Storage Disaster Recovery Service

Product Introduction

Issue 10

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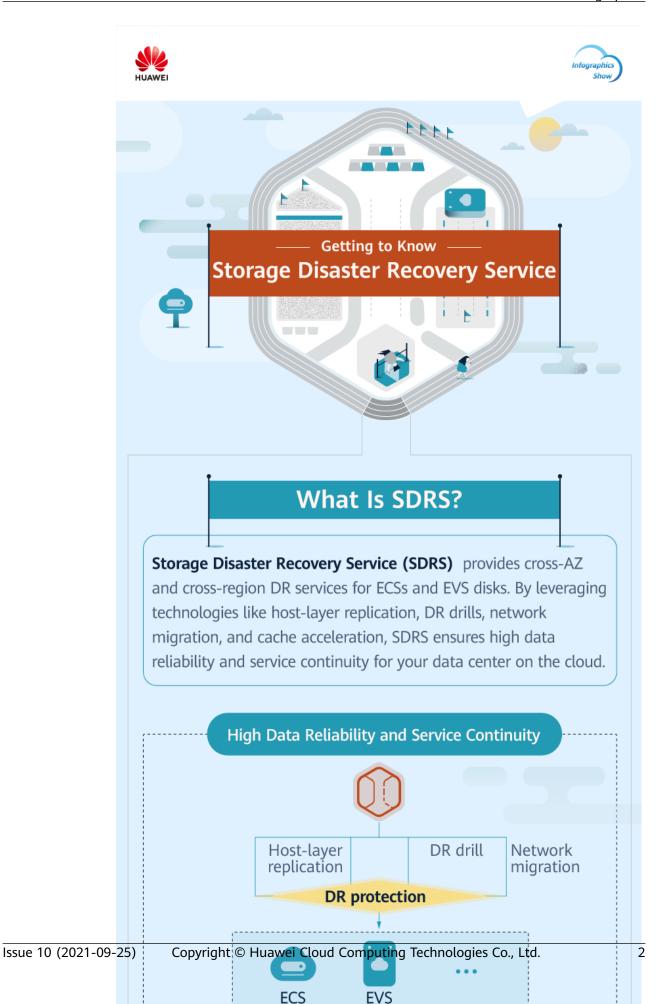
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SDRS Infographics



2 What Is SDRS?

DR and Backup

Differences between disaster recovery (DR) and backup are as follows:

- DR protects data centers against hardware faults or natural disasters, so it requires a safe distance (intra-city or remote) between the production site and disaster recovery site. Backups are used to restore data in the event of unintended actions, virus attacks, or logic errors. Backups are usually stored in the same data center as the service system.
- A DR system protects data but focuses more on protecting service continuity.
 A data backup system only ensures that data generated at different time points can be restored. Normally, a full backup is performed for the first time, which takes a long period of time. Subsequent backups are all incremental backups and can be done quicker.
- Disaster recovery can help you achieve an RPO of a few seconds. Backup allows you to set a backup policy to back up at up to 24 time points in one day, so you can restore data to different backup points.
- If a disaster occurs, such as earthquakes, fires, or dat center failure, a disaster recovery system takes only minutes to perform a failover, but a backup system takes hours or even dozens of hours to restore the data.

3 SDRS Advantages

SDRS has the following advantages:

Convenient recovery solution

Using the SDRS console, you can configure and manage server replication and perform failovers and drills.

• Site server replication

You can set up disaster recovery for site servers from the production site to the disaster recovery site.

Replication on demand

You can replicate servers from one AZ to another as required, reducing the costs and complexity for you to maintain another data center.

Zero impact on applications

You can replicate all applications on the servers. The replication has no impact on the applications.

RPO target

SDRS provides asynchronous replication for ECSs, and the recovery point object (RPO) is in seconds.

RTO target

Normally, the recovery time objective (RTO) is within 30 minutes, which does not include the time spent on DNS configuration, security group configuration, or customer script execution.

Crash consistency

Host-layer asynchronous replication ensures crash consistency between your production site and disaster recovery site. (SDRS only ensures crash consistency, not application consistency.)

Disaster recovery drill

By running disaster recovery drills, you can simulate recovery fault scenarios and formulate recovery plans. When a fault occurs, you can use the plans to recover services as quickly as possible.

Flexible failover

If the production site fails, you can fail over to the disaster recovery site in just a few clicks (purchasing, deploying, and starting disaster recovery servers and

- attaching disks with the most current data). Services can be recovered with only a few configurations.
- Cost-effective: When production site services are running properly, servers at the disaster recovery site are not created. You pay only for the disaster recovery site EVS disks and the Object Storage Service (OBS) buckets used.
- Simple deployment: Agent can be installed online without interrupting production services. The deployment is simple and fast.

4 SDRS Application Scenarios

Cross-region/Cross-AZ Disaster Recovery

SDRS provides host-layer disaster recovery protection for Huawei Cloud servers with an RPO of just seconds. By leveraging host-layer asynchronous replication, it offers cross-region and cross-AZ disaster recovery and keeps crash consistency for your data. If production site services fail to recover within a short period of time due to force majeure (fire and earthquake) or device faults (software and hardware damage), you can quickly recover services at the disaster recovery site with simple configurations.

Figure 4-1 Cross-region/Cross-AZ disaster recovery

Disaster Recovery Drill

Disaster recovery drills are used to simulate fault scenarios, formulate recovery plans, and verify whether the plans are applicable and effective. Services are not affected during disaster recovery drills. When a fault occurs, you can use the plans to quickly recover services, thus improving service continuity.

5 SDRS Usage Restrictions

Before using SDRS, learn about the constraints listed in the following tables.

Table 5-1 Asynchronous replication constraints

Constraint	Description
Architecture	Constraints on architecture types and versions:
	For Huawei Cloud Stack Online, all versions are supported.
Specifications	Constraints on specifications:
	Minimum specifications recommended for the cloud disaster recovery gateway, production site servers, and disaster recovery site servers are 8 vCPUs and 16 GB memory.
	NOTE For disaster recovery site servers, you are advised to reserve 2 GB memory for reverse reprotection.
	One disaster recovery gateway can protect a maximum of 20 protected instances and 58 disks.

Constraint	Description
Server	Constraints on servers:
	Protected instances can be created for ECSs.
	Only KVM ECSs are supported.
	Only x86 ECSs are supported.
	 Protected instances cannot be created for ECSs of the following series:
	- General Computing-plus C7
	– Memory-optimized M7
	– Disk-intensive
	- Ultra-high I/O
	- GPU-accelerated
	- FPGA-accelerated
	The OS must meet compatibility requirements.
	If you delete a server or disks that have been used to create a protected instance, the protected instance will become invalid.
Disk	Shared disks and encrypted disks are not supported.
	Servers' local disks are not supported.
	General Purpose SSD V2 disks cannot be used as disaster recovery disks.
	Disks using LVM are not supported.
Network	• Round-trip time (RTT) ≤ 100 ms
	NOTE You can run the ping command and set the packet size to 64,000 bytes to test the latency between the production site and the OBS domain name at the disaster recovery site.
	ping OBS domain name at the disaster recovery site -s 64000
	 Bandwidth ≥ Changed data volume per minute during peak hours/60 seconds. Minimum bandwidth: 10 Mbit/s
	NOTE Obtain the total amount of changed data during the period with the maximum service load and calculate the peak write bandwidth of the service disk using the changed data volume and time period. To meet the RPO requirements, use the obtained peak bandwidth as the minimum bandwidth. In cross-region replication scenarios, if the network bandwidth is shared, obtain the peak bandwidth of each protected instance, and use the maximum peak bandwidth as the minimum bandwidth.
	Note:
	Service load statistics are collected by server. The baseline bandwidth of the cloud disaster resource gateway.
	2. The baseline bandwidth of the cloud disaster recovery gateway must meet the bandwidth requirements. The recommended minimum baseline bandwidth is 2 Gbit/s.
	Packet loss rate < 0.1%

Constraint	Description
Function	 Constraints on functions: All disks on an ECS are protected. Disks cannot be added to or removed from protected instances, and disks in a protected instance cannot have their capacities expanded. Data consistency between protected instances is not supported.

Table 5-2 Synchronous replication constraints

Constraint	Description
Compute	 Constraints on server types: Kunpeng ECSs are not supported. x86-based, GPU-accelerated and FPGA-accelerated ECSs are not supported.
Replication	 Constraints on servers: The servers must be from two AZs of the same region. BMSs are not supported. The following types of servers cannot be used to create protected instances: Large Memory (Xen): This type of servers is bound to InfiniBand NICs. Disk Intensive I (Xen): This type of servers has local disks. Disk Intensive II (KVM): This type of servers has local disks. Constraints on EVS disks:
	 Disks used to create replication pairs cannot be deleted, and the disk snapshot cannot be used to roll back data.
Storage	Only servers using EVS or DSS disks are supported.
Application	Storage-based synchronous replication ensures disk data consistency but does not guarantee application data consistency. If your applications support crash consistency, you can run and replicate applications.
Deployment model	VPC migration: Servers at the production site and those at the disaster recovery site are in the same VPC. NIC migration and multiple NICs are supported for each server.
Service interconnecti on	Tag Management Service (TMS) is supported only via API.

Constraint	Description
Backup and restore	Only servers at the production site can be backed up and restored. Servers at the disaster recovery site can only be backed up.

□ NOTE

If the production site AZ becomes faulty, you can run a disaster recovery drill to recovery the services on servers.

Helpful Links

What Should I Pay Attention to When Logging In to the Server After the First Time Ever I Executed a Switchover, Failover, or DR Drill?

6 SDRS Supported OSs

The following tables list the OS versions that have been verified in the lab. Site servers running the following OSs supports SDRS.

Table 6-1 OSs supported by asynchronous replication

Туре	Version	Kernel Version	Bit
CentOS 7.2		3.10.0-327.el7.x86_64	64
		3.10.0-1127.19.1.el7.x86_64	
		3.10.0-1160.6.1.el7.x86_64	
	7.3	3.10.0-514.el7.x86 64	64
	7.4	3.10.0-693.el7.x86 64	64
	7.5	3.10.0-862.el7.x86 64	64
	7.6	3.10.0-957.el7.x86_64	64
		3.10.0-1160.6.1.el7.x86_64	
	7.7	3.10.0-1062.el7.x86_64	64
	7.9.	3.10.0-1160.el7.x86_64	64
Red Hat	7.4	3.10.0-693.el7.x86_64	64
	7.9	3.10.0-1160.el7.x86_64	64
	8.6	4.18.0-372.9.1.el8.x86_64	64
	8.8	4.18.0-477.10.1.el8_8.x86_64	64
Windows	Windows Server 2016	-	64
	Windows Server 2019	-	64

Table 6-2 OSs supported by synchronous replication

Туре	Version	Bit
Windows	Windows Server 2008 R2	64
	Windows Server 2012 R2	64
	Windows Server 2016	64
Red Hat	Red Hat Enterprise Linux 6.10	64
	Red Hat Enterprise Linux 7.5	64
CentOS	CentOS 6.5	64
	CentOS 6.8	64
	CentOS 6.9	64
	CentOS 7.2	64
	CentOS 7.3	64
	CentOS 7.4	64
SUSE	SUSE Enterprise 12 SP2	64
Ubuntu	Ubuntu 16.04 server	64

₩ NOTE

- OS images are from the cloud platform public images.
- OSs supported by SDRS will be updated on an ongoing basis.

SDRS and Other Services

Table 7-1 Asynchronous replication and other services

Interaction	Related Service	Reference
Use ECSs to create protected instances in asynchronous replication.	ECS	• Creating Protected Instances
Use EVS disks to create replication pairs in asynchronous replication.	EVS	Creating Protected Instances
Create a disaster recovery network on the cloud for asynchronous replication.	VPC	Creating a Replica Pair
Cache the production site and disaster recovery site data.	OBS	-

Table 7-2 Synchronous replication and other services

Interaction	Related Service	Reference
Use ECSs to create protected instances in synchronous replication.	ECS	• Creating Protected Instances
Use EVS disks to create replication pairs in synchronous replication.	EVS	• Creating a Replication Pair
Use DSS disks to create replication pairs in synchronous replication.	DSS	Creating a Replication Pair
Select a VPC for the protection group in synchronous replication.	VPC	Creating a Protection Group

Interaction	Related Service	Reference
Use CTS to record SDRS operations for querying, auditing, or backtracking later.	Cloud Trace Service (CTS)	• Interconnecting with CTS

8 SDRS Billing

Billing Modes

SDRS supports pay-per-use billing (postpayment).

 With regard to pay-per-use, prepayment is not required. After you top up your Huawei Cloud account, the system calculates the resource usage and settles the bill every hour. Fees are then deducted from your account balance.

For detailed prices, see **Product Pricing Details**.

■ NOTE

Spot instances cannot be used as production site servers.

Pay per Use

- Billing item: protected instance usage duration
- Billing mode: billed and settled by hour. A minimum fee is not included.

Helpful Links

• How Am I Billed for SDRS?

9 Permissions Management

If you need to assign different permissions to personnel in your enterprise to access your SDRS resources, Identity and Access Management (IAM) is a good choice for fine-grained permissions management. IAM provides identity authentication, permissions management, and access control, helping you to securely access your Huawei Cloud resources.

With IAM, you can use your HUAWEI ID to create IAM users, and assign permissions to the users to control their access to specific resources.

If your HUAWEI ID does not require individual IAM users for permissions management, skip this section.

IAM is a free service. You only pay for the resources in your account. For more information about IAM, see IAM Service Overview.

SDRS Permissions

By default, new IAM users do not have permissions. To assign permissions to new users, add them to one or more groups, and grant permissions to these groups. The users then inherit permissions from the groups to which the users belong, and can perform specific operations on cloud services.

SDRS is a project-level service deployed and accessed in specific physical regions. To assign SDRS permissions to a user group, specify the scope as region-specific projects and select projects (such as **ap-southeast-2**) for the permissions to take effect. If **All projects** is selected, the permissions will take effect for the user group in all region-specific projects. When accessing SDRS, the users need to switch to a region where they have been authorized to use SDRS.

Table 9-1 lists all the system-defined roles supported by SDRS. This role is dependent on other roles. When assigning SDRS roles to a user, you need to also assign the dependent roles to the user for the SDRS permissions to take effect.

Table 9-1 System-defined roles supported by SDRS

Role Name	Description	Dependencies
SDRS Administrator	Administrator permissions for SDRS	Dependent on the Tenant Guest , Server Administrator , and VPC Administrator policies.
		 Tenant Guest: A global policy, which must be assigned in the Global project.
		• Server Administrator: A project- level policy, which must be assigned in the same project as the SDRS Administrator policy.
		VPC Administrator: A project- level policy, which must be assigned in the same project as the SDRS Administrator policy.

Helpful Links

- IAM Service Overview
- Creating User Groups and Users and Granting SDRS Permissions

10 Product Concepts

10.1 SDRS Concepts

10.2 Region and AZ

10.1 SDRS Concepts

Table 10-1 General concepts

Concept	Description
Producti on site	Data center that independently runs services in normal cases. In asynchronous replication, the production site refers to your onpremises data center or the location where your ECSs reside. In synchronous replication, the production site refers to the AZ where your servers reside. It is specified when you create protection groups.
Disaster recovery site	Data center that does not run services when the production site works properly. It is used to back up data in real time. When the production site fails (planned or unexpected), the disaster recovery site can take over services after a switchover or failover. It can reside in the same city as the service management center or in another city. The production site and disaster recovery site must be in two AZs of a same region.
Protecti on group	Manage the servers you want to replicate. One protection group manages servers in one VPC. If you have multiple VPCs, create multiple protection groups.
Protecte d instance	A protected instance consists of one server and its replicated server. One protected instance belongs to one protection group only. The AZs of instance servers are the same as those of the protection group's production site and disaster recovery site.

Concept	Description
VBD	Virtual Block Device (VBD) is the default device type of EVS disks. VBD EVS disks support only basic SCSI read/write commands. This disk type is suitable for enterprise office applications as well as development and testing.
SCSI	Small Computer System Interface (SCSI) is another EVS device type. SCSI EVS disks support transparent SCSI command transmission and allow the server OS to directly access the underlying storage media. In addition to basic SCSI read/write commands, SCSI EVS disks support advanced SCSI commands, such as persistent SCSI reservations, which are used for clustered applications to guarantee data security.
RPO	Recovery point objective. It is a service switchover policy with minimal data loss. Data recovery points are used as objectives to ensure that the data used for disaster recovery switchovers is the latest backup data.
RTO	Recovery time objective. It is the target time spent for critical services to recover to an acceptable level. RTO is set to minimize the impacts on the services. For SDRS, RTO refers to the period of time from when you perform a switchover or failover at the production site to the time when the servers at the disaster recovery site start to run. This period does not include the time spent on DNS configuration, security group configuration, or customer script execution, and is within 30 minutes.
Disaster recovery drill	Verify that disaster recovery site servers can take over services from production site servers after a failover. By running disaster recovery drills, you can simulate recovery scenarios and formulate recovery plans. When a fault occurs, you can use the plans to recover services as quickly as possible.

Table 10-2 Asynchronous replication concepts

Concept	Description
Replica pair	A replica pair consists of a production site and a disaster recovery site. The replication relationship is established between two sites.
Cloud disaster recovery gateway	Aggregate and compress data on all replicated production site servers, and synchronize the data to the disaster recovery site.
Proxy client	Transmit data on the server to the cloud disaster recovery gateway.
Enabling protection	If services are running at the production site and the data synchronization stops, you can enable protection to start data synchronization.

Concept	Description
Failover	A failover switches the services from the production site to the disaster recovery site. After a failover, data synchronization stops and the protected instance status changes to Failover completed .
Failback	After a failover, services are running at the disaster recovery site. You can fail back to your production site with a failback. After the failback, data synchronization stops.
Reverse reprotection	After a failover, data is not automatically synchronized from the disaster recovery site to the production site, and protection is disabled for protected instances. To start data synchronization from the disaster recovery site to the production site, perform a reverse reprotection.
Reprotection	After a failback, data is not automatically synchronized from the production site to the disaster recovery site, and protection is disabled for protected instances. To start data synchronization from the production site to the disaster recovery site, perform a reprotection.
Disabling protection	If services are running at the production site, and data synchronization is in progress or completed, you can disable protection to stop data synchronization.

Table 10-3 Synchronous replication concepts

Concept	Description
Replication pair	A replication pair consists of one EVS disk and its replicated disk. One replication pair belongs to one protection group and can be attached to a protected instance in this group.
Switchover	Temporarily stop servers at the production site and switch over services to the disaster recovery site for planned outages. After a switchover, the disaster recovery direction is from the disaster recovery site to the production site. Servers and EVS disks at the disaster recovery site are ready to start.
Failover	A failover forcibly stops the servers and disks at the production site and sets the servers and disks at the disaster recovery site to ready-to-start state. This operation affects all the protected instances in the protection group. After a failover, you need to manually start the servers at the disaster recovery site. In addition, the protection group status changes to Failover complete , and data synchronization of the protection group stops. You need to enable reprotection to recover data synchronization.

Concept	Description
Enabling protection	Protection can be enabled after a protection group is created or data synchronization stops. Once protection is enabled, data synchronization starts, and you can view the synchronization progress on the console. This operation affects all the protected instances and replication pairs in the protection group.
	After you click Enable Protection , the status of the protection group changes to Synchronizing , and Disable Protection is not available.
Reprotection	Reprotection can be enabled after a failover. Once reprotection is enabled, data synchronization starts, and you can view the synchronization progress on the console. This operation affects all the protected instances and replication pairs in the protection group. After you click Reprotect , the status of the protection group changes to Reprotecting , and Disable Protection becomes unavailable.
Disabling protection	Protection can be disabled after data synchronization of a protection group is complete. After disabling protection, the status of the protection group changes to Available .
Attaching a replication pair	Attach the two disks in a replication pair to the servers in a protected instance.
Detaching replication pair	Detach the two disks in a replication pair from the servers in a protected instance.
Disaster recovery direction	Data replication direction. After you create a protection group, data is replicated from the production site to the disaster recovery site.
	A switchover or failover changes the disaster recovery direction of a protection group.
Protection group status	Status of a protection group, after you create, delete, switch over, fail over, enable protection for, or disable protection for a protection group.
	For details, see Protection Group Status .
Synchronization status	Data replication status between the production and disaster recovery sites.
VPC	VPC of the protection group. A VPC facilitates internal network management and configuration, allowing secure and quick modifications to networks. By defaults, servers in the same VPC can communicate with each other, but those in different VPCs cannot.

10.2 Region and AZ

Concept

A region and availability zone (AZ) identify the location of a data center. You can create resources in a specific region and AZ.

- Regions are divided based on geographical location and network latency.
 Public services, such as Elastic Cloud Server (ECS), Elastic Volume Service (EVS), Object Storage Service (OBS), Virtual Private Cloud (VPC), Elastic IP (EIP), and Image Management Service (IMS), are shared within the same region. Regions are classified into universal regions and dedicated regions. A universal region provides universal cloud services for common tenants. A dedicated region provides specific services for specific tenants.
- An AZ contains one or more physical data centers. Each AZ has independent cooling, fire extinguishing, moisture-proof, and electricity facilities. Within an AZ, computing, network, storage, and other resources are logically divided into multiple clusters. AZs within a region are interconnected using highspeed optical fibers, to support cross-AZ high-availability systems.

Figure 10-1 shows the relationship between regions and AZs.

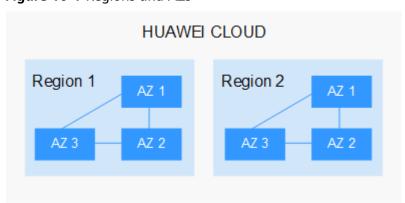


Figure 10-1 Regions and AZs

Huawei Cloud provides services in many regions around the world. You can select a region and an AZ based on requirements. For more information, see **Huawei** Cloud Global Regions.

Selecting a Region

When selecting a region, consider the following factors:

- Location
 It is recommended that you select the closest region for lower network latency and quick access.
- Resource price
 Resource prices may vary in different regions. For details, see Product Pricing Details.

Regions and Endpoints

Before you use an API to call resources, specify its region and endpoint. For more details, see **Regions and Endpoints**.

11 Change History

Released On	Description
2024-04-30	This issue is the tenth official release.
	Added support for asynchronous replication.
2021-09-25	This issue is the tenth official release.
	Added the following content:
	Added the description of asynchronous replication.
2021-06-21	This issue is the ninth official release.
	Modified the following content:
	Deleted the RTO target in 3 SDRS Advantages.
	Deleted the following content:
	Deleted section "SDRS Compatible Applications and Versions."
2021-04-20	This issue is the eighth official release.
	Modified the following content:
	Deleted the description that general purpose SSD disks cannot be used to create replication pairs and that high I/O (performance-optimized I) and ultra-high I/O (latency-optimized) disks on SAP HANA ECSs, HPC ECSs, and HL1 ECSs cannot be used to create replication pairs in 5 SDRS Usage Restrictions.
2020-06-20	This issue is the seventh official release.
	Modified the following content:
	Modified constraints in 5 SDRS Usage Restrictions . Specifically, Kunpeng servers are not supported.
2020-04-29	This issue is the sixth official release.
	Modified the following content:
	Modified constraints in 5 SDRS Usage Restrictions . Specifically, shared disks are supported.

Released On	Description
2020-03-31	This issue is the fifth official release.
	Added the following content:
	8 SDRS Billing
2019-07-25	This issue is the fourth official release.
	Modified the following content:
	Added constraints in 5 SDRS Usage Restrictions . Specifically, added the constraint that servers at the production site can be backed up and restored. Servers at the disaster recovery site can be backed up only.
2019-07-25	This issue is the third official release.
	Modified the following content:
	Added constraints in 5 SDRS Usage Restrictions . Specifically, added the constraint that servers at the production site can be backed up and restored. Servers at the disaster recovery site can be backed up only.
2019-05-30	This issue is the second official release.
	Added the following content:
	Region and AZ
	Modified the following content:
	Deleted constraints in 5 SDRS Usage Restrictions. Specifically, deleted the constraint that the specifications of the disaster recovery site server must be consistent with those of the production site server.
2019-05-24	This issue is the first official release.