise key manager mode is enabled, is blocked.

NOTE: When replacing a controller enabled with enterprise key management, lifecycle controller part replacement will re-configure the new controller to match the existing controller's configuration.

NOTE: If key exchange fails during boot, view and correct any connection issues with the key server identified in the iDRAC lifecycle log. Then the system can be cold booted.

Supported controllers for OpenManage Secure Enterprise Key Manager

Enterprise key manager mode is supported on the PERC H755 adapter, PERC H755 front SAS, and PERC H755N front NVMe, and allows the creation of secured virtual disks and non–RAID disks. For more information about supported platforms, see www.dell.com/idracmanuals.

Enterprise key manager mode is not supported on the PERC H755 MX adapter, PERC H355 front SAS, PERC H355 adapter SAS, PERC H350 adapter SAS, and PERC H350 Mini Monolithic SAS.

Manage enterprise key manager mode

iDRAC manages Enterprise key manager features. For instructions on enabling enterprise key manager mode, see www.dell.com/idracmanuals.

NOTE: If preserved cache is present, the controller does not allow OpenManage Secure Enterprise Key Manager (SEKM) mode to be enabled.

NOTE: When enterprise key manager mode is enabled, the controller waits up to two minutes for iDRAC to send keys, after which the PERC continues to boot.

NOTE: Transitioning a controller from Local Key Management (LKM) mode to SEKM mode is supported on firmware starting with version 52.16.1-4074. For more information, see Transition of drives from local key management to enterprise key (with supported fimware for PERC and iDRAC).

NOTE: iDRAC performs rotation of keys. Any attempt to rekey the controller through a different management application is not supported.

Disable enterprise key manager mode

Enterprise key manager mode can be disabled from any supported Applications & User Interfaces supported by PERC 11. For more information, see the management application's user's guide or see Disable security key.

Manage virtual disks in enterprise key manager mode

Virtual disks are managed in the same way in enterprise key manager mode as in local key manager mode. SED capable virtual disks can be secured during or after creation. See Create a secured virtual disk.

Manage non–RAID disks in enterprise key manager mode

Non–RAID disks are managed in the same way in enterprise key manager mode as in local key manager mode. SED capable non–RAID disks can be secured after creation. See Create a secured virtual disk.

Transition of drives from local key management to enterprise key management (with supported firmware for PERC and iDRAC)

PERC enables transition from Local Key Management (LKM) mode to Secure Enterprise Key Manager (SEKM) mode without disabling LKM security first. For instructions on transitioning from LKM mode to SEKM mode, see https://www.dell.com/idracmanuals.

About this task

NOTE: This feature is supported on firmware starting with version 52.16.1-4074.

The transition from LKM to SEKM on the controller fails if the following are true at time of attempt:

- Snapdump is present on PERC.
- Preserved cache is present on PERC.
- RAID level migration is in progress on PERC,
- Online capacity expansion is in progress on PERC.
- Sanitize on a physical disk is in progress.
- LKM key that does not match with the current key of PERC.
- PERC firmware does not support transition.

Transition of drives from local key management to enterprise key management (without supported firmware for PERC and iDRAC)

Local key management drives can be transitioned to an enterprise key management enabled system, but the controller cannot be transitioned from local key management mode to enterprise key manager mode or the reverse without first disabling security on the controller. Perform the following steps to transition from local key management drives to enterprise key management:

Steps

1. Save the current local key management security key.
2. Shut down both systems.
3. Remove the local key management drives and reinsert them to the enterprise key manager enabled system.
4. Power on the enterprise key manager system.
5. Go to HII foreign configuration.
6. Enter the local key management keys for those drives.
7. Import the configuration.

NOTE: Once local key management drives are migrated to enterprise key manager, they cannot be migrated back to local key management mode. The drives have to be cryptographically erased to disable security and then converted back to local key management disks. For more information about performing this action, contact https://www.dell.com/supportassist.

9

Troubleshooting

To get help with your Dell Technologies PowerEdge RAID Controller 11 series, you can contact your Dell Technical Service representative or see https://www.dell.com/support.

Topics:

Single virtual disk performance or latency in hypervisor configurations

Multi-initiator or hypervisor configurations running multiple I/O workloads to a single raid array may experience degraded performance or latency. This is caused by upper layers sending separate I/O workloads for each virtual machine to the storage subsystem which ends up being a random I/O workload to the under lying RAID array. For I/O workload configurations that require lower latency restrictions and higher I/O performance it may be beneficial to run fewer I/O workloads to individual RAID arrays or to use separate RAID arrays and physical disks for each I/O workload. Other considerations are making sure write-back, read ahead cache is enabled for rotational disks or using solid state drives (SSDs) to improve random I/O workload performance.

Performance degradation may also be observed when background operations such as initialization, consistency check, or reconstructions are running on the virtual disk. See your hypervisor storage best practices or performance best practices guides for additional configuration support.

Configured disks removed or not accessible error message

Error Message:	`Some configured disks have been removed from your system or are no longer accessible. Check your cables and ensure all disks are present. Press any key or 'C' to continue.`
Probable Cause:	The message indicates that some configured disks were removed. If the disks were not removed, they are no longer accessible. The cables from the PERC controller to the backplane might be improperly connected.
Corrective Action:	Check the cable connections and fix issues if any. Restart the system. If there are no cable problems, press any key or <C> to continue.

Dirty cache data error message

Error Message:	`The following virtual disks are missing: (x). If you proceed (or load the configuration utility), these virtual disks will be removed from your configuration. If you wish to use them at a later time, they will have to be imported. If you believe these virtual disks should be present, please power off your system and check your cables to ensure all disks are present. Press any key to continue, or 'C' to load the configuration utility. The cache contains dirty data, but some virtual disks are missing or will go offline, so the cached data cannot be written to disk. If this is an unexpected error, then please power off your system and check your cables to ensure all disks are present. If you continue, the data in cache will be permanently discarded. Press 'X' to acknowledge and permanently destroy the cached data.`
Probable Cause:	The controller preserves the dirty cache from a virtual disk if the disk becomes offline or is deleted because of missing physical disks. This message indicates that some configured disks were removed. If the disks were not removed, they are no longer accessible. The cables from the PERC controller to the backplane might be improperly connected.
Corrective Action:	Check the cable connections and fix any problems. Restart the system. Use the HII configuration utility to import the virtual disk or discard the preserved cache. For the steps to discard the preserved cache, see Clear the cache memory.

Discovery error message

Error Message:	`A discovery error has occurred, please power cycle the system and all the enclosures attached to this system.`
Probable Cause:	This message indicates that discovery did not complete within 120 seconds. The cables from the PERC controller to the backplane might be improperly connected.
Corrective Action:	Check the cable connections and fix any problems. Restart the system.

Drive Configuration Changes Error Message

Error Message:	`Entering the configuration utility in this state will result in drive configuration changes. Press 'Y' to continue loading the configuration utility or please power off your system and check your cables to ensure all disks are present and reboot.`

Probable Cause:	The message is displayed after another HII warning indicating there are problems with previously configured disks and you have chosen to accept any changes and continue. The cables from the PERC controller to the backplane might be improperly connected.
Corrective Action:	Check the cable connections and fix any problems before restarting the system. If there are no cable problems, press any key or <Y> to continue.

Windows operating system installation errors

Ensure that you perform the following step before installing Windows on 4 KB sector drives:

1. Read and understand the updates to the version of Windows that you have installed. You can find this information in the Microsoft help. For more information, see Microsoft support policy for 4 K sector hard drives in Windows.

Firmware fault state error message

Error Message:	`Firmware is in Fault State.`
Corrective Action:	Contact Global Technical Support.

Foreign configuration found error message

Error Message:	`Foreign configuration(s) found on adapter. Press any key to continue, or 'C' to load the configuration utility or 'F' to import foreign configuration(s) and continue.`
Probable Cause:	When a controller firmware detects a physical disk with existing foreign metadata, it flags the physical disk as **foreign** and generates an alert indicating that a foreign disk was detected.
Corrective Action:	Press **<F>** at this prompt to import the configuration (if all member disks of the virtual disk are present) without loading the **HII Configuration Utility**. Or press **<C>** to enter the **HII Configuration Utility** and either import or clear the foreign configuration.

Foreign configuration not found in HII error message

Error Message:	`The foreign configuration message is present during POST but no foreign configurations are present in the foreign view page in HII configuration utility. All virtual disks are in an optimal state.`
Corrective Action:	Ensure all your PDs are present and all VDs are in optimal state. Clear the foreign configuration using **HII configuration utility** or **Dell OpenManage Server Administrator Storage Management**. **CAUTION: The physical disk goes to Ready state when you clear the foreign configuration.** If you insert a physical disk that was previously a member of a virtual disk in the system, and that disk's previous location has been taken by a replacement disk through a rebuild, you must manually remove the foreign configuration flag of the newly inserted disk.

Degraded state of virtual disks

A redundant virtual disk is in a degraded state when one or more physical disks have failed or are inaccessible. For example, if a RAID 1 virtual disk consists of two physical disks and one of them fails or become inaccessible, the virtual disk become degraded.

To recover a virtual disk from a degraded state, you must replace the failed physical disk and rebuild it. Once the rebuilding process is complete, the virtual disk state changes from degraded to optimal.

Memory errors

Memory errors can corrupt cached data, so the controllers are designed to detect and attempt to recover from the memory errors. Single-bit memory errors can be handled by the controller and do not disrupt normal operation. A notification is sent if the number of single-bit errors exceeds a threshold value.

Multi-bit errors are more serious as they result in corrupted data and data loss. The following are the actions that occur in the case of multi-bit errors:

- If a multi-bit error occurs while accessing data in the cache when the controller is started with dirty cache, the controller discards the cache contents. The controller generates a warning message to the system console to indicate that the cache was discarded and generates an event.
- If a multi-bit error occurs at run-time either in code/data or in the cache, the controller stops.
- The controller logs an event to the controller's internal event log and a message during POST is displayed indicating a multi-bit error has occurred.

NOTE: In case of a multi-bit error, contact Global Technical Support.

Preserved Cache State

The controller preserves the dirty cache from a virtual disk if the virtual disk goes offline or is deleted because of missing physical disks. This preserved dirty cache is called **pinned cache** and is preserved until you import the virtual disk or discard the cache.

1. Import the virtual disk—Power off the system, re-insert the virtual disk and restore the system power. Use the **HII Configuration Utility** to import the foreign configuration.
2. Discard the preserved cache—See Clear the cache memory.

NOTE: It is recommended to clear the preserved cache before reboot using any of the virtual disks present on the controller.

Security key errors

Secured foreign import errors

A foreign configuration is a RAID configuration that already exists on a replacement physical disk that you install in a system. A secured foreign configuration is a RAID configuration that was created under a different security key.

There are two scenarios in which a secured foreign import fails:

- **The passphrase authentication fails**—A virtual disk secured with a security key different from the current controller security key cannot be imported without authentication of the original passphrase used to secure them. Supply the correct passphrase to import the secured foreign configuration. If you have lost or forgotten the passphrase, the secured foreign disks remain locked (inaccessible) until the appropriate passphrase is entered or if they are erased.
- **The secured virtual disk is in an offline state after supplying the correct passphrase**—You must check to determine why the virtual disk failed and correct the problem.

Failure to select or configure non Self-Encrypting Disks non-SED

A virtual disk can be either secured or unsecured depending on how it was configured when created. In order to create a secured virtual disk, the controller must have a security key present and must contain SEDs only. In order to select/configure non-SED, you must create an unsecured virtual disk. You can create an unsecured virtual disk even if there is a security key. Select the **Secure VD** option as **No** in the **Create New VD** menu. For steps on how to create an unsecured virtual disk, see Create virtual disks.

Failure to delete security key

A security key is used to lock or unlock access to a security-enabled component. This key is not utilized in the actual encryption of data. If a security key is present, both secured and unsecured virtual disks may exist.

To delete the security key, you must have a previously established security key present on the controller and there cannot be any configured secured disks. If there are configured secured virtual disks, remove or delete them.

Failure of Cryptographic Erase on encryption-capable physical disks

Cryptographic Erase is the process of securely erasing all data permanently on an encryption-capable physical disk and resetting the security attributes. It is used in scenarios such as deleting a foreign configuration in the event of a forgotten or lost passphrase or unlocking a disk that had been previously locked.

You can perform Cryptographic Erase only on encryption-capable disks that are not hot spares and not configured as non-RAID or virtual disks. Ensure that the conditions are met and see Cryptographic Erase.

General issues

PERC card has yellow bang in Windows operating system device manager

Issue:	The device is displayed in **Device Manager** but has a yellow bang (exclamation mark).
Corrective Action:	Reinstall the driver. For more information on reinstalling drivers, see Driver support for PERC 11 .

PERC card not seen in operating systems

Issue:	The device does not appear in the **Device Manager**.
Corrective Action:	Turn off the system and reseat the controller. For more information, see Install and remove a PERC 11 card.

Issues in controller, battery, and disk when operating at low temperature

Issue:	If the controller is operating at temperatures less than zero degree Centigrade, then an increase in the number of issues related to controller, battery, or drive is observed.
Corrective Action:	Ensure that the controller ambient temperature is more than zero degree Centigrade.

Physical disk issues

Physical disk in failed state

Issue:	One of the physical disks in the disk array is in the failed state.

Corrective Action:	Update the PERC cards to the latest firmware available on https://www.dell.com/support and replace the drive.

Unable to rebuild a fault tolerant virtual disk

Issue:	Cannot rebuild a fault tolerant virtual disk. For more information, see the alert log for virtual disks.
Probable Cause:	The replacement disk is too small or not compatible with the virtual disk.
Corrective Action:	Replace the failed disk with a compatible good physical disk with equal or greater capacity.

Fatal error or data corruption reported

Issue:	Fatal error(s) or data corruption(s) are reported when accessing virtual disks.
Corrective Action:	Contact Global Technical Support.

Multiple disks are inaccessible

Issue:	Multiple disks are simultaneously inaccessible.
Probable Cause:	Multiple physical disk errors in a single array typically indicate a failure in cabling or connection and could involve the loss of data.
Corrective Action:	You can recover the virtual disk after multiple physical disks become simultaneously inaccessible. Perform the following steps to recover the virtual disk:

CAUTION: Follow the safety precautions to prevent electrostatic discharge.

1. Turn off the system, check cable connections, and reseat physical disks.
2. Ensure that all the disks are present in the enclosure.
3. Turn on the system and enter the **HII Configuration Utility**.
4. Import the foreign configuration.
5. Press <F> at the prompt to import the configuration, or press <C> to enter the **HII Configuration Utility** and either import or clear the foreign configuration.

If the virtual disk is redundant and transitioned to **Degraded** state before going **Offline**, a rebuild operation starts automatically after the configuration is imported. If the virtual disk has gone directly to the **Offline** state due to a cable pull or power loss situation, the virtual disk is imported in its **Optimal** state without a rebuild occurring.

NOTE: You can use the **HII Configuration Utility** or Dell OpenManage storage management application to perform a manual rebuild of multiple physical disks.

Rebuilding data for a failed physical disk

Issue:	Rebuilding data for a physical disk that is in a failed state.
Probable Cause:	Physical disk is failed or removed.
Corrective Action:	If you have configured hot-spares, the PERC card automatically tries to use one of the hot-spares to rebuild a physical disk that is in a failed state. Manual rebuild is necessary if no hot-spares with enough capacity to rebuild the failed physical disks are available. You must insert a physical disk with enough storage in the subsystem before rebuilding the physical disk.

NOTE: You can use the **HII Configuration Utility** or Dell OpenManage storage management application to perform a manual rebuild of an individual physical disk.

Virtual disk fails during rebuild using a global hot spare

Issue:	A virtual disk fails during rebuild while using a global hot spare.
Probable Cause:	One or more disks in the virtual disks fails or is disconnected while the rebuild is in progress.
Corrective Action:	No action is required. The global hot spare reverts to **Hot spare** state and the virtual disk is in **Failed** state.

Dedicated hot spare disk fails during rebuild

Issue:	A hot spare disk fails during rebuild while using a dedicated hot spare.
Probable Cause:	The dedicated hot spare assigned to the virtual disk fails or is disconnected while the rebuild is in progress.
Corrective Action:	If there is a global hot spare available with enough capacity, rebuild will automatically start on the global hot spare. Where there is no hot spare present, you must insert a physical disk with enough capacity into the system before performing a rebuild.

Redundant virtual disk fails during reconstruction

Issue:	Multiple disks fails during a reconstruction process on a redundant virtual disk that has a hot spare.
Probable Cause:	Multiple physical disks in the virtual disk is failed or the cables are disconnected.
Corrective Action:	No action is required. The physical disk to which a reconstruction operation is targeted reverts to **Ready** state, and the virtual disk goes to **Failed** state. If there are any other virtual disks that can be supported by the capacity of the hot spare then the dedicated hot spare is converted to global hot spare, if not the hot spare will revert back to **Ready** state.

Virtual disk fails rebuild using a dedicated hot spare

Issue:	A virtual disk fails during rebuild while using a dedicated hot spare.
Probable Cause:	One or more disks in the virtual disks fails or is disconnected while the rebuild is in progress.
Corrective Action:	No action is required. The dedicated hot spare is in **hot spare** state and converted to global hot spare if there is any other virtual disk that is supported, otherwise the dedicated hot spare reverts to **Ready** state and the virtual drive is in **Failed** state.

Physical disk takes a long time to rebuild

Issue:	A physical disk is taking longer than expected to rebuild.
Description:	A physical disk takes longer to rebuild when under high I/O stress. There is only one rebuild I/O operation for every five host I/O operations.
Corrective Action:	If possible, reduce I/O stress on the physical disk or increase the value of rebuild rate controller parameter.

Drive removal and insertion in the same slot generates a foreign configuration event

Issue:	When a drive which is part of a virtual disk is removed and reinserted into the same slot the drive goes through a transient state of being foreign for a short period of time before rebuilding.

Description:	This transient state could be reported as an event in management applications as **A foreign configuration was detected on RAID Controller is SL x**, where x is the slot of the RAID controller.
Corrective Action:	No action is required on the foreign configuration state of the drive as it is transient and the controller handles the event automatically.

SMART errors

SMART monitors the internal performance of all motors, heads, and physical disk electronics and detects predictable physical disk failures.

NOTE: For information about where to find reports of SMART errors that could indicate hardware failure, see the Dell OpenManage storage management documentation at www.dell.com/openmanagemanuals.

Smart error detected on a non–RAID disk

Issue:	A SMART error is detected on a non–RAID disk.
Corrective Action:	Perform the following steps: 1. Back up your data. 2. Replace the affected physical disk with a new physical disk of equal or higher capacity. 3. Restore from the backup.

Smart error detected on a physical disk in a non–redundant virtual disk

Issue:	A SMART error is detected on a physical disk in a non–redundant virtual disk.
Corrective Action:	Perform the following steps: 1. Back up your data. 2. Use **Replace Member** to replace the disk manually. **NOTE:** For more information about the **Replace Member** feature, see Configure hot spare drives. 3. Replace the affected physical disk with a new physical disk of equal or higher capacity. 4. Restore from the backup.

Smart error detected on a physical disk in a redundant virtual disk

Issue:	A SMART error is detected on a physical disk in a redundant virtual disk.
Corrective Action:	Perform the following steps: 1. Back up your data. 2. Force the physical disk offline. **NOTE:** If a hot spare is present, the rebuild starts with the hot spare after the disk is forced offline. 3. Replace the disk with a new physical disk of equal or higher capacity. 4. Perform the **Replace Member** operation. **NOTE:** The **Replace Member** operation allows you to copy data from a source physical disk of a virtual disk to a target physical disk that is not a part of the virtual disk. For more information about the **Replace Member** feature, see the topic Configure hot spare drives.

Replace member errors

NOTE: For more information about the **Replace Member** features, see Configure hot spare drives.

Source disk fails during replace member operation

Issue:	The source disk fails during the **Replace Member** operation and the **Replace Member** operation stops due to the source physical disk error.
Probable Cause:	Physical disk failure or physical disk is removed or disconnected.
Corrective Action:	No action required. If the virtual disk can tolerate disk failure, and the source data is available from other disks in the virtual disk, the rebuild begins automatically on the target disk, using the data from the other disks, if the virtual disk cannot tolerate the failure, the virtual disk goes to offline state and the replace member operation is stopped.

Target disk fails during replace member operation

Issue:	The target disk failure reported during the **Replace Member** operation, and the **Replace Member** operation stops.
Probable Cause:	Physical disk failure or physical disk is removed or disconnected.
Corrective Action:	It is recommended that you replace or check the target drive, and restart the **Replace Member** operation or perform the operation on a different target drive.

A member disk failure is reported in the virtual disk which undergoes replace member operation

Issue:	The source and the target drive which is part of **Replace Member** operation are online, while a different drive which is a member of the virtual drive reports a failure.
Probable Cause:	Physical disk failure or physical disk is removed or disconnected.
Corrective Action:	A rebuild starts if there any hot-spares configured or you may replace the failed drive. The **Replace Member** operation continues as far as the source virtual disk can tolerate the drive failure. If the source virtual disk fails, the **Replace Member** is stopped, otherwise the virtual disk continues to be in degraded state.

Linux operating system errors

Virtual disk policy is assumed as write-through error message

Error:	`<Date:Time> <HostName> kernel: sdb: asking for cache data failed<Date:Time> <HostName> kernel: sdb: assuming drive cache: write through`
Corrective Action:	The error message is displayed when the Linux Small Computer System Interface (SCSI) mid-layer asks for physical disk cache settings. The controller firmware manages the virtual disk cache settings on a per controller and a per virtual disk basis, so the firmware does not respond to this command. The Linux SCSI mid-layer assumes that the virtual disk's cache policy is **Write-Through**. SDB is the device node for a virtual disk. This value changes for each virtual disk. For more information about **Write-Through** cache, see Virtual Disk Write Cache Policies.

Except for this message, there is no effect of this behavior on normal operation. The cache policy of the virtual disk and the I/O throughput are not affected by this message. The cache policy settings for the PERC SAS RAID system remain unchanged.

Unable to register SCSI device error message

Error:	`smartd[smartd[2338] Device: /dev/sda, Bad IEC (SMART) mode page, err=-5, skip device smartd[2338] Unable to register SCSI device /dev/sda at line 1 of file /etc/smartd.conf.`
Corrective Action:	This is a known issue. An unsupported command is entered through the user application. User applications attempt to direct Command Descriptor Blocks to RAID volumes. The error message does not affect the feature functionality. The `Mode Sense/Select` command is supported by firmware on the controller. However, the Linux kernel **daemon** issues the command to the virtual disk instead of to the driver **IOCTL** node. This action is not supported.

Drive indicator codes

The LEDs on the drive carrier indicates the state of each drive. Each drive carrier has two LEDs: an activity LED (green) and a status LED (bicolor, green/amber). The activity LED blinks whenever the drive is accessed.

Figure 30. Drive indicators

1. Drive activity LED indicator
2. Drive status LED indicator
3. Drive capacity label

If the drive is in the Advanced Host Controller Interface (AHCI) mode, the status LED indicator does not power on. Drive status indicator behavior is managed by Storage Spaces Direct. Not all drive status indicators may be used.

Table 18. Drive indicator codes

Drive status indicator code	Condition
Blinks green twice per second	The drive is being identified or preparing for removal
Off	The drive is ready for removal **NOTE:** The drive status indicator remains off until all drives are initialized after the system is powered on. Drives are not ready for removal during this time.
Blinks green, amber, and then powers off	There is an expected drive failure
Blinks amber four times per second	The drive has failed

Table 18. Drive indicator codes (continued)

Drive status indicator code	Condition
Blinks green slowly	The drive is rebuilding
Solid green	The drive is online
Blinks green for three seconds, amber for three seconds, and then powers off after six seconds	The rebuild has stopped

HII error messages

Unhealthy Status of the Drivers

Error: `One or more boot driver(s) have reported issues. Check the Driver Health Menu in Boot Manager for details.`

Probable Cause: This message might indicate that the cables are not connected, the disks might be missing, or the UEFI driver might require configuration changes.

Corrective Action:

1. Check if the cables are connected properly, or replace missing hard drives, if any and then restart the system.
2. Press any key to load the driver health manager to display the configurations. The Driver Health Manager displays the driver(s), which requires configuration.
3. Alternately, if the UEFI driver requires configuration, press any key to load the Configuration Utility.

Rebuilding a drive during full initialization

Issue: Automatic rebuild of drives is disabled for virtual disk during full initialization.

Corrective Action: After full initialization the drive will automatically start its rebuild on its corresponding virtual disk.

System reports more drive slots than what is available

The system reports more slots than what is available in the following two scenarios:

System drives are hot swappable with backplane. When the system drives are hot swappable, the PERC controller is not able to communicate correctly with the backplane or enclosure. Hence, the PERC controller reports a generic enclosure with drive 16 slots. In iDRAC, under **Overview** > **Enclosures**, the **Enclosure ID** is displayed as **BP_PSV** and **Firmware version** is displayed as **03**.

Corrective action Turn off the system, reseat the controller and all the cables on the controller and backplane. If the issue is not resolved, contact your Dell Technical Service representative.

System drives are not hot swappable with cable direct attached. When the system drives are not hot swappable, a default enclosure with 16 drive slots is expected to be reported (even though the system does not support that many drives).

World Wide Number on drive sticker is not the same in applications

World Wide Number (WWN) on the drive sticker and applications are not matching.	NVMe drives do not have a WWN. So, the applications create a WWN from the available drive information. This WWN may not match with the WWN that is on the drive sticker, if present.

Backplane firmware revision not changing in PERC interfaces after an update

After updating the backplane firmware on 15G and later PowerEdge servers, the backplane version will not show as updated on some interfaces until the system is reset.

10

Appendix RAID description

RAID is a group of independent physical disks that provides high performance by increasing the number of disks used for saving and accessing data.

CAUTION: In the event of a physical disk failure, a RAID 0 virtual disk fails, resulting in data loss.

A RAID disk subsystem offers the following benefits:

- Improved I/O performance and data availability.
- Improved data throughput because several disks are accessed simultaneously. The physical disk group appears either as a single storage unit or multiple logical units to the host system.
- Improved data storage availability and fault tolerance. Data loss caused by a physical disk failure can be recovered by rebuilding missing data from the remaining physical disks containing data or parity.

Topics:

Summary of RAID levels

Following is a list of the RAID levels supported by the PERC 11 series of cards:

- RAID 0 uses disk striping to provide high data throughput, especially for large files in an environment that requires no data redundancy.
- RAID 1 uses disk mirroring so that data written to one physical disk is simultaneously written to another physical disk. RAID 1 is good for small databases or other applications that require small capacity and complete data redundancy.
- RAID 5 uses disk striping and parity data across all physical disks (distributed parity) to provide high data throughput and data redundancy, especially for small random access.
- RAID 6 is an extension of RAID 5 and uses an additional parity block. RAID 6 uses block-level striping with two parity blocks distributed across all member disks. RAID 6 provides protection against double disk failures, and failures while a single disk is rebuilding. If you are using only one array, deploying RAID 6 is more effective than deploying a hot spare disk.
- RAID 10 is a combination of RAID 0 and RAID 1, uses disk striping across mirrored disks. It provides high data throughput and complete data redundancy.
- RAID 50 is a combination of RAID 0 and RAID 5 where a RAID 0 array is striped across RAID 5 elements. RAID 50 requires at least six disks.
- RAID 60 is a combination of RAID 0 and RAID 6 where a RAID 0 array is striped across RAID 6 elements. RAID 60 requires at least eight disks.

The following table lists the minimum and maximum disks supported on each RAID levels.

Table 19. Minimum and maximum disks supported on each RAID levels

RAID Level	Minimum disk	Maximum disk
0	1	32
1	2	2
5	3	32
6	4	32
10	4	240
50	6	240
60	8	240

NOTE: The maximum number of virtual disks is currently limited to 192, because of the supported enclosure configuration.

RAID 10 configuration

In PERC 10 and PERC 11 controllers, RAID 10 can be configured without spanning up to 32 drives. Any RAID 10 volume that has more than 32 drives require spanning. Each span can contain up to 32 drives. Drives must be distributed evenly across all the spans with each span containing an even number of drives.

NOTE: Spans in a RAID 10 volume are only supported if spans are even. Uneven spanned RAID 10 cannot be imported from previous controller generations.

The following table shows the RAID 10 configurations.

Table 20. RAID 10 configurations

Disk or span count	RAID 10 capable	Disk or span count	RAID 10 capable	Disk or span count	RAID 10 capable	Disk or span count	RAID 10 capable
4 (1)	Yes	64 (2)	Yes	124	No	184	No
6 (1)	Yes	66 (3)	Yes	126 (7)	Yes	186	No
8 (1)	Yes	68	No	128 (4)	Yes	188	No
10 (1)	Yes	70 (5)	Yes	130 (5)	Yes	190	No
12 (1)	Yes	72 (3)	Yes	132 (6)	Yes	192 (6)	Yes
14 (1)	Yes	74	No	134	No	194	No
16 (1)	Yes	76	No	136	No	196 (7)	Yes
18 (1)	Yes	78 (3)	Yes	138	No	198	No
20 (1)	Yes	80 (4)	Yes	140 (5)	Yes	200	No
22 (1)	Yes	82	No	142	No	202	No
24 (1)	Yes	84 (6)	Yes	144	Yes	204	No
26 (1)	Yes	86	No	146	No	206	No
28 (1)	Yes	88 (4)	Yes	148	No	208 (8)	Yes
30 (1)	Yes	90 (3)	Yes	150 (5)	Yes	210 (7)	Yes
32 (1)	Yes	92	No	152	No	212	No
34	No	94	No	154 (7)	Yes	214	No
36 (2)	Yes	96 (3)	Yes	156 (6)	Yes	216	No
38	No	98 (7)	Yes	158	No	218	No
40 (2)	Yes	100 (5)	Yes	160 (5)	Yes	220	No
42 (2)	Yes	102	No	162	No	222	No
44 (2)	Yes	104 (4)	Yes	164	No	224 (8)	Yes
46	No	106	No	166	No	226	No
48 (2)	Yes	108 (6)	Yes	168 (6)	Yes	228	No
50 (2)	Yes	110 (5)	Yes	170	No	230	No
52 (2)	Yes	112 (4)	Yes	172	No	232	No
54 (2)	Yes	114	No	174	No	234	No
56 (2)	Yes	116	No	176 (8)	Yes	236	No
58	No	118	No	178	No	238	No

Table 20. RAID 10 configurations (continued)

Disk or span count	RAID 10 capable	Disk or span count	RAID 10 capable	Disk or span count	RAID 10 capable	Disk or span count	RAID 10 capable
60 (2)	Yes	120 (4)	Yes	180 (6)	Yes	240 (8)	Yes
62	No	122	No	182 (7)	Yes	-	-

RAID terminology

Disk striping

Disk striping allows you to write data across multiple physical disks instead of just one physical disk. Disk striping involves partitioning each physical disk storage space in stripes of the following sizes: 64 KB, 128 KB, 256 KB, 512 KB, and 1 MB. The stripes are interleaved in a repeated sequential manner. The part of the stripe on a single physical disk is called a stripe element.

For example, in a four-disk system using only disk striping (used in RAID 0), segment 1 is written to disk 1, segment 2 is written to disk 2, and so on. Disk striping enhances performance because multiple physical disks are accessed simultaneously, but disk striping does not provide data redundancy.

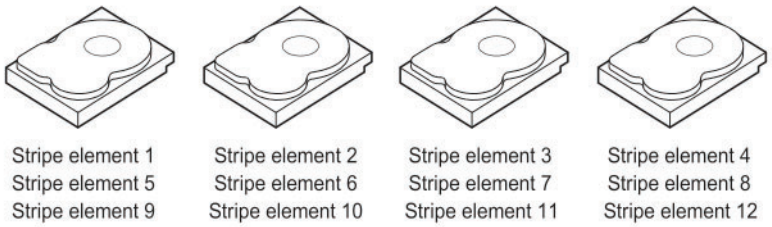

Figure 31. Example of disk striping (RAID 0)

Disk mirroring

With mirroring (used in RAID 1), data written to one disk is simultaneously written to another disk. If one disk fails, the contents of the other disk can be used to run the system and rebuild the failed physical disk. The primary advantage of disk mirroring is that it provides complete data redundancy. Both disks contain the same data at all times. Either of the physical disks can act as the operational physical disk.

Disk mirroring provides complete redundancy, but is an expensive option because each physical disk in the system must be duplicated.

NOTE: Mirrored physical disks improve read performance by read load balance.

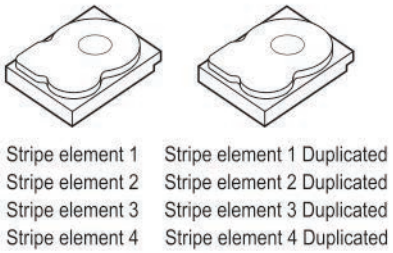

Figure 32. Example of Disk Mirroring (RAID 1)

Spanned RAID levels

Spanning is a term used to describe the way in which RAID levels 10, 50, and 60 are constructed from multiple sets of basic, or simple RAID levels. For example, a RAID 10 has multiple sets of RAID 1 arrays where each RAID 1 set is considered a span. Data is then striped (RAID 0) across the RAID 1 spans to create a RAID 10 virtual disk. Similarly, RAID 50 and RAID 60 combine multiple sets of RAID 5 or RAID 6 respectively with striping.

Parity data

Parity data is redundant data that is generated to provide fault tolerance within certain RAID levels. In the event of a disk failure, the parity data can be used by the controller to regenerate user data. Parity data is present for RAID 5, 6, 50, and 60.

The parity data is distributed across all the physical disks in the system. If a single physical disk fails, it can be rebuilt from the parity and the data on the remaining physical disks. RAID level 5 combines distributed parity with disk striping. Parity provides redundancy for one physical disk failure without duplicating the contents of the entire physical disks.

RAID 6 combines dual distributed parity with disk striping. This level of parity allows for two disk failures without duplicating the contents of entire physical disks.

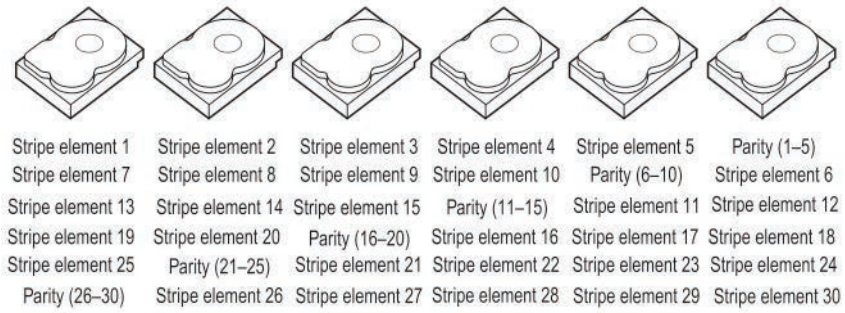

Figure 33. Example of Distributed Parity (RAID 5)

NOTE: Parity is distributed across multiple physical disks in the disk group.

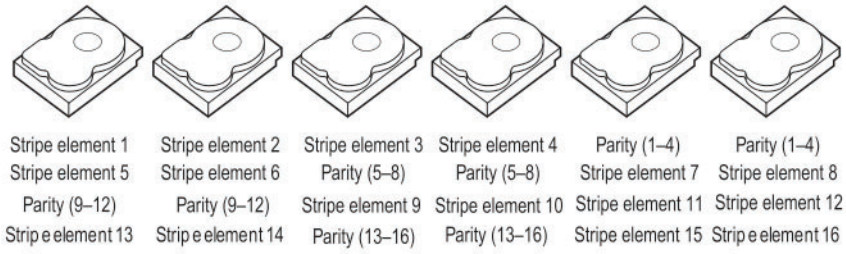

Figure 34. Example of Dual Distributed Parity (RAID 6)

NOTE: Parity is distributed across all disks in the array.

11

Getting help

Topics:

Recycling or End-of-Life service information

Take back and recycling services are offered for this product in certain countries. If you want to dispose of system components, visit www.dell.com/recyclingworldwide and select the relevant country.

Contacting Dell

Dell provides online and telephone based support and service options. If you do not have an active internet connection, you can find Dell contact information on your purchase invoice, packing slip, bill or Dell product catalog. The availability of services varies depending on the country and product, and some services may not be available in your area. To contact Dell for sales, technical assistance, or customer service issues:

Steps

1. Go to www.dell.com/support/home.
2. Select your country from the drop-down menu on the lower right corner of the page.
3. For customized support:
   a. Enter the system Service Tag in the **Enter a Service Tag, Serial Number, Service Request, Model, or Keyword** field.
   b. Click **Submit**.
   The support page that lists the various support categories is displayed.
4. For general support:
   a. Select your product category.
   b. Select your product segment.
   c. Select your product.
   The support page that lists the various support categories is displayed.
5. For contact details of Dell Global Technical Support:
   a. Click Global Technical Support.
   b. The **Contact Technical Support** page is displayed with details to call, chat, or e-mail the Dell Global Technical Support team.

Locating the Express Service Code and Service Tag

The unique Express Service Code and Service Tag is used to identify the system.

The information tag is located on the front of the system rear of the system that includes system information such as Service Tag, Express Service Code, Manufacture date, NIC, MAC address, QRL label, and so on. If you have opted for the secure default access to iDRAC, the Information tag also contains the iDRAC secure default password. If you have opted for iDRAC Quick Sync 2, the Information tag also contains the OpenManage Mobile (OMM) label, where administrators can configure, monitor, and troubleshoot the PowerEdge servers.

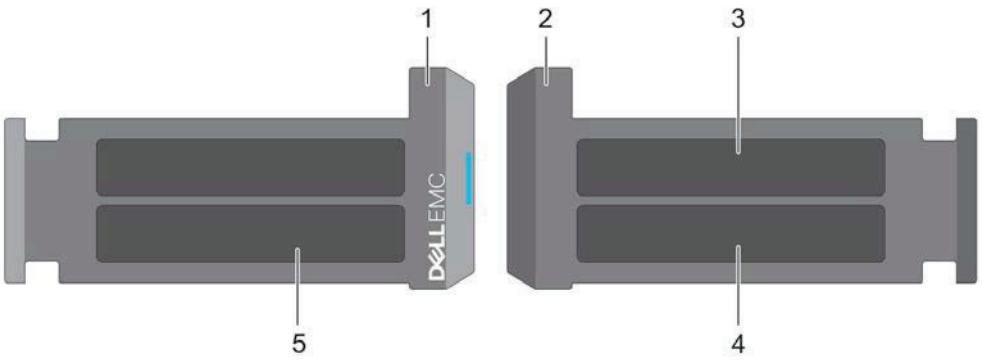

Figure 35. Locating the Express Service Code and Service tag

1. Information tag (front view)
2. Information tag (back view)
3. OpenManage Mobile (OMM) label
4. iDRAC MAC address and iDRAC secure password label
5. Service Tag, Express Service Code, QRL label

The Mini Enterprise Service Tag (MEST) label is located on the rear of the system that includes Service Tag (ST), Express Service Code (Exp Svc Code), and Manufacture Date (Mfg. Date). The Exp Svc Code is used by Dell to route support calls to the appropriate personnel.

Alternatively, the Service Tag information is located on a label on left wall of the chassis.

Receiving automated support with SupportAssist

Dell SupportAssist is an optional Dell Services offering that automates technical support for your Dell server, storage, and networking devices. By installing and setting up a SupportAssist application in your IT environment, you can receive the following benefits:

- Automated issue detection — SupportAssist monitors your Dell devices and automatically detects hardware issues, both proactively and predictively.
- Automated case creation — When an issue is detected, SupportAssist automatically opens a support case with Dell Technical Support.
- Automated diagnostic collection — SupportAssist automatically collects system state information from your devices and uploads it securely to Dell. This information is used by Dell Technical Support to troubleshoot the issue.
- Proactive contact — A Dell Technical Support agent contacts you about the support case and helps you resolve the issue.

The available benefits vary depending on the Dell Service entitlement purchased for your device. For more information about SupportAssist, go to www.dell.com/supportassist.

12

Documentation resources

This section provides information about the documentation resources for your system.

To view the document that is listed in the documentation resources table:

- From the Dell support site:
  1. Click the documentation link that is provided in the Location column in the table.
  2. Click the required product or product version.

     NOTE: To locate the product name and model, see the front of your system.
  3. On the Product Support page, click **Manuals & documents**.
- Using search engines:
  - Type the name and version of the document in the search box.

Table 21. Additional documentation resources for your system

Task	Document	Location
Setting up your system	For more information about installing and securing the system into a rack, see the Rail Installation Guide included with your rail solution. For information about setting up your system, see the *Getting Started Guide* document that is shipped with your system.	www.dell.com/poweredgemanuals
Configuring your system	For information about the iDRAC features, configuring and logging in to iDRAC, and managing your system remotely, see the Integrated Dell Remote Access Controller User's Guide. For information about understanding Remote Access Controller Admin (RACADM) subcommands and supported RACADM interfaces, see the RACADM CLI Guide for iDRAC. For information about Redfish and its protocol, supported schema, and Redfish Eventing implemented in iDRAC, see the Redfish API Guide. For information about iDRAC property database group and object descriptions, see the Attribute Registry Guide. For information about Intel QuickAssist Technology, see the Integrated Dell Remote Access Controller User's Guide.	www.dell.com/poweredgemanuals
	For information about earlier versions of the iDRAC documents. To identify the version of iDRAC available on your system, on the iDRAC web interface, click **?** > **About**.	www.dell.com/idracmanuals

Table 21. Additional documentation resources for your system (continued)

Task	Document	Location
	For information about installing the operating system, see the operating system documentation.	www.dell.com/operatingsystemmanuals
	For information about updating drivers and firmware, see the Methods to download firmware and drivers section in this document.	www.dell.com/support/drivers
Managing your system	For information about systems management software offered by Dell, see the Dell OpenManage Systems Management Overview Guide.	www.dell.com/poweredgemanuals
	For information about setting up, using, and troubleshooting OpenManage, see the Dell OpenManage Server Administrator User's Guide.	www.dell.com/openmanagemanuals > OpenManage Server Administrator
	For information about installing, using, and troubleshooting Dell OpenManage Enterprise, see the Dell OpenManage Enterprise User's Guide.	https://www.dell.com/openmanagemanuals
	For information about installing and using Dell SupportAssist, see the Dell SupportAssist Enterprise User's Guide.	https://www.dell.com/serviceabilitytools
	For information about partner programs enterprise systems management, see the OpenManage Connections Enterprise Systems Management documents.	www.dell.com/openmanagemanuals
Understanding event and error messages	For information about the event and error messages generated by the system firmware and agents that monitor system components, go to qrl.dell.com > **Look Up** > **Error Code**, type the error code, and then click **Look it up**.	www.dell.com/qrl
Troubleshooting your system	For information about identifying and troubleshooting the PowerEdge server issues, see the Server Troubleshooting Guide.	www.dell.com/poweredgemanuals

Dell PowerEdge R750

Technical Guide

Regulatory Model: E70S Series
Regulatory Type: E70S001
November 2022
Rev. A03

DELL Technologies

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your product.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

Contents

1

System overview

The Dell EMC™ PowerEdge™ R750 is Dell EMC's latest 2U 2-socket designed to run complex workloads using highly scalable memory, I/O, and network options. The system features the 3rd Generation Intel® Xeon® Processor Scalable family, with up to 32 DDR4 DIMMs, up to 8 PCI Express® Gen4 enabled expansion slots, and a choice of embedded NIC technologies.

Topics:

Key workloads

The R750 is high performance, general purpose platform that is ready to run any workload found within a customer's datacenter. The following table lists some of these workloads and the situations wherein the R750 is a good fit.

Table 1. Key workloads

Workload	PowerEdge R750 is best for
General Data Center Standardization	Customers with a wide range of workloads requiring a single server model to handle them all. Flexible configuration options allow these to match the performance needed for the most demanding workloads
Virtualization & Cloud Applications	High density virtualization Cloud-native applications High performance local storage requirements
Virtual Desktop Infrastructure	VDI deployments requiring high performance GPUs Medium-large local storage capacity
Database & Analytics	Large traditional or in-memory databases Medium-large local storage capacity Persistent memory
High-Performance Computing	HPC that requires large memory capacity High performance CPU support GPU assistance
Software Defined Storage build-out	High performance SDS node Large local storage capacity Persistent memory

New technologies

Table 2. New Technologies

Technology	Detailed Description
3rd Generation Intel® Xeon® Processor Scalable Family	Consult the Processor section for specific SKU details. 10nm process technology 3x Intel® Ultra Path Interconnect (UPI) per CPU at 10.4GT/s or 11.2GT/s 64 PCIe Gen4 lanes at 16GT/s Up to 40 cores per socket Up to 3.6 GHz Max TDP: 270 W
3200 MT/s DDR4 Memory	Max 16 DIMMs per CPU Supports DDR4 RDIMM, LRDIMM, 3DS DIMM and with ECC up to 3200MT/s
Persistent Memory	Supports DDR4 Intel Optane Persistent Memory 200 Series up to 3200 MT/s, max 8x 512GB Intel Optane Persistent Memory 200 Series DIMMs per CPU.
Flex IO	LOM board, 2x1 Gb with BCM5720 LAN controller STD Rear IO with 1Gb Dedicated Management Network Port, USB3.0x1, USB2.0x1 and VGA port Serial Port Option with STD Rear IO board. OCP Mezz 3.0 (supported by x8 PCIe lanes) LC Rear IO with 1Gb Dedicated Management Network Port, USB3.0x1, USB2.0x1. Serial Port or VGA Port Option with LC Rear IO board.
Dedicated PERC	Front Storage module PERC with Front PERC10.5 & PERC11
Software RAID	OS RAID / S150
Power Supplies	60mm / 86mm dimension is the new PSU form factor on 15G design Titanium 700 W mixed mode Platinum 800 W mixed mode Titanium 1100 W mixed mode -48 - (-60) V 1100 W DC Platinum 1400 W mixed mode Titanium 1800 W mixed mode Platinum 2400 W mixed mode Titanium 2800 W mixed mode

2

System features and generational comparison

The following table shows the comparison between the PowerEdge R750 with the PowerEdge R740:

Table 3. Features compared to previous version

Feature	PowerEdge R750	PowerEdge 740
CPU	2x 3rd Generation Intel® Xeon® Processor Scalable Family	2x 2nd Generation Intel® Xeon® Processor Scalable Family
CPU Interconnect	Intel Ultra Path Interconnect (UPI)	Intel Ultra Path Interconnect (UPI)
Memory	32 x DDR4 RDIMM, LRDIMM 16 x PMem (Intel Optane Persistent Memory 200 Series)	24 x DDR4 RDIMM, LRDIMM 12 x NVDIMM 12 x PMem (Intel Optane Apache Pass)
Storage Drives	3.5 inches, 2.5 inches- 12 Gb SAS, 6 Gb SATA, NVMe	3.5 inches, 2.5 inches- 12 Gb SAS, 6 Gb SATA, NVMe
Storage Controllers	Adapters: HBA355I, HBA355E, H345, H745, H755, H755N, H840 BOSS S1 BOSS S2 SW RAID: S150	Adapters: HBA330, H330, H730P, H740P, H840, 12G SAS HBA Mini Mono: HBA330, H330, H730P, H740P SW RAID: S140
NVMe	Up to 24 x NVMe drives	Up to 24 x NVMe drives
PCIe Slots	Max 8 PCIe 4.0 (up to 6 x16 slots)	Max 8 PCIe 3.0 (up to 4 x16 slots)
LOM	2 x 1 Gb	N/A
Networking	OCP 3.0 (x8 PCIe)	rNDC
USB Ports	Front: 1 ports (USB 2.0), 1 dedicated (micro-USB) Rear: 2 ports (Bottom: USB 3.0, Top: USB 2.0) Internal: 1 port (USB 3.0) for IDSDM/internal USB cards up-sell option	Front: 2 ports (USB 2.0), 1 managed (micro-USB) Rear: 2 ports (USB 3.0) Internal: 1 port (USB 3.0) Optional Upsell: 1 Front port (USB 3.0) - Not offered on xd
Rack Height	2U	2U
Power Supplies	AC (Platinum): 800 W, 1400 W, 2400 W AC (Titanium): 1100 W AC mixed mode/HLAC (Titanium): 700 W, 1800 W, 2800 W DC (Mixed Mode): 700 W, 800 W, 1100 W, 1400 W, 1800 W, 2400 W, 2800W	AC (Platinum): 495 W, 750 W, 1100 W, 1600 W, 2000 W, 2400 W AC(Titanium): 750 W DC: 1100 W Mix Mode/HVDC: 750 W, 1100 W

Table 3. Features compared to previous version (continued)

Feature	PowerEdge R750	PowerEdge 740
	DC -48V~-60V: 1100 W	
System Management	LC 3.x, OpenManage, QuickSync2.0, OMPC3, Digital License Key, iDRAC Direct (dedicated micro-USB port), Easy Restore	LC 3.x, OpenManage, QuickSync 2.0, OMPC3, Digital License Key, iDRAC Direct (dedicated micro-USB port), Easy Restore, vFlash
Internal GPU	Up to 2 x double width, FH, FL (300 W each) Up to 4 x16 single width, FH, FL (150 W each) or 6x8 PCIe single width FH, FL (75W each) Up to 6 x single width, LP/FH, HL (75 W each)	3x 300 W (DW) or 6x 75 W (SW)
Availability	Hot-plug Drives Hot-plug Redundant Cooling Hot-plug Redundant Power Supplies IDSDM Hot-plug BOSS S2 BOSS S1	Hot-plug Drives Hot-plug Redundant Cooling Hot-plug Redundant Power Supplies BOSS IDSDM

3

Chassis views and features

Topics:

- Chassis views

Chassis views

Front view of the system

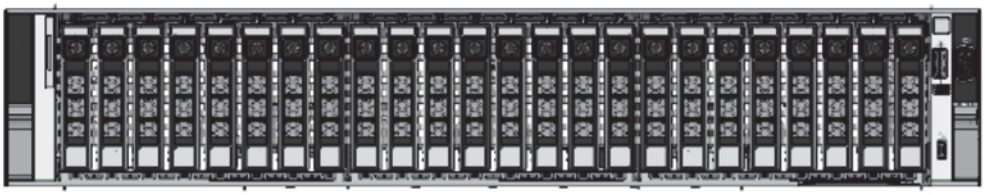

Figure 1. Front view of the R750, 24x 2.5 inches Chassis

Figure 2. 24x SAS/SATA or 24x NVMe

Figure 3. 16x SAS/SATA + 8x NVMe

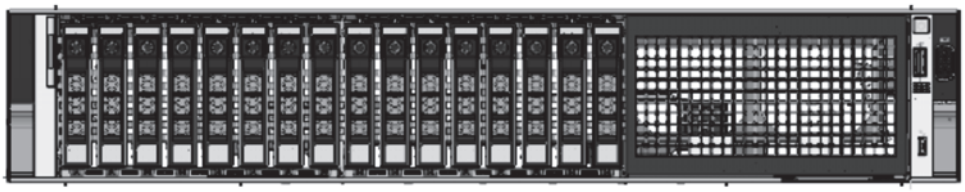

Figure 4. Front view of the R750, 16x 2.5 inches SAS/SATA Chassis

Figure 5. Front view of the R750, 16x 2.5 inches SAS/SATA Chassis

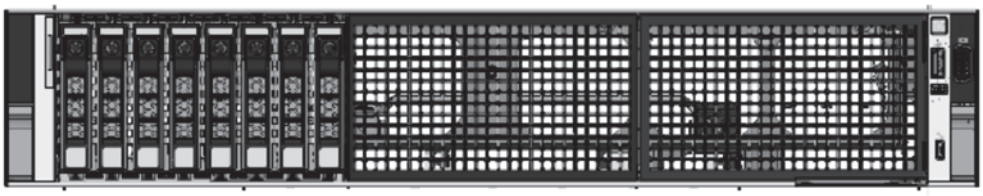

Figure 6. Front view of the R750, 8x 2.5 inches Chassis

Figure 7. Front view of the R750, 8x 2.5 inches Chassis

Figure 8. Front View of the R750, 12x 3.5 inches SAS/SATA Chassis

SLOT0	SLOT3	SLOT6	SLOT9
SLOT1	SLOT4	SLOT7	SLOT10
SLOT2	SLOT5	SLOT8	SLOT11

Figure 9. Front View of the R750, 12x 3.5 inches SAS/SATA Chassis

Rear view of the system

Figure 10. Rear view of the R750 with 2x 2.5 inches storage drives, 6x PCIe Gen4 slots and Hot-plug BOSS

Figure 11. Rear view of the R750 with 8x PCIe Gen4 slots and Hot-plug BOSS

Figure 12. Rear view of the R750 with 4x 2.5 inches storage drives, 4x PCIe Gen4 slot and Hot-plug BOSS

Inside the system

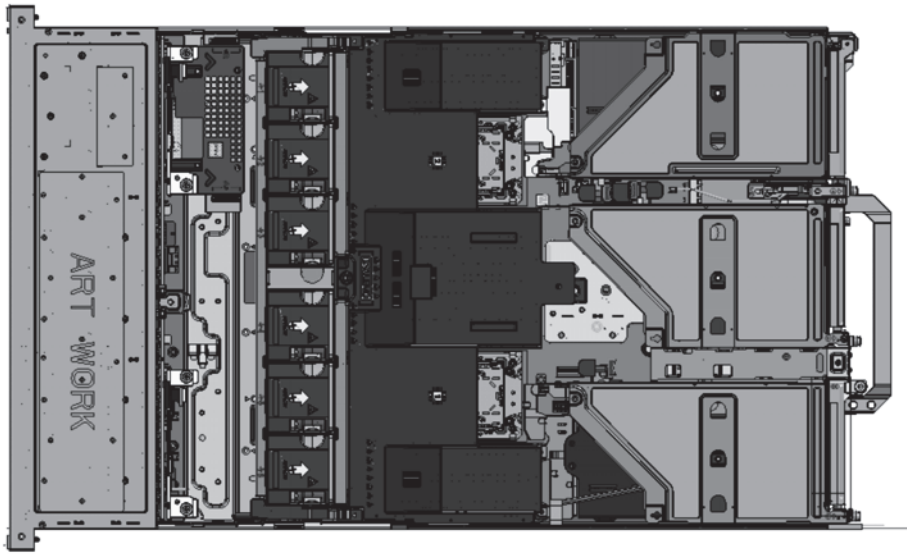

Figure 13. Inside the system of the R750

Quick Resource Locator

The QRL on everything (SILs, GSG, Installation and Service Manual except on the EST) is a generic QRL for R750 that leads to a webpage for that product. That webpage has links for things like setup and service videos, iDRAC manual, and other things that apply to the platform. The QRL on the EST is unique and specific to that service tag and will contain the Service Tag number and the iDRAC password. The label and the QRL code within it are printed on demand at the L10 factories. This QRL links to a webpage that shows the exact configuration as built for that customer, and the specific warranty purchased. It is one click away from the same content of generic information that applies to R750 that is available in the other QRLs.

Figure 14. R750 Quick Resource Locator

4

Processor

Topics:

Processor features

The 3rd Generation Xeon Scalable Processors stack is next generation data center CPU offering with the latest features, increased performance, and incremental memory options. This latest generation Xeon Scalable processor will support usages from entry designs based on Intel Xeon Silver processors to advanced capabilities offered in new Intel Xeon Platinum processor.

The following lists the features and functions included in the upcoming 3rd Generation Intel Xeon Scalable Processor offering:

- Faster UPI with 3 Intel Ultra Path Interconnect (Intel UPI) at 11.2 GT/s (supported in gold and platinum options)
- More, Faster I/O with PCI Express 4 and up to 64 lanes (per socket) at 16 GT/s
- Enhanced Memory Performance with support for up to 3200MT/s DIMMs (2 DPC)
- Increased Memory Capacity with up to 8 channels and up to 256GB DDR4 DIMM support

Breakthrough System Memory with Intel Optane persistent memory 200 series (Intel Optane Persistent Memory 200 Series, up to 512GB modules) up to 6TB of total system memory/socket DDR+PMM.

Supported processors

The following table shows the Intel Ice Lake XCC SKUs that are supported on the R750.

Table 4. Supported processors for R750

Proc	Clock Speed(GHz)	Cache (M)	UPI (GT/s)	Cores	Threads	Turbo	Memory Speed(MT/s)	Memory Capacity	Optane Memory Capable	TDP	R750
8380	2.3	60	11.2	40	80	Turbo	3200	6TB	Y	270W	May '21 RTS
8368Q	2.6	57	11.2	38	76	Turbo	3200	6TB	Y	270W	May '21 RTS
8368	2.4	57	11.2	38	76	Turbo	3200	6TB	Y	270W	May '21 RTS
8362	2.8	48	11.2	32	64	Turbo	3200	6TB	Y	265W	Jul '21 RTS
8360Y	2.4	54	11.2	36	72	Turbo	3200	6TB	Y	250W	May '21 RTS
8358	2.6	48	11.2	32	64	Turbo	3200	6TB	Y	250W	May '21 RTS

Table 4. Supported processors for R750 (continued)

Proc	Clock Speed(GHz)	Cache (M)	UPI (GT/s)	Cores	Threads	Turbo	Memory Speed(MT/s)	Memory Capacity	Optane Memory Capable	TDP	R750
8358P	2.6	48	11.2	32	64	Turbo	3200	6TB	Y	240W	May '21 RTS
8352Y	2.2	48	11.2	32	64	Turbo	3200	6TB	Y	205W	May '21 RTS
8352V	2.1	54	11.2	36	72	Turbo	2933	6TB	Y	195W	May '21 RTS
8352S	2.2	48	11.2	32	64	Turbo	3200	6TB	Y	205W	May '21 RTS
8352M	2.3	48	11.2	32	64	Turbo	3200	6TB	Y	185W	Jul '21 RTS
8351N	2.4	54	11.2	36	72	Turbo	2933	6TB	Y	205W	May '21 RTS
6354	3	39	11.2	18	36	Turbo	3200	6TB	Y	235W	May '21 RTS
6348	2.6	42	11.2	28	56	Turbo	3200	6TB	Y	235W	May '21 RTS
6346	3.1	36	11.2	16	32	Turbo	3200	6TB	Y	205W	May '21 RTS
6342	2.8	36	11.2	24	48	Turbo	3200	6TB	Y	230W	Jul '21 RTS
6338	2	36	11.2	32	64	Turbo	3200	6TB	Y	205W	May '21 RTS
6338N	2.2	48	11.2	32	64	Turbo	3200	6TB	Y	185W	May '21 RTS
6336Y	2.4	36	11.2	24	48	Turbo	2666	6TB	Y	185W	Jul '21 RTS
6334	3.6	18	11.2	8	16	Turbo	3200	6TB	Y	165W	Jul '21 RTS
6330	2	42	11.2	28	56	Turbo	2933	6TB	Y	205W	May '21 RTS
6330N	2.2	42	11.2	28	56	Turbo	3200	6TB	Y	165W	May '21 RTS
6326	2.9	24	11.2	16	32	Turbo	3200	6TB	Y	185W	Jul '21 RTS
6314U	2.3	48	11.2	32	64	Turbo	2666	6TB	Y	205W	May '21 RTS
6312U	2.4	36	11.2	24	48	Turbo	3200	6TB	Y	185W	Jul '21 RTS
5320	2.2	39	11.2	26	52	Turbo	2933	6TB	Y	185W	Jul '21 RTS
5318Y	2.1	36	11.2	24	48	Turbo	2933	6TB	Y	165W	Jul '21 RTS
5317	3	18	11.2	12	24	Turbo	2933	6TB	Y	150W	Jul '21 RTS

Table 4. Supported processors for R750 (continued)

Proc	Clock Speed(GHz)	Cache (M)	UPI (GT/s)	Cores	Threads	Turbo	Memory Speed(MT/s)	Memory Capacity	Optane Memory Capable	TDP	R750
5315Y	3.2	12	11.2	8	16	Turbo	2933	6TB	Y	140W	Jul '21 RTS
4316	2.3	30	10.4	20	40	Turbo	2666	6TB	N	150W	Jul '21 RTS
4314	2.4	24	10.4	16	32	Turbo	2666	6TB	Y	135W	Jul '21 RTS
4310	2.1	18	10.4	12	24	Turbo	2666	6TB	N	120W	Jul '21 RTS
4309Y	2.8	12	10.4	8	16	Turbo	2666	6TB	N	105W	Jul '21 RTS

NOTE:

- 8368Q* requires liquid cooling
- 6312U and 6314U** are supported only in 1S configurations

5

Memory subsystem

The R750 supports up to 32 DIMMs, with maximum capacity around 12 TB per system for 8x512 GB Intel Optane Persistent Memory 200 Series and 8x 256 GB LRDIMM connected to per CPU and speeds of up to 3200MT/s.

The R750 supports registered (RDIMMs) and load reduced DIMMs (LRDIMMs) which use a buffer to reduce memory loading and provide greater density, allowing for the maximum platform memory capacity. Unbuffered DIMMs (UDIMMs) are not supported.

For detailed Intel Optane Persistent Memory 200 Series matrix support, please refer the tables below.

Topics:

Supported memory

The table below lists the memory technologies supported by the platform.

Table 5. Memory technology

Feature	PowerEdge R750 (DDR4)
DIMM type	RDIMM
	LRDIMM (DDP/3DS)
	3DS (Intel Optane Persistent Memory 200 Series)
Transfer speed	3200 MT/s
Voltage	1.2 V

Memory speed

The table below lists the memory configuration and performance details for PowerEdge R750 based on the quantity and type of DIMMs per memory channel.

Table 6. DIMM performance details

DIMM Type	DIMM Ranking	Capacity	DIMM Rated Voltage, Speed	Operating speed (MT/s)	
				1 DPC	2 DPC
RDIMM	1R	8 GB	DDR4 (1.2 V), 3200	3200	3200
RDIMM	2R	16 GB, 32 GB, 64 GB	DDR4 (1.2 V), 3200	3200	3200
LRDIMM	4R	128 GB	DDR4 (1.2 V), 3200	3200	3200
LRDIMM	8R	256 GB	DDR4 (1.2 V), 3200	3200	3200

6

Storage

Topics:

Storage controllers

Dell's RAID controller options offer performance improvements, including the fPERC solution. fPERC provides a base RAID HW controller without consuming a PCIe slot by using a small form factor and high-density connector to the base planar.

15G PERC Controller offerings will be a heavy leverage of 14G PERC family. The Value and Value Performance levels will carry over to 15G from 14G. New to 15G, is the Harpoon-based Premium Performance tier offering. This high-end offering will drive IOPs performance and enhanced SSD performance.

Table 7. PERC Series Controller Offerings

Performance Level	Controller and Description
Entry	S150 (SATA, NVMe) SW RAID SATA, NVMe
Value	H345, HBA355 (Internal/External)
Value Performance	H745, H755, H755N
Premium Performance	H840 Harpoon Chip (LSI 3508) Memory: 8GB DDR4 NV cache 72-bit memory 2133MHz Low profile form factors Dual A15 1.2GHz CPU X8PCIe 3.0, x8 12Gb SAS

Supported Drives

The table shown below lists the internal drives supported by the PowerEdge R750.

Table 8. Supported drives - SAS and SATA or NVMe SSD

Form Factor	Type	Speed	Rotational Speed	Capacities
2.5-inch	SATA SSD	6 Gb	N/A	240 GB, 480 GB, 960 GB, 1.92 TB, 3.84 TB

Table 8. Supported drives - SAS and SATA or NVMe SSD (continued)

Form Factor	Type	Speed	Rotational Speed	Capacities
	SAS	12 Gb	10 K	600 GB, 1.2 TB, 2.4 TB
	SAS	12 Gb	15 K	900 GB
	SAS SSD	12 Gb	N/A	400 GB, 480 GB, 800 GB, 960 GB, 1.6 TB, 1.92 TB, 3.84 TB, 6.4 TB, 7.68 TB, 12.8 TB, 15.36 TB
2.5-inch (U.2)	NVMe SSD	Gen4	N/A	400 GB, 800 GB, 960 GB, 1.6 TB, 1.92 TB, 3.2 TB, 3.84 TB, 6.4 TB, 7.68 TB
	NVMe SSD	Gen3	N/A	375 GB, 400 GB, 750 GB, 800 GB, 960 GB, 1.6 TB, 1.92 TB, 3.2 TB, 3.84 TB, 6.4 TB, 7.68 TB
3.5-inch	SATA	6 Gb	7.2 K	2 TB, 4 TB, 8 TB, 12 TB, 16 TB, 18 TB
	SAS	12 Gb	7.2 K	2 TB, 4 TB, 8 TB, 12 TB, 16TB, 18 TB
M.2	SATA SSD	6 GB	N/A	240 GB, 480 GB
uSD	N/A	N/A	uSD	16 GB, 32 GB, 64 GB

Internal storage configurations

The PowerEdge R750 internal storage configurations are available in the list below.

- 12x3.5" SAS/SATA
- 12x3.5" w/ rear 2x2.5" SAS/SATA or NVMe
- 12x3.5" SAS/SATA + 4x2.5" SAS/SATA or NVMe
- 8x2.5" NVMe
- 8x2.5" NVMe RAID
- 8x2.5" Universal
- 16x2.5" SAS/SATA
- 16x2.5" NVMe
- 16x2.5" NVMe RAID - Dual Controller Required
- 16x2.5" SAS/SATA + 8x2.5" NVMe
- 24x2.5" NVMe switch*
- 24x2.5" NVMe RAID switched - Dual Controller*
- 24x2.5" SAS/SATA
- 24x2.5" SAS/SATA with 8x Universal slots
- 24x2.5" SAS/SATA - Dual Controller
- 24x2.5" SAS/SATA + 2x2.5" SAS/SATA or NVMe
- 24x2.5" SAS/SATA + 2x2.5" SAS/SATA - Dual Controller
- 24x2.5" SAS/SATA + 4x2.5" SAS/SATA or NVMe
- 12x3.5" SAS/SATA + 4x2.5" NVMe - 1S only
- 12x3.5" + 4x2.5" SAS/SATA - 1S only
- 24x2.5" SAS/SATA with 4x Universal slots - 1S only

NOTE: *Available post-RTS.

External storage

The PowerEdge R750 supports the external storage device types listed in the table below.

Table 9. Supported external storage devices

Device Type	Description
External Tape	Supports connection to external USB tape products
NAS/IDM appliance software	Supports NAS software stack
JBOD	Supports connection to 12 Gb MD14xx and ME484 JBODs RBOD supports connection to 12 Gb ME40xx series

7

Networking

Topics:

Overview

PowerEdge offers a wide variety of options to get information moving to and from our servers. Industry best technologies are chosen and systems management features are added by our partners to firmware to tie in with iDRAC and Lifecycle Controller. These adapters are rigorously validated for worry-free, fully supported use in our servers.

Supported OCP cards

OCP NIC 3.0 and rack network daughter card (rNDC) comparisons

Table 10. PowerEdge R750 OCP 3.0, 2.0, and rNDC NIC Comparison

Form Factor	Dell rNDC	OCP 2.0 (LOM Mezz)	OCP 3.0	Note
PCIe Gen	Gen 3	Gen 3	Gen 4	Supported OCP3 are SFF (small form factor)
Max PCIe Lanes	x8	Up to x16	Up to x16	See server slot priority matrix
Shared LOM	Yes	Yes	Yes	This is iDRAC port redirect
Aux power	Yes	Yes	Yes	Used for shared LOM

SNAP I/O support

SNAP Input Output value proposition

Dual-socket servers offer ample compute power to meet the needs of a wide range of workloads. However, if the network adapters in the system are unbalanced, users may be at risk of creating a bottleneck that will reduce bandwidth and increase latency. SNAP I/O is a solution which leverages Mellanox socket direct technology to balance I/O performance without increasing the TCO. By allowing both processors to share one adapter, data can avoid traversing the UPI inter-processor link when accessing remote memory.

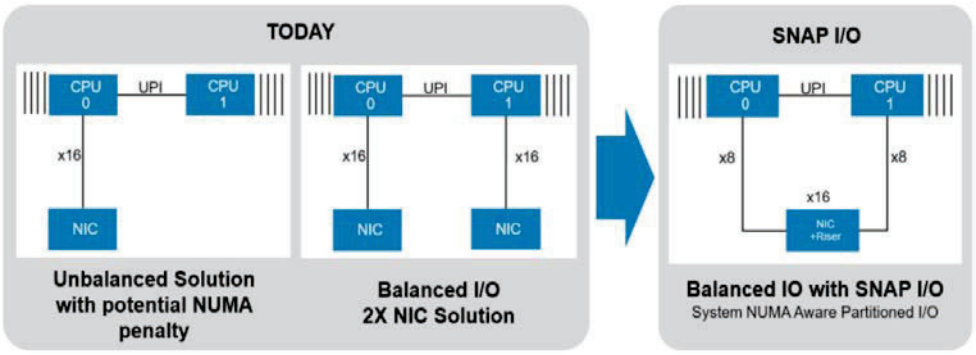

Figure 15. Comparing an unbalanced one-NIC solution and a balanced two-NIC solution to a SNAP I/O one-NIC solution.

The SNAP I/O solution on the right allows CPU 0 and 1 to communicate to their corresponding NIC card without traversing the UPI channels, therefore reducing latency/TCO and freeing up UPI bandwidth for applications.

8

PCIe subsystem

Topics:

- PCIe risers

PCIe risers

The PowerEdge R750 have a no riser option. Shown below are the riser offerings for the PowerEdgeR750.

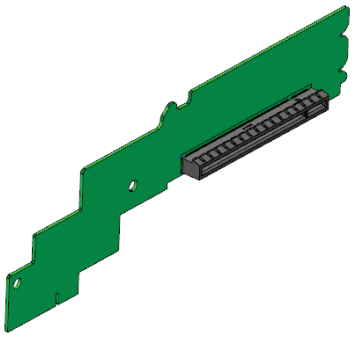

Figure 16. Riser 1A: 1 slot

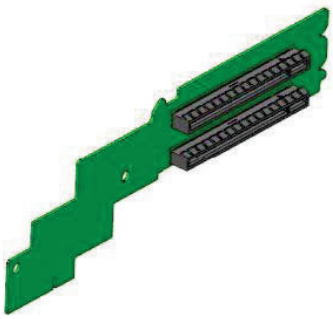

Figure 17. Riser 1B: 2 slots

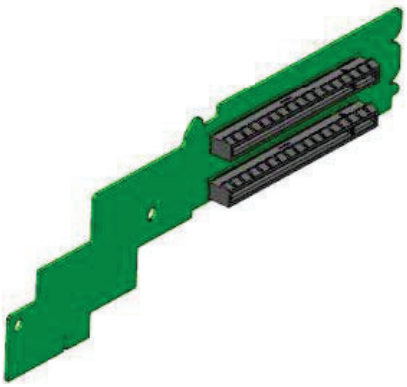

Figure 18. Riser 1C: 2 slots

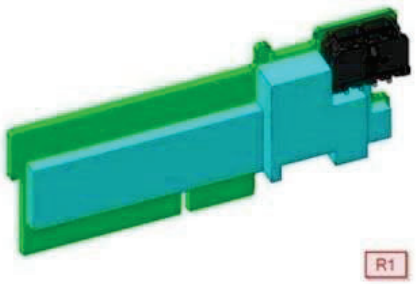

Figure 19. R1 Paddle (routes PCIe lanes to front backplane for additional NVMe)

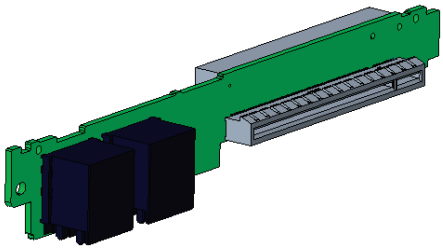

Figure 20. Riser 2A: 2 Slots

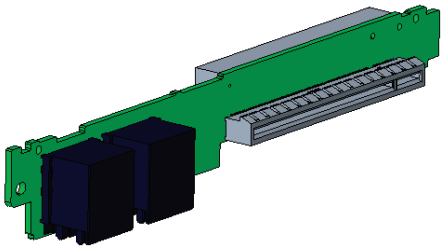

Figure 21. R750 Riser 2B: 2 Slots

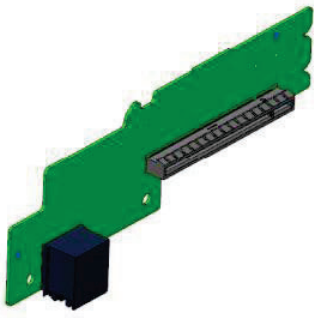

Figure 22. Riser 3A: 1 Slot

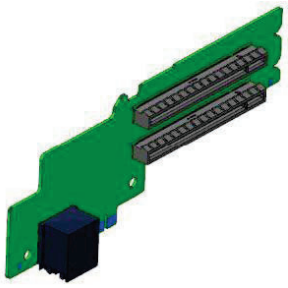

Figure 23. Riser 3B: 2 Slots

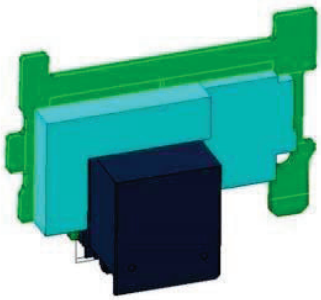

Figure 24. R3 Paddle (routes PCIe lanes to front backplane for additional NVMe)

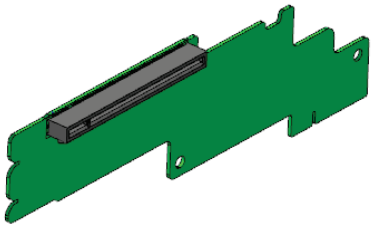

Figure 25. Riser 4A: 1 Slot

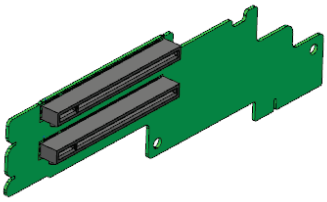

Figure 26. Riser 4B: 2 Slots

Table 11. Riser offerings

Config No.	RSR configuration	No.of CPUs	PERC type supported	Rear storage possible	x8 CPU1	x16 CPU1	x8 CPU 2	x16 CPU 2
0	R1b+R4b	2	fPERC/ Adapter	No	2	0	2	0
1	R1b+R2a+R 3b+R4b	2	fPERC/ Adapter	No	2	1	4	1
2-1	R1a+R2a+R 3b+R4a (FL)	2	fPERC/ Adapter	No	0	2	2	2

Table 11. Riser offerings (continued)

Config No.	RSR configuration	No.of CPUs	PERC type supported	Rear storage possible	x8 CPU1	x16 CPU1	x8 CPU 2	x16 CPU 2
2-2	R1a+R2a+R3b+R4a (HL)	2	fPERC/ Adapter	No	0	2	2	2
3-1	R1a+R2b+R3b+R4a (FL)	2	fPERC	No	0	2	3	1
3-2	R1a+R2b+R3b+R4a (HL)	2	fPERC	No	0	2	3	1
4-1	R1c+R2a+R3a+R4a (FL)	2	fPERC	No	0	3	0	3
4-2	R1c+R2a+R3a+R4a (HL)	2	fPERC	No	0	3	0	3
5	R2a+R4b	2	fPERC/ Adapter	Yes	0	1	2	1
6	R1b+R2a+R4b	2	fPERC/ Adapter	Yes	2	1	2	1
7	R2a+R4b + R1-paddle for XA cable + R3-paddle for XA cable	2	No	No	0	1	2	1
8	R1b+R2a	1	fPERC	No	2	1	0	0
9	R2a	1	Adapter	Yes	0	1	0	0

9

Power, thermal, and acoustics

Topics:

- Power
- Thermal
- Acoustics

Power

Table 12. Power tools and technologies

Feature	Description
Power Supply Units(PSU) portfolio	Dell's PSU portfolio includes intelligent features such as dynamically optimizing efficiency while maintaining availability and redundancy. Find additional information in the Power supply units section.
Industry Compliance	Dell's servers are compliant with all relevant industry certifications and guidelines, including 80 PLUS, Climate Savers, and ENERGY STAR.
Power monitoring accuracy	PSU power monitoring improvements include: ● Dell's power monitoring accuracy is currently 1%, whereas the industry standard is 5% ● More accurate reporting of power ● Better performance under a power cap
Power capping	Use Dell's systems management to set the power cap limit for your systems to limit the output of a PSU and reduce system power consumption.
Systems Management	iDRAC Enterprise provides server- level management that monitors, reports, and controls power consumption at the processor, memory, and system level. Dell OpenManage Power Center delivers group power management at the rack, row, and data center level for servers, power distribution units, and uninterruptible power supplies.
Rack infrastructure	Dell offers some of the industry's highest- efficiency power infrastructure solutions, including: ● Power distribution units (PDUs) ● Uninterruptible power supplies (UPSs) ● Energy Smart containment rack enclosures

Thermal

PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps regulate temperature thereby reducing server noise and power consumption.

Acoustics

Acoustical performance

Dell EMC PowerEdge R750 is a rack-mount server appropriate for attended data center environment. However, lower acoustical output is attainable with proper hardware or software configurations. For example, the minimum configuration of R750 is quiet enough for typical office environment.

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Rack information

The PowerEdge R750 offers two different varieties of sliding rails: Drop-in sliding rails, and combination Stab-in/Drop-in sliding rails. Only one variety of static rail is offered: stab-in.

A “Drop-in” design means that the system is installed vertically into the rails by inserting the standoffs on the sides of the system into the “J-slots” in the inner rail members with the rails in the fully extended position. The recommended method of installation is to first insert the rear standoffs on the system into the rear J-slots on the rails in order to free up a hand and then rotate the system down into the remaining J-slots while using the free hand to hold the rail against the side of the system.

A “Stab-in” design means that means that the inner (chassis) rail members must first be attached to the sides of the system and then inserted into the outer (cabinet) members installed in the rack. For 2U systems, this is a 2- person lift.

Topics:

Static rails

The static rails (shown in the figure below) support a wider variety of racks than the sliding rails, but do not support serviceability in the rack. The static rails are not compatible with the CMA and SRB.

B4 Ready Rails Static Rails for 4-post & 2-post Racks:

- Supports Stab-in installation of the chassis to the rails.
- Support tool-less installation in 19 inches EIA-310-E compliant square or unthreaded round hole 4-post racks including all generations of Dell racks
- Support tooled installation in 19 inches EIA-310-E compliant threaded hole 4-post and 2-post racks
- Support for tooled installation in Dell EMC Titan or Titan-D rack

NOTE:

- Screws are not included with the static rail kit since racks are offered with various thread types. The screws are provided for mounting static rails in racks with threaded mounting flanges
- Screw head diameter should be 10 mm or less.

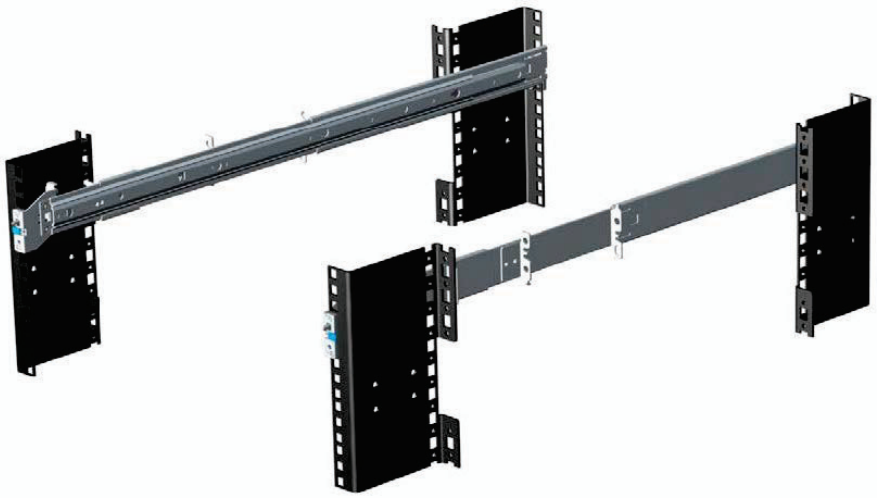

Figure 27. Static Rails

Sliding rails

The sliding rails (shown in the figure below) allow the system to be fully extended out of the rack for service. The sliding rails have a CMA and a SRB option. There are two types of Sliding rails available in 15G, ReadyRails II sliding rails and Stab-in/Drop-in sliding rails.

B6 ReadyRails™ II sliding rails for 4-post racks:

- Supports Drop-in Installation of the chassis to the rails.
- Support for tool-less installation in 19 inches EIA-310-E compliant square or unthreaded round hole 4-post racks including all generations of Dell racks.
- Support for tooled installation in 19 inches EIA-310-E compliant threaded hole 4-post racks.
- Support full extension of the system out of the rack to allow serviceability of key internal components.
- Support for optional cable management arm (CMA).
- Support for optional strain relief bar (SRB).

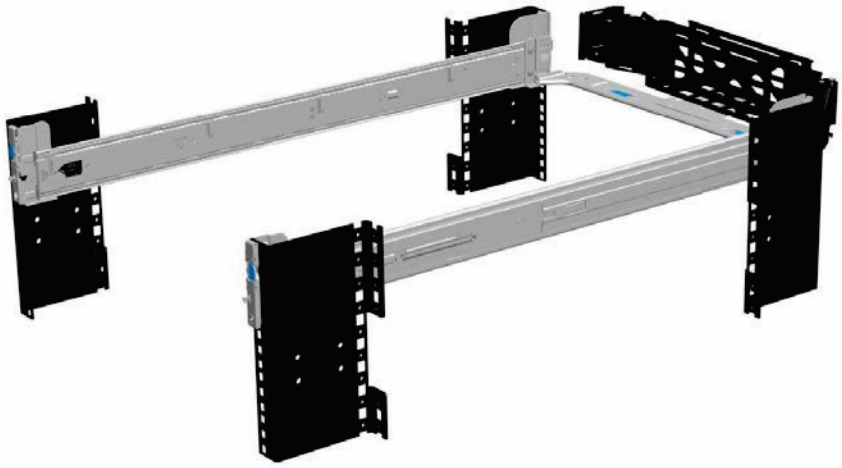

Figure 28. Sliding rails with optional CMA

Figure 29. Sliding rails with optional SRB

B13 Stab-in/Drop-in Sliding Rails for 4-post Racks

- Supports Drop-in or Stab-in installation of the chassis to the rails.
- Support for tool-less installation in 19 inches EIA-310-E compliant square, unthreaded round hole racks including all generations of Dell racks. Also supports tool-less installation in threaded round hole 4-post racks.
- Support full extension of the system out of the rack to allow serviceability of key internal components.
- Support for optional cable management arm (CMA).
- Support for optional strain relief bar (SRB).

NOTE:

- For situations where CMA support is not required, the outer CMA mounting brackets can be uninstalled from the sliding rails. This reduces the overall length of the rails and eliminates the potential interferences with rear mounted PDUs or the rear rack door.
- Scan the QRL code for the documentation and trouble-shooting information regarding the installation procedures for Drop-in/Stab in rail types.

11

Supported Operating Systems

The following lists the supported operating systems for the PowerEdge R750:

- RedHat Enterprise Linux 7.9 Server x86_64
- RedHat Enterprise Linux 8.2 Server x86_64
- RedHat Enterprise Linux 8.3 Server x86_64
- Novell SuSE Linux Enterprise Server 15 SP2 x86_64
- MS, Windows Server 2016
- MS, Windows Server 2019
- Ubuntu 20.04
- VMWare vSphere 7.0 U2 (ESXi 7.0 U2)
- VMWare vSphere 2019 (ESXi 2019)
- Citrix Xen Server 8.2 LTSR

The link to the specific OS versions and editions, certification matrices, Hardware Compatibility Lists (HCL) portal, and Hypervisor support can be found at Dell EMC Enterprise Operating Systems

12

Dell EMC OpenManage systems management

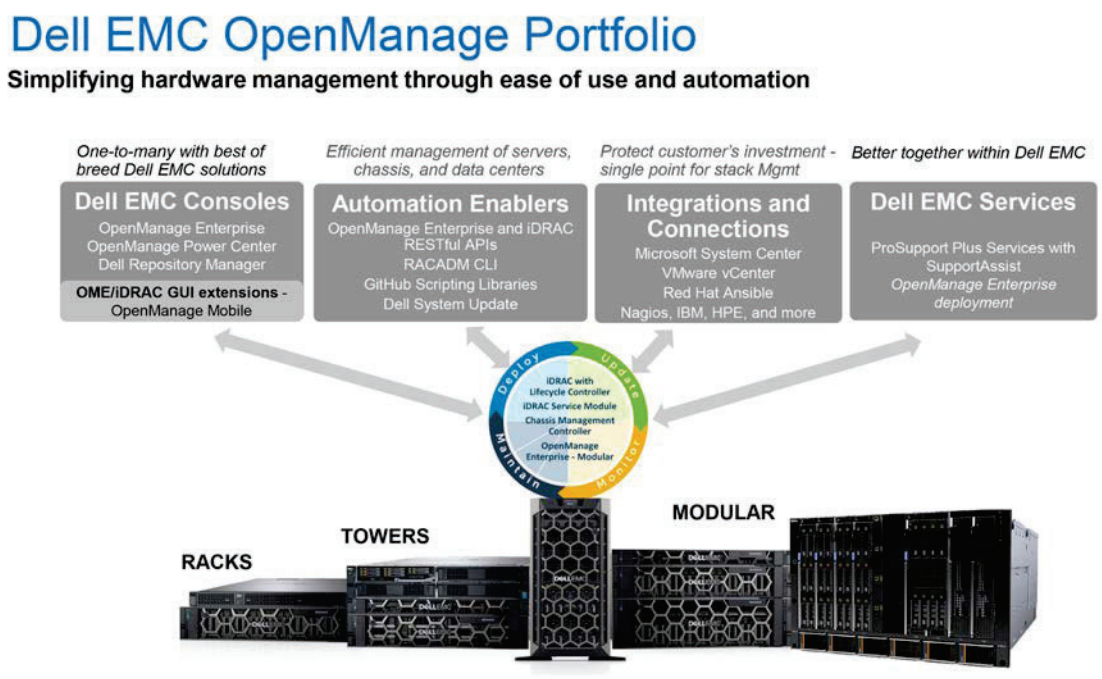

Figure 30. Dell EMC OpenManage Portfolio

Dell EMC delivers management solutions that help IT Administrators effectively deploy, update, monitor, and manage IT assets. OpenManage solutions and tools enable you to quickly respond to problems by helping them to manage Dell EMC servers effectively and efficiently; in physical, virtual, local, and remote environments, operating in-band, and out-of-band (agent-free). The OpenManage portfolio includes innovative embedded management tools such as the integrated Dell Remote Access Controller (iDRAC), Chassis Management Controller and Consoles like OpenManage Enterprise, OpenManage Power Manager plug in, and tools like Repository Manager.

Dell EMC has developed comprehensive systems management solutions based on open standards and has integrated with management consoles that can perform advanced management of Dell hardware. Dell EMC has connected or integrated the advanced management capabilities of Dell hardware into offerings from the industry's top systems management vendors and frameworks such as Ansible, thus making Dell EMC platforms easy to deploy, update, monitor, and manage.

The key tools for managing Dell EMC PowerEdge servers are iDRAC and the one-to-many OpenManage Enterprise console. OpenManage Enterprise helps the system administrators in complete lifecycle management of multiple generations of PowerEdge servers. Other tools such as Repository Manager, which enables simple yet comprehensive change management.

OpenManage tools integrate with systems management framework from other vendors such as VMware, Microsoft, Ansible, and ServiceNow. This enables you to use the skills of the IT staff to efficiently manage Dell EMC PowerEdge servers.

Topics:

Server and Chassis Managers

- Integrated Dell Remote Access Controller (iDRAC)
- iDRAC Service Module (iSM)

Dell EMC consoles

- Dell EMC OpenManage Enterprise
- Dell EMC Repository Manager (DRM)
- Dell EMC OpenManage Enterprise Power Manager plugin to OpenManage Enterprise
- Dell EMC OpenManage Mobile (OMM)

Automation Enablers

- OpenManage Ansible Modules
- iDRAC RESTful APIs (Redfish)
- Standards-based APIs (Python, PowerShell)
- RACADM Command Line Interface (CLI)
- GitHub Scripting Libraries

Integration with third-party consoles

- Dell EMC OpenManage Integrations with Microsoft System Center
- Dell EMC OpenManage Integration for VMware vCenter (OMIVV)
- Dell EMC OpenManage Ansible Modules
- Dell EMC OpenManage Integration with ServiceNow

Connections for third-party consoles

- Micro Focus and other HPE tools
- OpenManage Connection for IBM Tivoli
- OpenManage Plug-in for Nagios Core and XI

Dell EMC Update Utilities

- Dell System Update (DSU)
- Dell EMC Repository Manager (DRM)
- Dell EMC Update Packages (DUP)
- Dell EMC Server Update Utility (SUU)
- Dell EMC Platform Specific Bootable ISO (PSBI)

Dell resources

For additional information about white papers, videos, blogs, forums, technical material, tools, usage examples, and other information, go to the OpenManage page at https://www.dell.com/openmanagemanuals or the following product pages:

Table 13. Dell resources

Resource	Location
Integrated Dell Remote Access Controller (iDRAC)	https://www.dell.com/idracmanuals
iDRAC Service Module (iSM)	https://www.dell.com/support/kbdoc/000178050/
OpenManage Ansible Modules	https://www.dell.com/support/kbdoc/000177308/
OpenManage Essentials (OME)	https://www.dell.com/support/kbdoc/000175879/
OpenManage Mobile (OMM)	https://www.dell.com/support/kbdoc/000176046
OpenManage Integration for VMware vCenter (OMIVV)	https://www.dell.com/support/kbdoc/000176981/
OpenManage Integration for Microsoft System Center (OMIMSSC)	https://www.dell.com/support/kbdoc/000147399
Dell EMC Repository Manager (DRM)	https://www.dell.com/support/kbdoc/000177083
Dell EMC System Update (DSU)	https://www.dell.com/support/kbdoc/000130590
Dell EMC Platform Specific Bootable ISO (PSBI)	Dell.com/support/article/sln296511
Dell EMC Chassis Management Controller (CMC)	www.dell.com/support/article/sln311283
OpenManage Connections for Partner Consoles	https://www.dell.com/support/kbdoc/000146912
OpenManage Enterprise Power Manager	https://www.dell.com/support/kbdoc/000176254
OpenManage Integration with ServiceNow (OMISNOW)	Dell.com/support/article/sln317784

NOTE: Features may vary by server. Please refer to the product page on https://www.dell.com/manuals for details.

13

Dell Technologies Services

Dell Technologies Services include a wide, customizable range of service choices to simplify the assessment, design, implementation, management and maintenance of IT environments and to help you transition from platform to platform. Depending on your current business requirements and the level of service right for you, we provide factory, on-site, remote, modular, and specialized services that fit your needs and budget. We'll help with a little or a lot—your choice—and provide access to our global resources.

For more information, see DellEMC.com/Services.

Topics:

Dell EMC ProDeploy Enterprise Suite

ProDeploy Enterprise Suite gets your server out of the box and into optimized production—fast. Our elite deployment engineers with broad and deep experience utilizing best-in-class processes along with our established global scale can help you around the clock and around the globe. From simple to the most complex server installations and software integration, we take the guess work and risk out of deploying your new server technology.

		Basic Deployment	ProDeploy	ProDeploy Plus
Pre-deployment	Single point of contact for project management	-	●	In-region
	Site readiness review	-	●	●
	Implementation planning	-	●	●
	SAM engagement for ProSupport Plus entitled devices	-	-	●
Deployment	Deployment service hours	Business hours	24x7	24x7
	Remote guidance for hardware installation or Onsite hardware installation and packaging material removal	Onsite	Remote or Onsite	Onsite
	Install and configure system software	-	Remote	Onsite
	Install support software and connect with Dell Technologies	-	●	●
	Project documentation with knowledge transfer	-	●	●
Post-deployment	Deployment verification	-	●	●
	Configuration data transfer to Dell EMC technical support	-	●	●
	30-days of post-deployment configuration assistance	-	-	●
	Training credits for Dell EMC Education Services	-	-	●

Figure 31. ProDeploy Enterprise Suite capabilities

NOTE: Hardware installation not applicable on selected software products.

Dell EMC ProDeploy Plus

From beginning to end, ProDeploy Plus provides the skill and scale needed to successfully execute demanding deployments in today's complex IT environments. Certified Dell EMC experts start with extensive environmental assessments and detailed migration planning and recommendations. Software installation includes set up of most versions of Dell EMC SupportAssist and OpenManage system management utilities. Post-deployment configuration assistance, testing, and product orientation services are also available.

Dell EMC ProDeploy

ProDeploy provides full service installation and configuration of both server hardware and system software by certified deployment engineers including set up of leading operating systems and hypervisors as well as most versions of Dell EMC SupportAssist and OpenManage system management utilities. To prepare for the deployment, we conduct a site readiness review and implementation planning exercise. System testing, validation, and full project documentation with knowledge transfer complete the process.

Basic Deployment

Basic Deployment delivers worry-free professional installation by experienced technicians who know Dell EMC servers inside and out.

Dell EMC Server Configuration Services

With Dell EMC Rack Integration and other Dell EMC PowerEdge Server Configuration Services, you save time by receiving your systems racked, cabled, tested, and ready to integrate into the data center. Dell EMC staff pre-configure RAID, BIOS and iDRAC settings, install system images, and even install third-party hardware and software.

For more information, see Server Configuration Services.

Dell EMC Residency Services

Residency Services helps customers transition to new capabilities quickly with the assistance of on-site or remote Dell EMC experts whose priorities and time you control. Residency experts can provide post implementation management and knowledge transfer related to a new technology acquisition or day-to-day operational management of the IT infrastructure.

Dell EMC Remote Consulting Services

When you are in the final stages of your PowerEdge server implementation, you can rely on Dell EMC Remote Consulting Services and our certified technical experts to help you optimize your configuration with best practices for your software, virtualization, server, storage, networking, and systems management.

Dell EMC Data Migration Service

Protect your business and data with our single point of contact to manage your data migration project. Your project manager will work with our experienced team of experts to create a plan using industry-leading tools and proven processes based on global best practices to migrate your existing files and data so your business system get up and running quickly and smoothly.

Dell EMC ProSupport Enterprise Suite

With the ProSupport Enterprise Suite, we help keep your IT systems running smoothly, so you can focus on running your business. We will help maintain peak performance and availability of your most essential workloads. ProSupport Enterprise Suite is a suite of support services that enable you to build the solution that is right for your organization.

Choose support models based on how you use technology and where you want to allocate resources. From the desktop to the data center, address everyday IT challenges, such as unplanned downtime, mission-critical needs, data and asset protection, support planning, resource allocation, software application management and more. Optimize IT resources by choosing the right support model.

Figure 32. Dell EMC ProSupport Enterprise Suite

Dell EMC ProSupport Plus for Enterprise

When you purchase your PowerEdge server, we recommend ProSupport Plus, our proactive and preventative support service for your business-critical systems. ProSupport Plus provides you with all the benefits of ProSupport, plus the following:

- An assigned Services Account Manager who knows your business and your environment
- Immediate advanced troubleshooting from an engineer who understands your PowerEdge server
- Personalized, preventive recommendations based on analysis of support trends and best practices from across the Dell Technologies infrastructure solutions customer base to reduce support issues and improve performance
- Predictive analysis for issue prevention and optimization enabled by SupportAssist
- Proactive monitoring, issue detection, notification, and automated case creation for accelerated issue resolution enabled by SupportAssist
- On-demand reporting and analytics-based recommendations enabled by SupportAssist and TechDirect

Dell EMC ProSupport for Enterprise

Our ProSupport service offers highly trained experts around the clock and around the globe to address your IT needs. We help minimize disruptions and maximize availability of PowerEdge server workloads with:

- 24x7 support through phone, chat and online
- Predictive, automated tools and innovative technology
- A central point of accountability for all hardware and software issues
- Collaborative 3rd party support
- Hypervisor, operating system and application support
- Consistent experience regardless of where you are located or what language you speak
- Optional onsite parts and labor response options including next business day or four-hour mission critical

NOTE: Subject to service offer country availability.

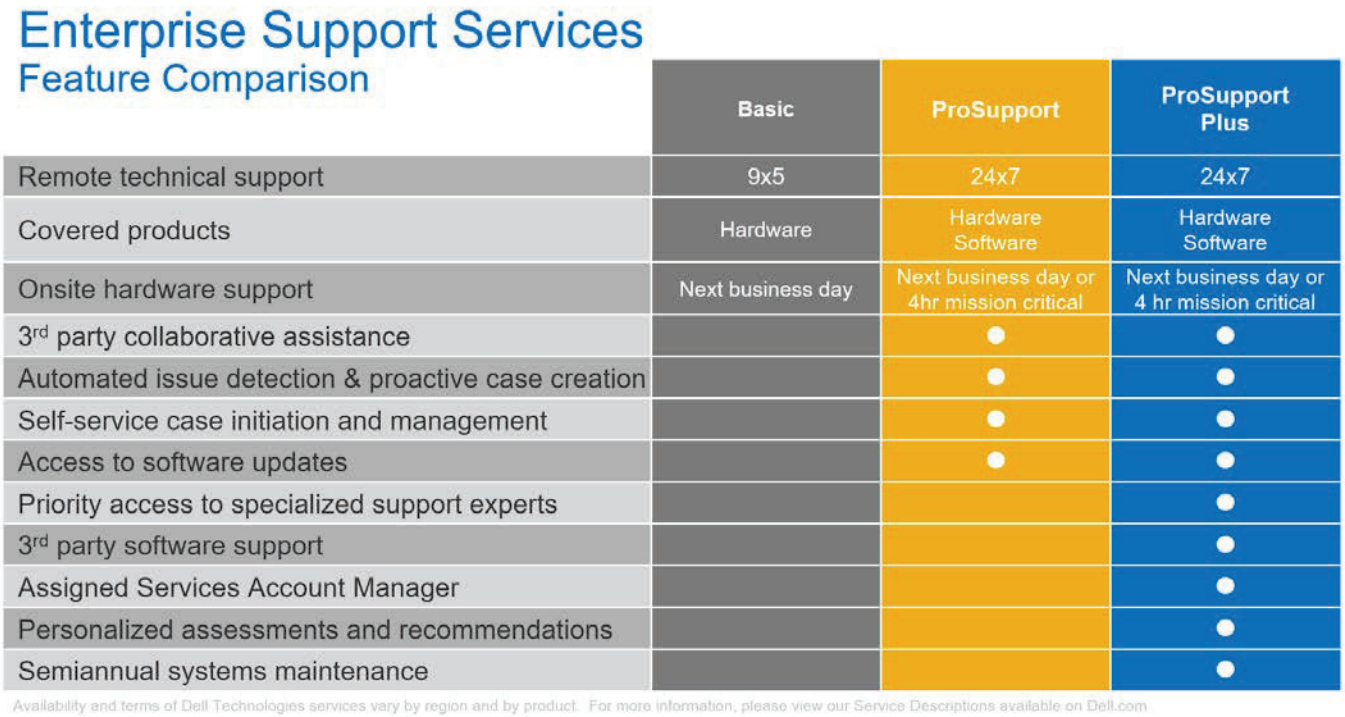

Figure 33. Dell EMC Enterprise Support model

Dell EMC ProSupport One for Data Center

ProSupport One for Data Center offers flexible site-wide support for large and distributed data centers with more than 1,000 assets. This offering is built on standard ProSupport components that leverage our global scale but are tailored to your company's needs. While not for everyone, this service option offers a truly unique solution for Dell Technologies largest customers with the most complex environments.

- Team of assigned Services Account Managers with remote, on-site options
- Assigned ProSupport One technical and field engineers who are trained on your environment and configurations
- On-demand reporting and analytics-based recommendations enabled by SupportAssist and TechDirect
- Flexible on-site support and parts options that fit your operational model
- A tailored support plan and training for your operations staff

ProSupport for HPC

The ProSupport for HPC provides solution-aware support including:

- Access to senior HPC experts
- Advanced HPC cluster assistance: performance, interoperability & configuration
- Enhanced HPC solution level end-to-end support
- Remote pre-support engagement with HPC Specialists during ProDeploy implementation

Learn more at DellEMC.com/HPC-Services.

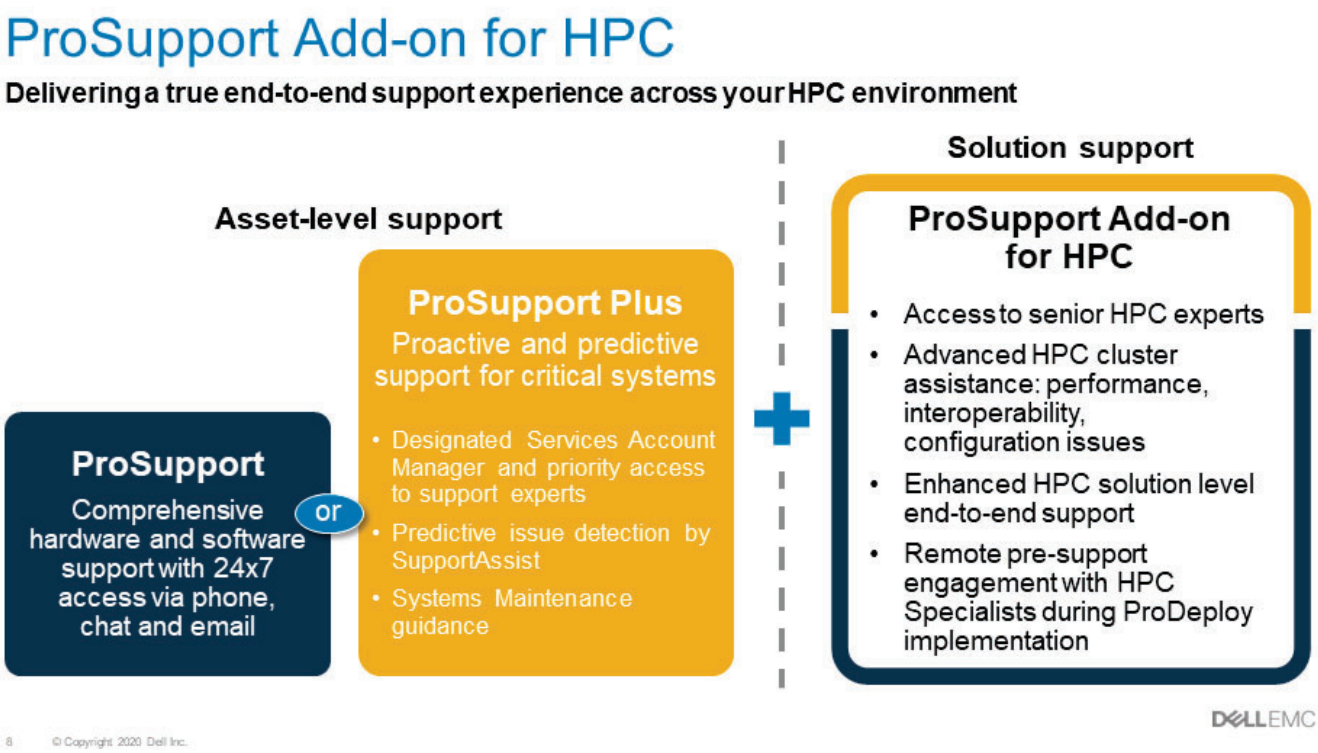

Figure 34. ProSupport for HPC

Support Technologies

Powering your support experience with predictive, data-driven technologies.

Dell EMC SupportAssist

The best time to solve a problem is before it happens. The automated proactive and predictive technology SupportAssist helps reduce steps and time to resolution, often detecting issues before they become a crisis. Benefits include:

- Value—SupportAssist is available to all customers at no additional charge
- Improve productivity—replace manual, high-effort routines with automated support
- Accelerate time to resolution—receive issue alerts, automatic case creation, and proactive contact from Dell EMC experts
- Gain insight and control—optimize enterprise devices with on-demand ProSupport Plus reporting in TechDirect, and get predictive issue detection before the problem starts

NOTE: SupportAssist is included with all support plans, but features vary based on service level agreement.

	Basic Hardware Warranty	ProSupport	ProSupport Plus
Automated issue detection and system state information collection	•	•	•
Proactive, automated case creation and notification		•	•
Predictive issue detection for failure prevention			•
Recommendation reporting available on-demand in TechDirect			•

Figure 35. SupportAssist model

Get started at Dell.com/SupportAssist

Dell EMC TechDirect

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Reduce the cost, complexity, and risk of managing IT. Focus your resources on digital innovation and transformation while our experts help optimize your IT operations and investment with managed services backed by guaranteed service levels.

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Appendix A: Additional specifications

Topics:

- Chassis dimension
- Chassis weight
- Video specifications
- USB ports
- PSU rating
- Environmental Specifications

Chassis dimension

The PowerEdge R750 has the following dimensions:

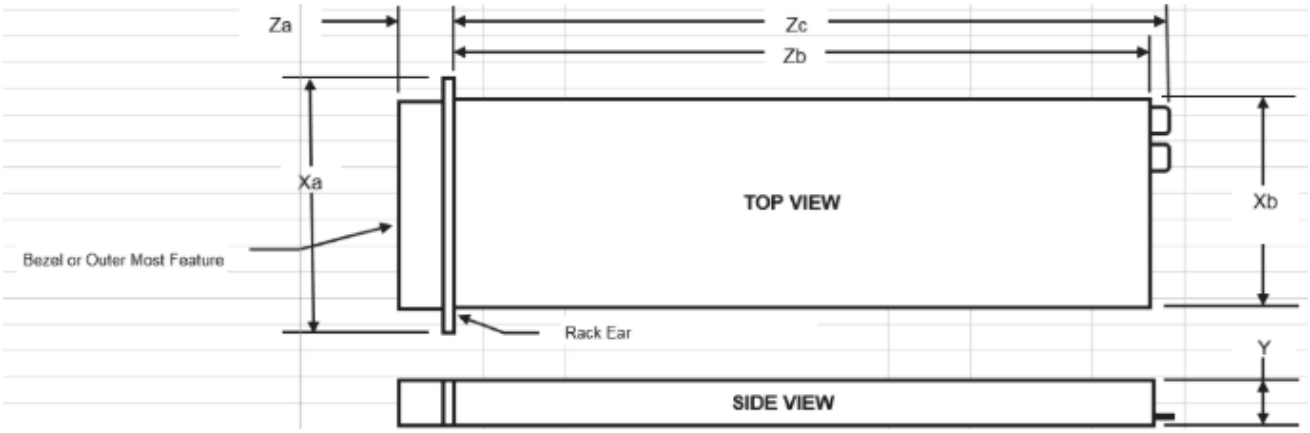

Figure 36. Chassis dimensions

Table 14. Chassis dimensions

Model number	Xa	Xb	Y	Za with bezel	Za without bezel	Zb	Zc	Max Sys Wgt	Chassis (U)
R750	482 mm	434 mm	86.8 mm	35.84 mm	22 mm	700.7 mm	736.29 mm	35.3 kg	2U

Chassis weight

Table 15. Chassis weight

System	Maximum weight
12x 3.5-inch chassis	35.3 kg
8x 2.5-inch chassis	29.6 Kg
16x 2.5-inch chassis	32.6 kg

Table 15. Chassis weight (continued)

System	Maximum weight
24x 2.5-inch chassis	35.2 kg
No drive chassis	27.7 kg

Video specifications

The PowerEdge R750 supports the following video resolution and refresh rates:

Table 16. Video specifications for PowerEdge R750

Resolution	Refresh Rate	Freq.	Pixel Clock	DVO DisplayPort
1024 x 768	60 Hz	48.4 kHz	65.0 MHz	Yes*
1280 x 800	60 Hz	49.7 kHz	83.5 MHz	Yes*
1280 x 1024	60 Hz	64.0 kHz	108.0 MHz	Yes*
1360 x 768	60 Hz	47.71 kHz	85.5 MHz	Yes*
1440 x 900	60 Hz	55.9 kHz	106.5 MHz	Yes*
1600 x 900	60 Hz	55.54 kHz	97.75 MHz	Yes*
1600 x 1200	60 Hz	75.0 kHz	162.0 MHz	Yes*
1680 x 1050	60 Hz	64.7 kHz	119.0 MHz	Yes*
1920 x 1080	60 Hz (RB)	67.158 kHz	173.0 MHz	No
1920 x 1200	60 Hz (RB)	74.556 kHz	193.25 MHz	No

*DVO - DP is for investigation only, dependent on Nuvoton DVO capabilities to support up to 165MHz.

*(RB) - Reduced Blanking for Digital Displays requiring less blank time. This was introduced for Signal Integrity improvements by reducing Pixel Clock rates for VGA- Analog input devices.

USB ports

All USB ports follow USB specifications. Front USB 2.0 port only supports output current up to 0.5A and can't support high power consumption devices such as CD-ROM. The bottom port of the rear USB connector can support USB 3.0 to supply output current up to 0.9A.

Figure 37. Front USB 2.0

Figure 38. Rear USB 3.0 port (bottom) and USB 2.0 port (top)

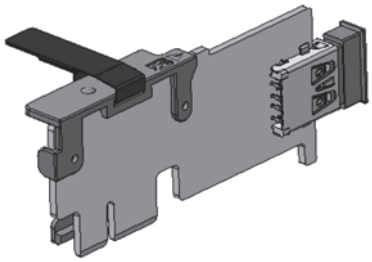

Figure 39. Internal USB 3.0 Card, size is 40 x 16 x 8 mm (L x W x H)

PSU rating

Below table lists the power capacity the PSUs in High/Low line operation mode.

Table 17. PSUs Highline and Lowline ratings

Highline and lowline ratings	700 W Titanium	800 W Platinum	1100 W Titanium	1400 W -48 V DC	1400 W Platinum	1800 W Titanium	2400 W Platinum	2800 W Titanium
Peak Power (Highline/-72 V DC)	1190 W	1360 W	1870 W	1870 W	2380 W	3060 W	4080 W	4760 W
Highline/-72 V DC	700 W	800 W	1100 W	1100 W	1400 W	1800 W	2400 W	2800 W
Peak Power (Lowline/-40 V DC)	N/A	1360 W	1785 W	1870 W	1785 W	N/A	2380 W	N/A
Lowline/-40 V DC	N/A	800 W	1050 W	1100 W	1050 W	N/A	1400 W	N/A
Highline 240 V DC	700 W	800 W	1100 W	N/A	1400 W	1800 W	2400 W	2800 W
Highline 200-380 V DC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DC -48-60 V	N/A	N/A	N/A	1100 W	N/A	N/A	N/A	N/A

The PowerEdge R750 supports up to 2 AC power supplies with 1+1 redundancy, autosensing, and auto-switching capability.

If two PSUs are present during POST, a comparison is made between the wattage capacities of the PSUs. In the event that the PSU wattages do not match, the larger of the two PSUs is enabled. Also, there is a PSU mismatch warning displayed in BIOS, iDRAC, or on the System LCD.

If a second PSU is added at run-time, in order for that particular PSU to be enabled, the wattage capacity of the first PSU must equal the second PSU. Otherwise, the PSU will be flagged as unmatched in iDRAC and the second PSU will not be enabled.

Dell PSUs have achieved Platinum efficiency levels as shown in the table below.

Table 18. PSU Efficiency Levels

Efficiency Targets by Load						
Output	**Class**	**Form Factor**	**10%**	**20%**	**50%**	**100%**
700 W AC	Titanium	60 mm	90.00%	94.00%	96.00%	91.50%
800 W AC	Platinum	60 mm	89.00%	93.00%	94.00%	91.50%
1100 W AC	Titanium	60 mm	90.00%	94.00%	96.00%	91.50%
1100 W -48 V DC	N/A	60 mm	85.00%	90.00%	92.00%	90.00%
1400 W AC	Platinum	60 mm	89.00%	93.00%	94.00%	91.50%
1800 W AC	Titanium	60 mm	90.00%	94.00%	96.00%	94.00%
2400 W AC	Platinum	86 mm	89.00%	93.00%	94.00%	91.50%
2800 W AC	Titanium	86 mm	90.00%	94.00%	96.00%	94.00%

Environmental Specifications

See the *PowerEdge R750 Technical Specifications* on www.dell.com/poweredgemanuals for detailed environmental specifications.

Thermal restrictions

See *Dell EMC PowerEdge R750 Technical Specifications* on www.dell.com/poweredgemanuals for detailed thermal restrictions.

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Appendix B. Standards compliance

The system conforms to the following industry standards.

Table 19. Industry standard documents

Standard	URL for information and specifications
ACPIAdvance Configuration and Power Interface Specification, v2.0c	https://uefi.org/specsandtesttools
Ethernet IEEE 802.3-2005	https://standards.ieee.org/
HDGHardware Design Guide Version 3.0 for Microsoft Windows Server	microsoft.com/whdc/system/platform/pcdesign/desguide/serverdg.mspx
IPMI Intelligent Platform Management Interface, v2.0	intel.com/design/servers/ipmi
DDR4 Memory DDR4 SDRAM Specification	jedec.org/standards-documents/docs/jesd79-4.pdf
PCI Express PCI Express Base Specification Rev. 2.0 and 3.0	pcisig.com/specifications/pciexpress
PMBus Power System Management Protocol Specification, v1.2	http://pmbus.org/Assets/PDFS/Public/PMBus_Specification_Part_I_Rev_1-1_20070205.pdf
SAS Serial Attached SCSI, v1.1	http://www.t10.org/
SATA Serial ATA Rev. 2.6; SATA II, SATA 1.0a Extensions, Rev. 1.2	sata-io.org
SMBIOS System Management BIOS Reference Specification, v2.7	dmtf.org/standards/smbios
TPM Trusted Platform Module Specification, v1.2 and v2.0	trustedcomputinggroup.org
UEFI Unified Extensible Firmware Interface Specification, v2.1	uefi.org/specifications
USB Universal Serial Bus Specification, Rev. 2.7	usb.org/developers/docs

Appendix C Additional resources

Table 20. Additional resources

Resource	Description of contents	Location
Installation and Service Manual	This manual, available in PDF format, provides the following information: • Chassis features • System Setup program • System indicator codes • System BIOS • Remove and replace procedures • Diagnostics • Jumpers and connectors	Dell.com/Support/Manuals
Getting Started Guide	This guide ships with the system, and is also available in PDF format. This guide provides the following information: • Initial setup steps	Dell.com/Support/Manuals
Rack Installation Guide	This document ships with the rack kits, and provides instructions for installing a server in a rack.	Dell.com/Support/Manuals
System Information Label	The system information label documents the system board layout and system jumper settings. Text is minimized due to space limitations and translation considerations. The label size is standardized across platforms.	Inside the system chassis cover
Quick Resource Locator (QRL)	This code on the chassis can be scanned by a phone application to access additional information and resources for the server, including videos, reference materials, service tag information, and Dell EMC contact information.	Inside the system chassis cover
Enterprise Infrastructure Planning Tool (EIPT)	The Dell EMC online EIPT enables easier and more meaningful estimates to help you determine the most efficient configuration possible. Use EIPT to calculate the power consumption of your hardware, power infrastructure, and storage.	Dell.com/calc

Luminex
NETWORK INTELLIGENCE

PRODUCT SPECIFICATIONS

GigaCore 30i 1 Gigabit

Description: Technical specifications GigaCore 30i - 1G - range | REVISION: 20220922-REV 1.0.1

MADE IN BELGIUM

1. APPLICATIONS

1 Gigabit Ethernet switch

The GigaCore 30i is an Ethernet switch, **dedicated to AV** integration, installation, and touring, designed to support the most advanced AV protocols. In combination with the **Araneo** software platform, GigaCore 30i is the ideal solution to deploy an entire AV network with one click in any fixed installation.

Each GigaCore can be configured through an **intuitive** built-in AV Web UI but also, System-Wide management across the Luminex network is possible with the Araneo network monitoring, planning and management software. Araneo will boost your productivity and **confidence** in the network and **reduce commissioning** times significantly.

GigaCore 30i is an indispensable part of any AV network where **reliability** and a quick and easy setup are needed. As a user, you don't need to make choices nor tradeoffs as GigaCore handles most AV protocols for you out of the box: Pre-defined QoS/DiffServ (Quality of Service) settings, optimized IGMP (Internet Group Management Protocol) per group (VLAN) and pre-defined yet editable groups (VLANs) to easily separate your network in different applications making converged networks obvious, easy and reliable.

For many applications, GigaCore 30i in the 1 Gigabit version, offers sufficient bandwidth, connectivity, and port availability with **6x independent SFP+ ports** capable of data transfer speeds of up to **1 Gbps** and 24 x 1Gbps copper ports.

Time synchronization is crucial in many applications and with GigaCore 30i you have a hassle free **PTPV2 enabled** switch which will work for most major audio protocols (e.g. AES67, ST2110, Dante, Q-sys/Q-lan, …) without the need for making any complicated device settings.

Entertainment installations constantly push the limits, and the need to deploy PoE powered devices is continuously increasing. GigaCore 30i provides an answer to these scenarios by offering **PoE++ on all ports** (90W per port with a total PoE budget of up to 1000W) as an option.

With 2 available slots to accept optional hot swappable slide-in power supply units, the question of **redundant power** is answered in one and the same 1U rack space. Great care has been taken to ensure silent operation by means of intelligent fan control, giving you more install options with peace of mind that no live audience or recording session would be disturbed.

For those installations where a clean front panel is required, an optional 19" flush mount LED panel can be connected to a rear mounted GigaCore 30i .

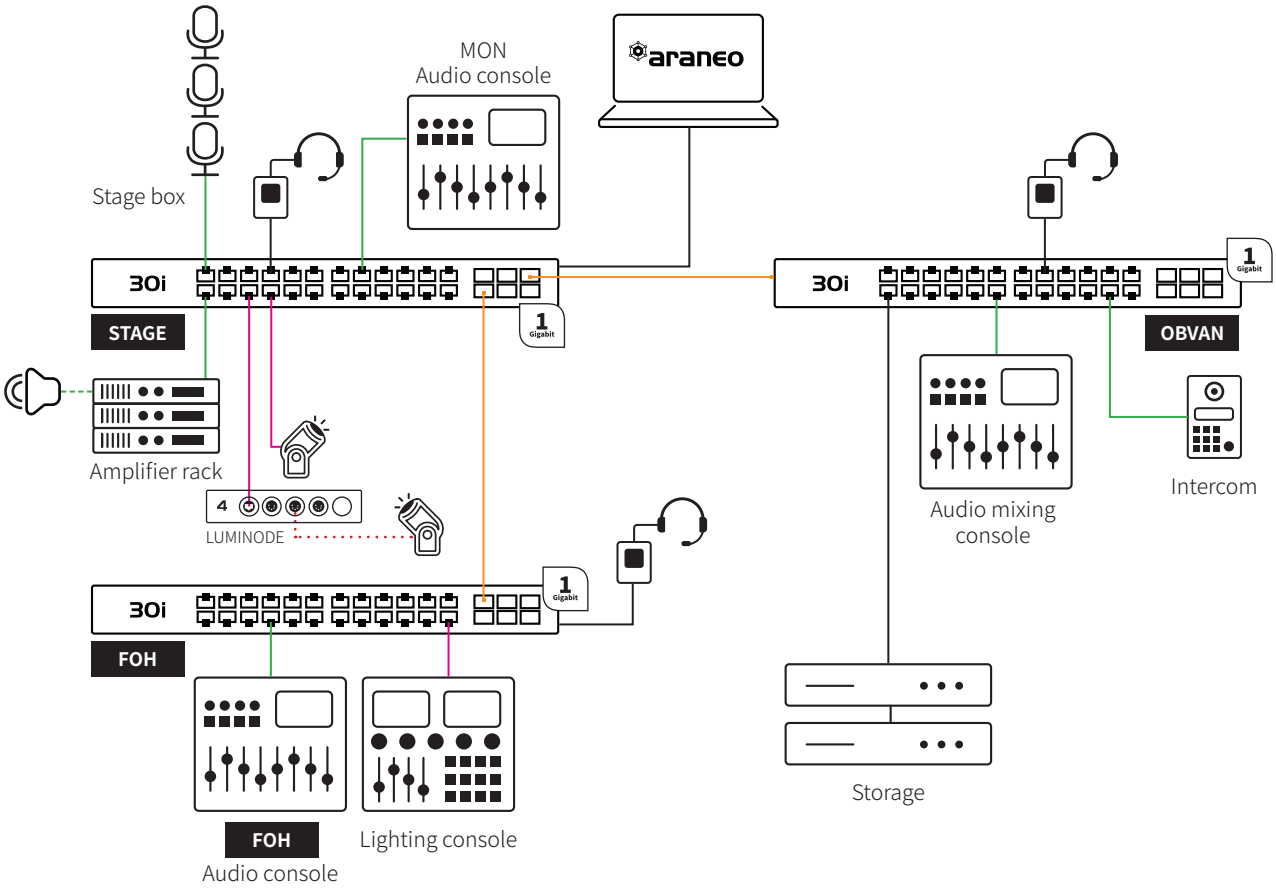
Applications:

- System integrations
- Theaters
- Concert halls
- Convention centers
- Sports arenas
- Broadcast and recording studios and OB vans
- Cruise ships
- Theme parks
- Hospitality installs (hotels etc)
- Houses of worship
- And other fixed installations

ORDERING INFORMATION	
Product name:	Part numbers:
1 Gbit versions	
GigaCore 30i – 24x1G – 6x1G(SFP+)	LU 01 00077 -1-1S1
GigaCore 30i – 24x1G – 6x1G(SFP+) - 2nd PSU 100W	LU 01 00077-1-2S1
GigaCore 30i – 24x1G – 6x1G(SFP+) – PoE++	LU 01 00077-1P-1S5
GigaCore 30i – 24x1G – 6x1G(SFP+) – PoE++ - 2nd PSU 550W	LU 01 00077-1P-2S5
Slide in PSU's	
GigaCore Slide-in PSU 100W	LU 70 00639
GigaCore Slide-in PSU 550W	LU 70 00640

2. APPLICATION DIAGRAMS

AUDIO/LIGHTING



VLAN ID

1 Gigabit fiber

Audio | Dante, AES67

Light | sACN

DMX

++ PoE++

3. TECHNICAL SPECIFICATIONS

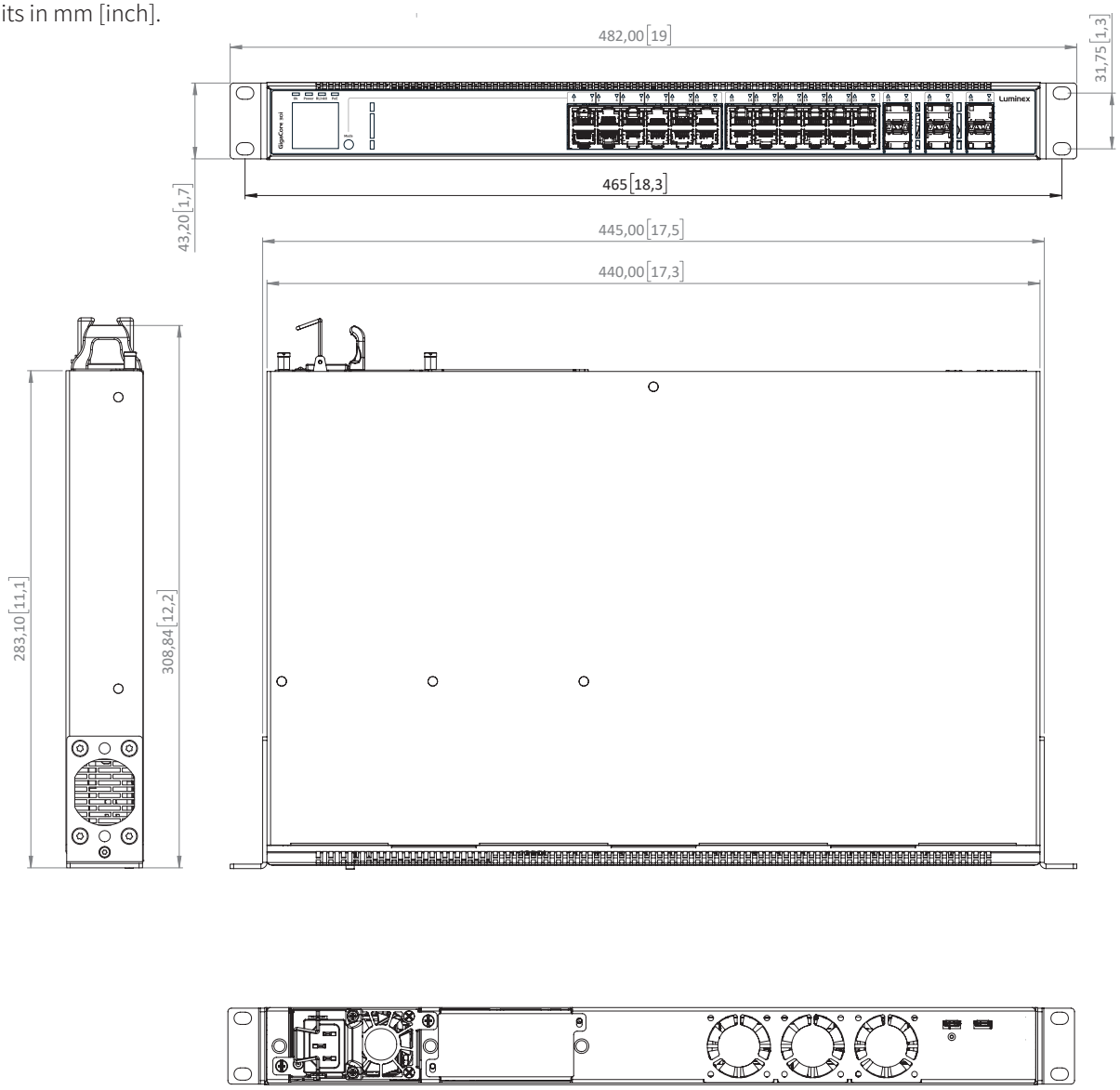
MECHANICAL	
Enclosure	Robust all metal housing
Dimensions (WxDxH)	482x283,1x43,2 mm (482x308,8x43,2 mm with inserted PSU) | 19x11,14x1,7 inch (19x12,15x1,7 inch with inserted PSU)
Material thickness	2 mm
Mounting type	Rack mount
Weight (no PSU inserted)	3,92 kg
Weight PSU	0,78 kg
Packaging dimensions	545 x 335 x 125 mm
Packaged weight	6,65 kg
CONNECTIVITY	
Network	6x 1 Gbps SFP+ cages on front panel, independent from other ports 24x Gigabit (10/100/1000 BASE-T) copper RJ45 on front panel
Serial	1x USB C
Extension	1x LED extension port
Power	IEC (C14) 1x for each inserted power supply (max 2)
Backup power	IEC (C14) 1x for each inserted power supply (max 2)
Backup PoE	IEC (C14) 1x for each inserted power supply (max 2)
TEMPERATURE MANAGEMENT	
Intelligent control	Yes
Number of fans	3x + 1x for each inserted power supply (max 5 fans)
Position of fans	Rear panel
Airflow direction	Front to rear
USER INTERFACE	
Device status	RGB LEDs • Device • Power • PoE supply
Dynamic labeling	E-ink Display
Fiber port status	2x RGB LED Port Speed/Activity Port Status • Group indication
RJ45 port status	2x RGB LED Port Speed/Activity Port Status • Group indication • PoE
FIBER PORT SPECIFICATIONS	
Port speed	1000 BASE-X
Port sensing	Fixed speed
CU PORT SPECIFICATIONS	
Port speed	10/100/1000 BASE-T
Port sensing	Auto Negotiation
Auto crossover	MDI/MDIX (allows use of straight or cross wired cable)
Auto sensing	Full or Half Duplex (Gigabit is Full Duplex)

POWER OVER ETHERNET	
Standards	802.3af 802.3at 802.3bt
PoE Ports	802.3af, 802.3at, 802.3bt On ports 1-24
Total PoE power budget	500 W (1x slide in PSU) 1000 W (2x slide in PSU)
LLDP Support	Yes
Power allocation	User configurable: • Priority per port • Consumption vs Class/LLDP based
Power limit	• Total power budget firmware limit – port shutdown at overload based on port priority • Per port hardware and firmware power limits based on classification – port shutdown at overload
SWITCH FEATURES	
Boot time	45 s
Redundant links	Yes
Group function	Yes
Ethernet compliance	IEEE 802.2 IEEE 802.3 IEEE 802.3u IEEE 802.3x Flow Control IEEE 802.3ab Gigabit Ethernet IEEE 802.3af PoE IEEE 802.3at PoE+ IEEE 802.3bt PoE++ 90W IEEE 802.1p CoS IEEE 802.1d Spanning Tree IEEE 802.1w Rapid Spanning Tree IEEE 802.1s Multiple Spanning Tree IEEE 802.1Q VLAN IEEE 802.1ab LLDP IEEE 1588-2008 PTPv2
Jumbo frames	Yes, supported up to 12000 MTU (with restrictions when using AVB)
Supported protocols	Avnu AVB/Milan (Available in future FW update) Dante RAVENNA/AES67 Ethersound Q-SYS/Q-LAN sACN ArtNet MANet HogNet RTTrPL (BlackTrax) …
Audio protocol compliance	Yes, low jitter and hardware timestamping (IEEE 1588-2008)
Ethernet switch type	Full non- blocking wire-speed switching performance
Memory	Flash 1 Gb RAM – 8 Mb NOR flash 4 Gb EMMC storage
Mac Address table	16384 entries
Address learning / aging	Self learning, Auto aging
Switching throughput	60 Gbps (1Gbps versions)
IGMP Querrier	Yes (V1|V2) (V3 compatible)
IGMP Snooping	Yes, enabled by default (V1|V2|V3)

MANAGEMENT	
Configuration	Built-in WebUI
Network wide configuration	Yes, with Araneo software
Firmware upgrades	Via WebUI or network wide with Araneo - Contingency option with second FW file stored
POWER	
Power input	100-240 VAC
Backup power	Yes with 2nd slide in PSU
Backup PoE	Yes with 2nd slide in PSU 550W
Power consumption	Max 50W - Max 1050W (Depending on PoE and PSU configuration)
ENVIRONMENTAL	
Operating temperature	0 to +50 °C
Storage temperature	-10 to +70 °C
APPROVALS	
Electromagnetic emissions and immunity	FCC Part 15 CFR 47 class A CAN/ICES-003 EN 61000 EN 55032 EN 55024
Safety	IEC 62368-1 EN 62368-1 UL 62368-1 CAN/CSA-C22.2 No. 62368-1
Certificates and approvals	cSGSus Mark (UL) CE Mark UKCA Mark CB Certificate
Green	RoHS REACH

GigaCore 30i - 1G

Units in mm [inch].



GigaCore 30i - 1G

PSU GigaCore 30i