



Service Delivery Engine User Guide, Release 6.40

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1

Overview

- ["SDE Overview" on page 8](#)
- ["SDE System Requirements" on page 9](#)

1.1 SDE Overview

Sandvine's Service Delivery Engine (SDE) is an advanced, multi-component policy management platform that integrates with Sandvine's Policy Traffic Switch (PTS) and Subscriber Policy Broker (SPB) to provide a broad range of services such as subscriber mapping, record generation and quota management for any access technology.

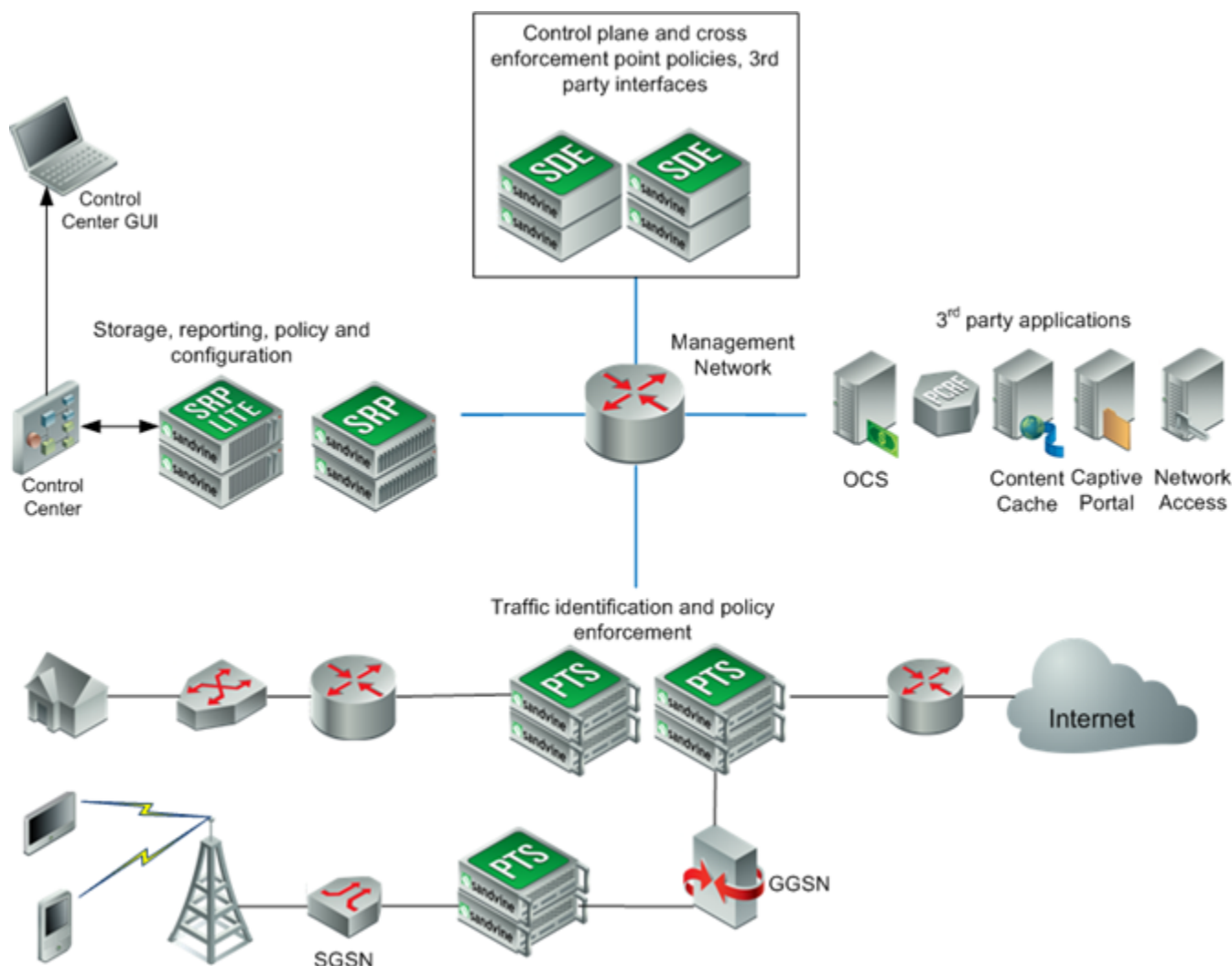


Figure: SDE in the Sandvine environment

The SDE includes a policy engine and multiple subsystems. It applies SandScript-based actions and conditions to collect data such as subscriber usage and mapping action, and communicates the appropriate information to the PTS, SPB and other external components.

1.1.1 Compatibility Matrix

The SDE 6.40 inter-operates within a Sandvine deployment based on this system compatibility table:

Software	Platform	Release
Control Center	SPB	6.20
Fairshare Traffic Management	PTS, SDE, SPB	4.10 or later
NDS	SPB	6.30 or later
PTS	PTS	6.20, 6.15.02 or later
Quota Manager	SDE, SPB	4.40 or later
Record Generator	PTS, SDE, SPB	4.40 or later
SPB	SPB	6.30 or later Note: If you are using the new ID Allocation subsystem, you must use SPB version 6.40.
Subscriber Mapping	SDE	6.40 or later



Warning:

If you are using Usage Management products, you must upgrade to Usage Management 4.40. SDE 6.40 is not compatible with earlier Usage Management versions.

1.2 SDE System Requirements

1.2.1 Recommended Hardware

The SDE runs on industry-standard servers meeting these requirements:

- Processor: 2 x Intel Xeon® 2.4GHz 5620 (each processor has 4 cores, 8 threads).
- Memory: 32GB RAM (DDR3).
- Hard drive: minimum 500GB (SAS with RAID 1 or better) with a minimum supported 10K rpm.
- Network controller: 2 x 1GB Ethernet. If the Subscriber Mapping application will run on the server, an eth0 interface is required.
- DVD drive (required for installing RHEL only).

All hardware must be compatible with these Red Hat Enterprise Linux (RHEL) operating system versions:

- RHEL 5 (5.7 and later).
- RHEL 6 (6.3 and later).

Sandvine recommends that you use the most recent version of RHEL to ensure that the latest security updates are available. Sandvine also recommends the use of RedHat Certified hardware. RedHat maintains a list of certified hardware platforms on their website.



Note:

Some products that run on the SDE platform may have different requirements, depending on the product configuration and deployment details. See their respective product documentation for more information.

1.2.2 Hardware Verification

The hardware used in different vendors' systems is known to change frequently. Therefore, before starting the installation, verify that the actual hardware for the SDE server meets or exceeds the minimum server requirements listed above, rather than relying solely on the vendor's server part numbers.

In addition, you should verify on the Red Hat site that the hardware you are using is fully compatible with the Red Hat Enterprise Linux version you are using.

1.2.3 Recommended Operating System

The SDE supports these Red Hat Enterprise Linux (RHEL) versions:

- RHEL 5 (5.7 and later).
- RHEL 6 (6.3 and later).



Note:

Sandvine recommends that you use the most recent version of RHEL to ensure that the latest security updates are available.

See the *SDE Software Installation Guide* for more information on RHEL installation requirements for the SDE.

The SDE also supports Community Enterprise Operating System (CentOS). Sandvine recommends the use of RHEL as compared to CentOS to ensure that the latest security updates are available.

1.2.3.1 Partitioning Requirements

Mandatory requirements

These operating system partitions are required for all SDE deployments:

Partition	Contents	Recommended Size
/	OS	30GB
/var	System logs, configuration	30GB



Note:

SDE logs, which are general logs of the SDE processes, are stored by default in `/var/log`.

Application requirements

Partition	Contents	Recommended Size	Comments
/var/sandvine/db	Persisted and replicated data files	Record Generator only, with no plans to use an application such as Quota Manager in the future: <150GB. Other deployment types: 150GB minimum. Actual size requirements may vary depending on your Sandvine applications.	By default the SDE searches for <code>/var/sandvine/db</code> . However, you can change the path for these files to a separate partition or a partition directory as long as it has a minimum of 150GB disk space. To change the partition or directory location, see Changing Database Locations on page 27.
/var/sandvine/logging/target	Logging records, such as usage data records (Record Generator) or the Subscriber Mapping audit log.	Logging subsystem without persistency: 150GB minimum. Quota Manager only, without Record Generator: <150GB. Logging subsystem with persistency: 250GB minimum.	By default the SDE searches for <code>/var/sandvine/logging/target</code> , but you can reconfigure the SDE to use another path. For instructions, see Changing the Target Root Path on page 109.

Partition	Contents	Recommended Size	Comments
		Actual size requirements may vary depending on your Sandvine applications. Note: This partition is always required for Subscriber Mapping if the Subscriber Mapping audit log is enabled.	
/opt	IPDR packages, when using the IPDR subsystem for Quota Manager	250GB. Actual size requirements may vary depending on your Sandvine applications.	

1.2.4 Network Requirements for SDE Installation

Before installing RHEL on the servers, check that these network requirements are available and at hand for *each* SDE machine:

- 1 IPv4 address (used for the server's real IP address)
- subnet mask
- default gateway IP address
- 1 primary name server IP address

Failover Clusters

When the SDE is deployed in failover clusters for high availability, each failover cluster requires an additional IP address. This IP address plays the role of a Virtual IP address (VIP), and external devices use it to connect to the SDE. VIP addresses must meet these requirements:

- IPv4 only
- Exist on the same subnet as both servers' primary network interface

Depending on the number and types of clients in your deployment, you may require more than one VIP per cluster.



Caution:

For deployments using the IPDR subsystem, the SDE *must* be deployed in a failover cluster. See "IPDR data collection".

For an explanation of the use of VIPs for failover clusters, see [Failover Cluster](#) on page 16.

IPDR Data Collection



Warning:

IPDR data collection is currently not supported on RHEL 6.

When the IPDR subsystem is used, an additional VIP is required for the SDE system. This VIP is referred to as the "management VIP".

If you are installing the IPDR subsystem in an existing SDE system with a failover cluster already configured, you also require an additional VIP for the IPDR subsystem's "edge VIP". (For new installations, the IPDR edge service and failover cluster share a VIP.)

For information regarding use of VIPs for IPDR, see [Configuring IPDR Connectivity](#) on page 71.



2

Configuring the SDE for High Availability

High availability provides protection in the event of a hardware failure. The SDE will fail over to a secondary unit or cluster to maintain service.



Note:

It can take several minutes for the restore from disk process to complete, depending on the size of the database.

- ["Troubleshooting High Availability Failure" on page 14](#)
- ["Failover Cluster" on page 16](#)
- ["Configuring Failover Clusters" on page 16](#)

2.1 Troubleshooting High Availability Failure

A pair of SDEs are deployed in a failover cluster node in order to provide high availability and to ensure continuation of service. If one of the deployed SDE fails, the high availability environment gets corrupted. The environment corruption can be troubleshooted by following these steps:

1. If one of the SDEs is not working then identify which SDE is not responding.

- a. Run this command on both SDEs in the failover-cluster.

```
svcli
SDE> show service failover-cluster stats
```

Output similar to this is displayed.

```
environmentState: [false]
  CreationError      : [false]
  Corrupted          : [true]
  FAULT DETECTOR
  =====
  NodeRole           : [passive]
  NodeRoleChanges    : '(0) 00 days 00:00:00.00'
  LastNodeRoleChangeTime: 2013-01-29,04:36:36.05,-05:00
  SyncState          : [synchronized]
  LastSyncTimeDuration : 0
```

2. If the value for Corrupted is true on one of the SDE machine. Run this command on the corrupted SDE.

```
svcli
SDE> set service failover-cluster environment-fixed true
```



Note:

If the SDE is not recovered, then it means that the DBs are corrupted and BDB can't recover them.

3. To recover the corrupted Database. Run this command:

- a. Enter the db_maintenance tool

```
[SDE]# db_maintenance
```

- b. Enter y to stop the SDE process.

```
To enable full control of db_maintenance SDE service must be stopped.
Do you want to stop the SDE service now (y/n)[n] ? y
```

- c. Enter 5 to remove database.

```
## Select database operation ##
#####
1) View configuration directories... 4) Restore...
2) Change configuration directories... 5) Remove database...
3) Backup now ... 6) Exit from this menu
#? 5
```

- d. Enter 2 to replicate the files.

```
## Select database operation ##
#####
1) Persistency
2) Replication
3) Exit from this menu
#? 2
```

- e. Enter 1 to remove all the database environment files.

```
## Select database operation ##
#####
1) Remove all database environment files...
2) Remove all backup databases...
3) Remove table by file...
4) Exit from this menu
#? 1
```

- f. Enter Y to delete the files.

```
Are you sure you want to delete all files in /usr/local/sandvine/replica_data
- (symlink to /var/sandvine/db/replica_data) (y/n)[n]y
```

- g. Enter 6 to exit from the menu.

```
## Select database operation ##
#####
1) View configuration directories... 4) Restore...
2) Change configuration directories... 5) Remove database...
3) Backup now... 6) Exit from this menu
#? 6
```

- h. Enter Y to start the SDE service.

```
Need to start SDE service by command "service sde start".
Do you want to start SDE service now (y/n)[n] ? y
```

The SDE starts and gets synchronized with the active SDE.



Note:

If SDE does not start and get synchronized, it means both the SDEs are in corrupted state.

4. Follow these steps to restore the machines from the backup:

- a. Run this command on both SDEs in the failover-cluster.

```
#svcli
SDE> set service failover-cluster environment-fixed true
```



Note:

If this did not fix the problem, then it means that the database is corrupted and that the BDB cannot be recovered.

5. Recover the SDEs from this state, continue with the these steps on both SDEs:

- a. Enter the db_maintenance tool.

```
[SDE]# db_maintenance
```

- b. Enter Y to stop the SDE process.

```
To enable full control of db_maintenance SDE service must be stopped.
Do you want to stop the SDE service now (y/n)[n] ? y
```

- c. Enter 5 to remove database.

```
## Select database operation ##
#####
1) View configuration directories... 4) Restore...
2) Change configuration directories... 5) Remove database...
3) Backup now... 6) Exit from this menu
#? 5
```

- d. Enter 2 to replicate the files.

```
## Select database operation ##
#####
1) Persistence
2) Replication
3) Exit from this menu
#? 2
```

- e. Enter 1 to remove database environment files.

```
## Select removing operation ##
#####
1) Remove all database environment files...
2) Remove all backup databases...
3) Remove table by file...
4) Exit from this menu
#? 1
```

- f. Enter Y to delete the files.

```
Are you sure you want to delete all files in /usr/local/sandvine/replica_data
- (symlink to /var/sandvine/db/replica_data) (y/n)[n]y
```

- g. Restore the backup files. Refer to the [Restoring Databases](#) on page 28 for more details.

- h. After checking that the SDE on which you have fixed the database is in active and stable state, check passive SDE. Exit the db_maintenance tool shell by restarting SDE.

2.2 Failover Cluster

The SDE can be deployed in failover clusters to provide high availability and ensure continuation of service if one SDE fails. Each failover cluster contains two SDE nodes (servers with the SDE software installed) configured in active-passive mode. If the active node fails, the passive SDE becomes the active node.

When the failover cluster is used, each client connects to the active SDE through a virtual IP (VIP) address that is configured to the active node. When configuring client connections to the SDE, you should use this VIP as the client's connecting IP address.

If the primary SDE host fails, the VIP fails over to the secondary SDE node with the clients still attached to it, thereby maintaining the connection to the SDE. The passive SDE becomes the active SDE. When the failed SDE comes back up, it becomes the passive SDE, while the second SDE node remains the active node.



Caution:

For deployments that use the IPDR subsystem, a failover cluster must be enabled.

The SDE supports replicating application data to disk when a failover cluster is used. The SDE replicates SandScript tables to the passive SDE node. This ensures the maintenance of state data and the continuation of service after failover.

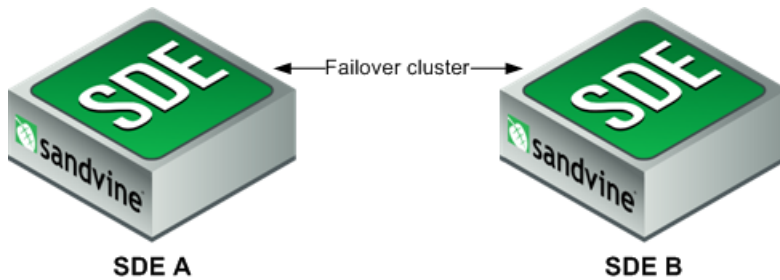
2.3 Configuring Failover Clusters



Caution:

If your deployment will use IPDR, it is recommended that you fully configure the IPDR subsystem before configuring the failover cluster. For instructions, see [IPDR Subsystem Overview](#) on page 64.

In this procedure, SDE A is designated the active node and SDE B is the passive node. Following the steps below, first configure SDE A for the failover cluster, and then configure SDE B. After each CLI `set` command, type 'y' at the prompt to confirm the change.



1. On SDE A, in CLI configuration mode, enable the failover cluster:

```
# svcli
SDE> configure
SDE# set config service failover-cluster enabled true
```

2. Set the real IPv4 address of SDE A, which will be used for data sharing between the two servers. Commonly the server's real IP address is used for this purpose. Run this command:

```
SDE# set config service failover-cluster local-host <IP address>
```

For example:

```
SDE# set config service failover-cluster local-host 10.10.10.1
```

3. Set the real IPv4 address of SDE B. This should be SDE B's real IP address. Run:

```
SDE# set config service failover-cluster remote-host <IP address>
```

For example:

```
SDE# set config service failover-cluster remote-host 10.10.10.2
```



Note:

Depending on your network, you may also be required to change some default failover-cluster settings, such as the local or remote port. For more information, see [Additional Failover Cluster Attributes](#) on page 19. You cannot change the local firewall configuration (iptables) using the SDE CLI. You need to modify the iptable rules to allow access to additional ports.

4. Commit the changes:

```
SDE# commit
```

This response should appear:

```
Writing configuration files...
```

```
Restarting SVSDE...
```

```
Stopping svside service .....[ OK ]
```

```
Starting svside service: .....[ OK ]
```

```
One or more services have been restarted and may still be starting up. Run 'show system
services' to check the operational status
of a service.
```

```
The CLI is now in OPERATIONAL mode.
```

```
SDE>
```



Note:

The SDE is restarted after the commit, and the SDE reverts to CLI operational mode.

5. Exit the CLI:

```
SDE> exit
```

6. In any text editor on SDE A, open the `/usr/local/sandvine/etc/vip_service_list.xml` file for editing.

For example:

```
/usr/local/sandvine/etc/vip_service_list.xml
```

This XML file appears:

```
<ServiceList>
  <Service>
    <Type>SingleVip</Type>
    <Name>HA</Name>
    <Description></Description>
    <VirtualIPList>
      <VirtualIP>
        <VipIP>10.10.10.4/8</VipIP>
        <VipType>inet</VipType>
        <VipPrefix>10.0.0.0/8</VipPrefix>
        <VipDefaultGw>10.0.0.1</VipDefaultGw>
        <InterfaceName>interface name</InterfaceName>
      </VirtualIP>
    </VirtualIPList>
  </Service>
</ServiceList>
```

7. Configure the `vip_service_list.xml` file according to the explanation in “Configuring services”, below. A sample configuration of this file can be accessed on the SDE server at `/usr/local/sandvine/etc/vip_service_list.xml.sample`.
8. Save the changes.
9. Perform an `svreload`.
10. On SDE B, repeat steps 1-9 :
 - a. The local host in step 2 is the real IP address of SDE B.
 - b. The remote host in step 3 is the real IP address of SDE A.
 - c. The `vip_service_list.xml` configuration should be exactly the same as used on SDE A. An easy way to validate that the files are the same is to run the `md5sum` command on each SDE and compare output.
11. After you have configured both nodes, verify that you have properly configured the failover cluster. See [Troubleshooting Failover Cluster Configuration](#) on page 20.



Caution:

You must replicate all subsystem and policy configurations on both SDE A and B when the SDE is deployed in a failover cluster.

2.3.1 Additional Failover Cluster Attributes

The mandatory and optional failover cluster attributes that you can configure from the CLI using the `set config service failover-cluster <attribute>` command are described in this table.



Note:

You cannot change the local firewall configuration (iptables) using the SDE CLI. You need to modify the iptable rules to allow access to additional ports.

Attribute	Mandatory	Description	Default value
ack-timeout	N	Determines the time in ms the SDE waits for a replication acknowledgement from the other node before counting a replication miss. Valid values are 0-infinity.	2000
election-timeout	N	Amount of time in ms the SDE waits for a foreign SDE to join the election for the replication master. Valid values are 500-infinity.	5000
enabled	Y	Defines whether the failover cluster is enabled. Valid values are true/false.	false
local-host	Y	This SDE server's hostname or IP address, as used for the replication connection. Valid value is a hostname or IPv4 address.	-
local-port	N	The port this SDE server uses for the replication connection. Valid values are 1-65535.	4998
remote-host	Y	The remote server's host name or IP address, as used for the replication connection. Valid value is a hostname or IPv4 address.	-
remote-port	N	The port the other SDE server uses for the replication connection. Valid values are 1-65535.	4998

2.3.2 Configuring Services

The `vip_service_list.xml` file contains the list of services used for the failover cluster. Each service in the list defines the VIP used by its clients to connect to the SDE.

Define the services required for your clients according to the following example and explanations. You can use the same service and VIP for several clients with the same connectivity requirements, or you can define a different service for each client—each with a different VIP. You are not allowed to use the same VIP for more than one service.

For each VIP you need:

- IP address (IPv4 only) and netmask
- Default gateway
- IP type
- Interface name or IP address prefix
- Interface name or network

In the example below, the SDE uses:

- VIP address: 10.10.10.5/8
- Default gateway: 10.0.0.1
- VIP type: inet
- VIP prefix: none
- Interface name: eth1

For definitions of the fields, see [Service list definitions](#) on page 20.



Note:

Use the exact same service configuration on both SDE A and SDE B.

```
<ServiceList>
  <Service>
    <Type>SingleVip</Type>
    <Name>SubMapping</Name>
    <Description>Subscriber Mapping Service</Description>
    <VirtualIPList>
      <VirtualIP>
        <VipIP>2.0.0.6/8</VipIP>
        <VipType>inet</VipType>
        <VipPrefix></VipPrefix>
        <VipDefaultGw>2.0.0.1</VipDefaultGw>
        <InterfaceName>eth0</InterfaceName>
      </VirtualIP>
    </VirtualIPList>
  </Service>
</ServiceList>
```

2.3.2.1 Service list definitions

Service list configuration parameters

Parameter	Description
Type	Defines the type of service. Valid value is: SingleVip
Name	Meaningful name for the service (for example, "SubMapping")
Description	Describes the service's use (for example, "Subscriber Mapping Service")
VirtualIPList	Defines the VIPs used by the service. Each service can include a different VIP for each client or one VIP that is used by several clients.
VirtualIP	Container for the specific VIP's configuration details
VipIP	IPv4 address used for the virtual IP . Values are IP/netmask or IP. If you don't define an IP/netmask, a prefix is required. (See 'VipPrefix' value, below.)
VipType	IP address type. Only IPv4 is supported. Valid values are 'inet' or string
VipPrefix	Prefix used for the IP address. If the interface name is used, this field is omitted.
VipDefaultGw	Default gateway for this IP address
InterfaceName	Name of the interface used for this IP address. If the VIP prefix is defined, the interface name isn't used.

2.3.3 Troubleshooting Failover Cluster Configuration

After configuring the failover cluster on both nodes, verify on both SDE A and SDE B that the configurations were performed correctly and that the failover cluster is enabled:

1. Enter CLI operation mode and check the failover cluster's configuration:

```
# svcli
SDE> show config service failover-cluster
```

2. Check in the output that the local and remote hosts are configured correctly and that the failover cluster is enabled. For example, output for this command on SDE A (the active node) should be similar to this example, with correct details for your SDE network configuration:

```
ack-timeout      : 2000
election-timeout : 5000
enabled         : true
local-host      : 10.10.10.1
local-port       : 4998
remote-host     : 10.10.10.2
remote-port      : 4998
backup
  enabled : true
  copies  : 5
  interval: 60
debug
  recovery-log           : false
  replication-election-log : false
  replication-lease-log  : false
  replication-log        : false
  replication-manager-misc-log: false
  replication-sync-log   : false
fault-detector
  heartbeat-monitor-timeout: 5000
  heartbeat-send-interval  : 1000
  initial-state-timeout    : 600000
replication
  cache-size-mb           : 1024
  transactions-commit-count : 1000
  transactions-commit-timeout: 5000
  queue-size              : 400000
vip
  spoof-packet-number: 3
  spoof-packet-delay : 5000
```

The output should show that:

- `enabled = "true"` (failover cluster is enabled).
- `local-host` displays the correct real IP address for this SDE node.
- `local-port` displays the correct port for this SDE node.
- `remote-host` displays the correct real IP address for the other SDE node.
- `remote-port` displays the correct port for the other SDE node.

On SDE B (the passive node), the `local-host` and `remote-host` configuration should be reversed.

If the configuration is not correct for either SDE node, enter CLI configuration mode and set the correct configuration values, as described in [Configuring Failover Clusters](#) on page 16, steps 1-4.

3. Run:

```
SDE> show service failover-cluster stats
```

On SDE A, the output should be similar to this, with correct details for your SDE network configuration:

```
EnvironmentState: [true]
CreationError      : [false]
Corrupted          : [false]

FAULT DETECTOR
=====

NodeRole          : [active]
NodeRoleChanges     : 1
LastNodeRoleChangeTime: 2012-08-26, 06:26:54.03, -04:00
RecoveryState       : [succeeded]
```

The output should show that:

- `EnvironmentState` = "true" (failover cluster is working properly).
- `CreationError` = "false" (no errors upon cluster creation).
- `Corrupted` = "false" (no corruption errors).
- `NodeRole` is correct for this SDE server (active or passive).

On SDE B (the passive node), the output should be similar to this, with the details for your configuration:

```
EnvironmentState: [true]
CreationError    : [false]
Corrupted        : [false]
```

```
FAULT DETECTOR
=====
```

```
NodeRole          : [passive]
NodeRoleChanges   : 0
LastNodeRoleError : 2012-10-28,07:37:07.07,-04:00
SyncState         : [Synchronized]
LastSyncTimeDuration : 0
```

If the `NodeRole` is incorrect for the two nodes, check the cluster configuration again, as shown in step 1. Correct the configuration as required. Make sure to perform an `SDE reload` after correcting the configuration.

4. Run:

```
SDE> show service failover-cluster vip
```

On SDE A, output similar to this should appear, with the correct details for your SDE network configuration:

```
VipsTimeToSetAll: 0
```

Id	AddrType	Ip	Prefix	Gateway	InterfaceName	ServiceType	OperationalStatus
1	inet	10.10.10.251/8	10.10.10.251/8	10.10.10.4	(eth1)	Standard	[true]

AdminStatus	SetCount	UnsetCount
[true]	2	0

Check that the configuration matches the configuration you created in `vip_service_list.xml`. The output on SDE A should show that:

- `OperationalStatus` = "true". (The VIP is configured on this server).
- `AdminStatus` = "true" (active node; the VIP is assigned to this server).

On SDE B (the passive node), the output for both `OperationalStatus` and `AdminStatus` should be "false".

If the output for `OperationalStatus` and `AdminStatus` isn't correct, verify that you have configured the `vip_service_list.xml` file correctly for the two nodes. If necessary, reconfigure the files according to the instructions in [Configuring Services](#) on page 19.

For additional troubleshooting information and a full description of the CLI output for the troubleshooting commands, see [Troubleshooting the SDE](#) on page 135.



3

Back-up and Restoration

- ["Backing up and Restoring Application Data" on page 24](#)
- ["Activating Database Maintenance" on page 25](#)
- ["Backing up SDE Systems" on page 31](#)

3.1 Backing up and Restoring Application Data

The SDE backs up persistent and replicated data to ensure the recovery of application data in the event that an SDE fails or you need to roll back to an earlier database.

Persistent data is application data that is written to disk in single-node deployments. In failover clusters, data is replicated from the active to the passive node using state sharing.

Both persistency and replication are activated by default on the SDE. The SDE performs both types of backups every hour and saves the five most recent persistency or replication database "snapshots" to disk. As new back ups are created, older ones are deleted.

3.1.1 Changing Persistency Backup Settings

1. Run `#svcli` from the SDE shell.
2. Run the `SDE> set config service persistency backup copies` CLI command to check the current backup settings.

This output should appear, with the currently configured values:

```
Enabled           : [true]
Copies            : 5
SourceDirectory   : /usr/local/sandvine/persistent_data
SourceAccessPermissions : [full access]
SourceFreeSpace    : 74%
SourceTotalUsage   : 4.0K
DestinationDirectory : /var/lib/sandvine/persistent_backup
DestinationAccessPermissions : [full access]
DestinationFreeSpace : 74%
DestinationTotalUsage : 8.0K
FailedBackups      : 0
SuccessfulBackups   : 0
Interval          : 60 min
AvailableBackups    :
```

3. Run the `SDE> configure` CLI command to enter the CLI configuration mode.
4. Run the `SDE> set config service persistency backup copies <value>` CLI command to change the number of backup copies retained on the SDE.

You can assign a value of 5 to 100 backup copies.

5. Run the `SDE> set config service persistency backup interval` CLI command to change the interval at which the SDE backs up the database.

You can configure backup intervals of 1 to 1440 minutes.

6. Run the `SDE> commit` CLI command to commit the changes.



Note:

See the `set config service persistency backup interval` command, in the *SDE Operations Reference Guide*, for additional information on changing persistency backup settings.

3.1.2 Changing Replication Backup Settings

1. Run `#svcli` from the SDE shell.
2. Run the `SDE> show config service failover-cluster backup` CLI command to check the current backup settings.
This output should appear, with the currently configured values:

```
enabled : true
copies  : 5
interval: 60
```
3. Run the `SDE> configure` CLI command to enter the CLI configuration mode.
4. Run the `SDE> set config service failover-cluster backup copies <value>` CLI command to change the number of backup copies retained on the SDE.
You can assign a value of 5 to 100 backup copies.
5. Run the `SDE> set config service failover-cluster backup interval <value>` CLI command to change the interval at which the SDE backs up the database.
You can configure backup intervals of 1 to 1440 minutes.
6. Run the `SDE> commit` CLI command to commit the changes.



Note:

See the `set config service failover-cluster backup` command, in the *SDE Operations Reference Guide*, for additional information on changing replication backup settings.

3.2 Activating Database Maintenance

The SDE includes an interactive database maintenance tool that allows you to safely manage persistent and replicated databases. Using this tool, you can configure database and backup directories, perform backups, restore data and removing old data from the database.

The interactive database maintenance tool checks whether the SDE service is running. To perform certain operations, you are required to first stop the SDE service. If the SDE service is running when you start the maintenance tool, you can choose to continue using the tool with limited options or to stop the SDE service so that you can continue with all options:

1. From the SDE shell, run:

```
db_maintenance
```


If the SDE service is running, a result similar to the following should appear:

```
To enable full control of db_maintenance SDE service must be
stopped.
Do you want to stop the SDE service now (y/n) [n] ?
```
2. If you select 'n', you are asked:

```
Do you want to continue with restricted actions (y/n) [n] ?
```
3. If you select 'y' to continue with restricted actions, these options appear:

Option	Description
1) View configuration directories	Allows you to view the locations of the database directories and storage locations of the backup files
2) Change configuration directories	Allows you to change the location of the backup directories
3) Backup now	Performs an immediate backup of databases
4) Exit from this menu	Exits the database maintenance tool

If you originally selected 'y' to stop the SDE service, these options should appear:

Option	Description
1) View configuration directories	Allows you to view the locations of the database directories and storage locations of the backup files
2) Change configuration directories	Allows you to change the location of the database or backup directories
3) Backup now	Performs an immediate backup of databases
4) Restore	Restores backup data to the SDE
5) Clean database	Removes old content from the database
6) Exit from this menu	Exits the database maintenance tool

- Enter the number for the option you want to perform.
- When you finish your database maintenance session, select the menu option for exiting database maintenance. If you have stopped the SDE service, enter 'y' to restart it. Upon exiting, the SDE reverts to the bash shell.

3.2.1 Viewing Database Locations

You can view the locations of the database directories and storage locations of the backup files:

- From the SDE shell, run:
`db_maintenance`
- To continue with restricted actions, enter 'n' and then 'y'; or to stop the SDE services, enter only 'y'.
- Enter '1'.

The SDE output should display the filepath for all persistency and replication directories. Database directories are presented as soft links.

The default file paths appear as:

```
#####
## Configuration directories ##
#####

Persistency database dir: /usr/local/sandvine/persistent_data ->
/var/sandvine/db/persistent_data
Persistency backup dir: /var/lib/sandvine/persistent_backup
State sharing database dir: /usr/local/sandvine/replica_data ->
```

```
/var/sandvine/db/replica_data  
State sharing backup dir: /var/lib/sandvine/replica_backup
```

4. When you finish your database maintenance session, select the menu option for exiting database maintenance. If you have stopped the SDE service, enter 'y' to restart it.

3.2.2 Changing Database Locations

You can change the location of the database or backup directory:

1. From the SDE shell, run:

```
db_maintenance
```

2. Select 'y' to stop the SDE service.



Note:

If you are only changing the location of the backup directory, you do not need to stop the SDE. In this case, select 'n', and then 'y'.

3. Select 2) Change configuration directories....

4. To change the persistency directory, select 1) Persistency. Or, to change the state sharing directories, select 2) Replication .

5. Next, to change the database directory, select 1) Database directory. To change the backup directory, select 2) Backup directory.

The output displays the current file path and asks you to change it. For example:

```
Please change "Persistency backup directory"  
old value: /var/lib/sandvine/persistent_backup  
new value:
```

6. Enter the new file path for the directory.



Note:

Because database directories are presented as soft links, changing the directory location modifies the soft link to point to the new location. However, databases are not moved automatically.

7. If the directory does not exist, the tool allows you to create it. To create the directory, enter 'y'.
8. The tool next asks whether you want to remove old database files. To remove the files, enter 'y'.

This is an example of the interactive output for changing the state sharing backup directory and removing old database files:

```
Please change "Replication backup directory"  
old value: /var/lib/sandvine/replica_backup  
new value: /root/99  
Error invalid path: "/root/99" : doesn't exist  
Do you want to create it now (y/n)[y] ? y  
Creating directory ...ok  
The previous path have been renamed to /var/lib/sandvine/replica_backup.old  
Changed successfully /var/lib/sandvine/replica_backup -> /root/99  
Old database files still exist at directory /var/lib/sandvine/replica_backup.old.  
Do you want to remove old database files (y/n)[y]? y  
Old database files removed.
```

9. When you are finished with the procedure, the tool takes you back to the main directory.
 - To change the location of another database directory, select 2) `Change configuration directories` again.
 - If you are finished changing directories, exit from the menu and restart the SDE service if necessary.

3.2.3 Backing up the Databases

The database maintenance tool allows you to perform an immediate backup of the persisted or replicated databases regardless of whether the SDE service is running:

1. From the SDE shell, run:
`db_maintenance`
2. To continue with restricted actions, enter **n** and then **y**; or to stop the SDE services, enter only **y**.
3. Select 3) `Backup now....`
4. Select the database type to back up: 1) `Persistency` or 2) `Replication` .
Output should appear that states that the backup was successful:
5. When you have finished the backup, select the menu option for exiting database maintenance. If you have stopped the SDE service, enter 'y' to restart it.
6. To verify the backup, check the system logs for additional information, such as backup errors, that does not appear in the output for the backup process.
 - The persistency log for single SDE nodes is located at `/var/log/sv_persistency_backup.log`.
 - The replication log for failover clusters is located at `/var/log/sv_replica_backup.log`.

3.2.4 Restoring Databases

The database maintenance tool allows you to roll back to an earlier version of the database using the restore option. For example, you may need to roll back to data that was backed up three hours or a day ago.

3.2.4.1 Restoring Data on a Standalone Server

1. From the SDE shell, run:
`db_maintenance`
2. Select 'y' to stop the SDE service.
3. Select 4) `Restore....`
4. Select 1) `Persistency` .
5. Select the path at which the backup database is located:

- In most cases, select 1) `From default backup path`, even if you changed the location of the database directories through the database maintenance tool. The soft link to the new location appears when you select this option.
- If you manually transferred the backup file to a different location (for example, to `/tmp`), select 2) `From another path...`, and then enter the file path for the backup files.

6. Enter the number of the file you want to restore. The files are named by date.

When the restore procedure is finished, the output should show that the file was restored successfully.

7. Select the option to exit the database maintenance tool, and then enter 'y' to restart the service.

If a failure message appears upon SDE startup, this indicates that the database restore process failed because the file used for the restore is corrupted. Repeat the restore procedure using a different backup file.

8. From the CLI, verify that the database recovery session was successful. Run:

```
# svcli
SDE> show service persistency status

This output, with these values, should appear:

Corrupted      : [false]
CreationError  : [false]
Active         : [true]
BaseDirectory: /usr/local/sandvine/persistent_data
```

3.2.4.2 Restoring Data in a Failover Cluster

Perform the restore procedure on only one node in the failover cluster. For example purposes, in this procedure SDE A is the active node and SDE B is the passive node, but you can reverse the nodes on which you perform the restore.

1. On SDE B, stop the SDE service. From the SDE shell, run:

```
service sde stop
```

2. On SDE A, start the database maintenance tool. Run:

```
db_maintenance
```

3. Select 'y' to stop the SDE service.

4. Select 4) `Restore...`

5. Select 2) `Replication` .

6. Select the path at which the backup database is located:

- In most cases, select 1) `From default backup path`, even if you changed the location of the database directories through the database maintenance tool. The softlink to the new location appears when you select this option.
- If you manually transferred the backup file to a different location on the passive node (for example, to `/tmp`), select 2) `From another path...`, and then enter the file path for the backup files.

7. Enter the number of the file you want to restore. The files are named by date.

When the restore procedure is finished, the output should show that the file was restored successfully.

8. Select the option to exit the database maintenance tool, and then enter 'y' to restart the service.

If a failure message appears upon SDE startup, this indicates that the database restore process failed because the file used for the restore is corrupted. Repeat the restore procedure using a different backup file.

- On SDE A, from the CLI, verify that the database recovery session was successful. Run:

```
# svccli
SDE> show service failover-cluster recovery
```

The output should show that the node is active and that the recovery succeeded. The recovery tables should display data appropriate to your deployment type. For example:

```
NodeRole           : [active]
LastNodeRoleChangeTime: yyyy-mm-dd,hh:mm:ss.ms,+GMT offset
RecoveryState      : [succeeded]
```

```
RECOVERY TABLES
=====
```

Name	RecoveredRowCount	RecoveryState
RADIUS_Sub_IP_0.backup	1,001,006	[succeeded]
RADIUS_Sub_IP_1.backup	1,001,006	[succeeded]
RADIUS_Sub_IP_2.backup	1,001,006	[succeeded]
RADIUS_Sub_IP_3.backup	1,001,006	[succeeded]
RADIUS_Sub_IP_4.backup	1,001,006	[succeeded]
RADIUS_Sub_IP_5.backup	1,001,006	[succeeded]
RADIUS_Sub_IP_6.backup	1,001,006	[succeeded]
RADIUS_Sub_IP_7.backup	1,001,006	[succeeded]

- On SDE B, restart the SDE service. At the root prompt, run:

```
service sde start
```

The replication process synchronizes the restored data on SDE A automatically to SDE B.

3.2.5 Deleting the Database

You can delete database or backup files using the database maintenance tool:

- From the SDE shell, run:

```
db_maintenance
```

- Select 'y' to stop the SDE service.
- Select 5) Remove database....
- Select the database type to clean: 1) Persistency or 2) Replication .
- Select which type of files to delete:
 - To delete all data stored in the database, enter '1' (Delete all database environment files...).
 - To delete all backups of persisted or replicated data, enter '2' (Delete all backup databases...).
 - To delete a specific file, enter '3' (Delete table by file...), and then enter the number for the file.
- At the prompt, enter 'y' to confirm that you want to delete the files.

The output should show that the files were removed successfully.

3.3 Backing up SDE Systems

You can save your current SDE configurations, including XML dictionary files and SandScript, on the local SDE server for use in restoring the system in cases of failure. When using Control Center, you can deploy the saved configurations to all SDEs in a cluster.

1. To save configurations locally, by date and time, in CLI configuration mode run:

```
SDE# save config
```

Or, to save configurations by name, run:

```
SDE# save config <file name>
```

Backups are saved to `/usr/local/sandvine/etc/configs/<date|file name>`.

2. To restore a configuration locally, in CLI configuration mode run:

```
SDE# load config <file date|name>
```

For example, a file saved on 20-6-2012 using `SDE# save config` might be reloaded by running:

```
SDE# load config 2012-06-25T16:18:56-0400
```

For information on deploying configurations through Control Center, see the *Control Center User Guide*.



4

DHCP

- ["DHCP Subsystem Overview" on page 34](#)
- ["Configuring the SDE for DHCP Traffic" on page 34](#)
- ["Configuring the SDE for DHCP Leasequery" on page 38](#)

4.1 DHCP Subsystem Overview

The DHCP subsystem in the SDE receives DHCP messages that are evaluated using SandScript. The Subscriber Mapping application uses the subsystem and associated events to make the association between an IP address and the subscriber to which it is assigned. When the DHCP subsystem is used, the PTS tees incoming DHCPv4 and DHCPv6 traffic to the SDE. The SDE detects and parses the DHCP messages and validates the DHCP sequences.

**Note:**

For information on using DHCP within the subscriber mapping context, see the *Subscriber Mapping User Guide*. The DHCP subsystem supports receiving DHCP messages through two tee modes:

- **Encapsulation:**

When encapsulation mode is used, the PTS encapsulates the entire DHCPv4 or DHCPv6 packet in an UDP datagram. This allows the SDE make use of both the address of the PTS which Teed the packet as well as the addresses on the original encapsulated packet.

- **IP rewrite:**

In this mode, the PTS strips out the IP header of the original DHCP packet (DHCPv4 or DHCPv6) and replaces it with a new IPv4- or IPv6-compatible header in which the PTS is the source address and the SDE is the destination address. It then sends the packet to the SDE.

When this mode is used:

- Both the original source and destination IP data are lost.
- An IPv4 IP header is used for both DHCPv4 and DHCPv6.

The mode used influences both the SDE platform configuration and PTS SandScript. When the PTS uses IP rewrite mode, you are required to configure iptables on the SDE to redirect the received traffic to the DHCP subsystem socket. When encapsulation mode is used, no iptables redirection is required, as the encapsulating header has the appropriate destination socket. For configuration instructions, see [Configuring the SDE for DHCP Traffic](#) on page 34. On the PTS, *policy.conf* needs to be modified for each tee mode used. For both modes, the destination should be declared with the PTS as the source address and the SDE as the destination address. For instructions, see the *Subscriber Mapping User Guide*.

4.2 Configuring the SDE for DHCP Traffic

For the DHCP subsystem to function properly within the Subscriber Mapping environment, these configurations are required on the SDE:

**Note:**

You cannot change the local firewall configuration (iptables) using the SDE CLI. You need to modify the iptable rules to allow access to additional ports.

1. Configure the DHCP interface.
2. If IP rewrite is used as the tee mode, on each SDE machine configure iptables to redirect the traffic to the DHCP listening socket.

This example assumes that the subsystem is listening to IPv4/DHCPv4 traffic on port 3128 (the DHCPv4 default) and to IPv4/DHCPv6 traffic on port 3129 (the DHCPv6 default). DHCPv4 traffic is always invoked in ports 67 and 68. DHCPv6 traffic is always invoked in ports 546 and 547:

```
iptables -t nat -A PREROUTING -i eth1 -p udp --dport 67 -j REDIRECT --to-port 3128
iptables -t nat -A PREROUTING -i eth1 -p udp --dport 68 -j REDIRECT --to-port 3128
iptables -t nat -A PREROUTING -i eth1 -p udp --dport 546 -j REDIRECT --to-port 3129
iptables -t nat -A PREROUTING -i eth1 -p udp --dport 547 -j REDIRECT --to-port 3129
```

3. After defining the IP rewrite, ensure that the firewall ports are open for the redirected ports.
4. In `/usr/local/sandvine/etc/policy.conf`, configure DHCP filters.

4.2.1 Configuring DHCP Listening Interfaces

The DHCP interface group defines the listening interfaces between the SDE and PTS. You can configure more than one interface for both IPv4 and IPv6.



Note:

You cannot change the local firewall configuration (iptables) using the SDE CLI. You need to modify the iptable rules to allow access to additional ports.

1. **DHCP IPv4:** To configure a DHCP IPv4 listening interface, from the CLI run:

```
SDE> configure
```

```
SDE# add config service dhcp interface ipv4 <name> port <int:1..65535>
```

To configure all available attributes when adding the interface, run:

```
add config service dhcp interface ipv4 <name> port <int:1..65535> ip <ipv4-address>  
encapsulated <false|true> dhcp-version <v4|v6>
```

DHCP IPv6: To configure a DHCP IPv6 listening interface, in the CLI run:

```
SDE# add config service dhcp interface ipv6 <name> port <int:1..65535>
```

To configure all available attributes when adding the interface, run:

```
SDE# add config service dhcp interface ipv6 <name> port <int:1..65535> ip <ipv6-address>
```

After you have added interfaces, you can edit parameters using the `set` command:

```
SDE# set config service dhcp interface ipv4|ipv6 <name>
```

2. Optionally configure the general parameters according to your system's requirements:

```
SDE# set config service dhcp [acceptable identifier] <valid value>
```

3. Commit and then verify the changes:

```
SDE# commit
```

```
SDE> show config service dhcp interface
```

4.2.1.1 Configuring IPv4 Interfaces

When you add DHCP IPv4 listening interfaces, you are required to configure a unique name and the listening port.



Note:

You cannot change the local firewall configuration (iptables) using the SDE CLI. You need to modify the iptable rules to allow access to additional ports.

By default the interface listens on all IPv4 addresses. The default tee mode is encapsulated and the default payload is DHCPv4.

1. To configure a basic DHCP IPv4 listening interface that uses default values, from the CLI run:

```
SDE> configure
```

```
SDE# add config service dhcp interface ipv4 <name> port <int:1..65535>
```

Alternatively, to configure all interface parameters run:

```
SDE# add config service dhcp interface ipv4 <name> port <int:1..65535> ip <ipv4-address>
encapsulated
<false|true> dhcp-version <v4|v6>
```

- After you have added the required interfaces, you can change the port, IP address, encapsulated and DHCP version using the `set` command:

```
SDE# set config service dhcp interface ipv4 <name> dhcp-version <v4|v6>
SDE# set config service dhcp interface ipv4 <name> ip <ipv4-address>
SDE# set config service dhcp interface ipv4 <name> encapsulated <false|true>
SDE# set config service dhcp interface ipv4 <name> port <int:1..65535>
```

- When you are finished with all DHCP configurations, commit the changes:

```
SDE# commit
```

4.2.1.1.1 DHCP IPv4 Interface Parameters

Parameter	Mandatory	Description	Default
encapsulated	N	Specifies whether the DHCP traffic is encapsulated: true = encapsulated false = IP rewrite used	true
dhcp-version	N	DHCP payload version: v4 v6	v4
ip	N	IPv4 address on which the SDE listens for this type of traffic. If not defined, the SDE listens on all addresses on all interfaces (ANY).	"(ANY)"
name (string)	Y	Unique name for this interface	--
port	Y	The port the SDE uses to listen on the interface. Usually port 3128 for DHCPv4, or port 3129 for DHCPv6. Range is 1-65535.	--

4.2.1.2 Configuring IPv6 Interfaces

When you add DHCP IPv6 listening interfaces, you are required to configure a unique name and the listening port.



Note:

You cannot change the local firewall configuration (iptables) using the SDE CLI. You need to modify the iptable rules to allow access to additional ports.

By default the interface listens on all IPv6 addresses. The tee mode is always IP rewrite and the payload is always DHCPv6.

- To configure a basic DHCP IPv6 listening interface that uses default values, from the CLI run:

```
SDE> configure
SDE# add config service dhcp interface ipv6 <name> port <int:1..65535>
```

Alternatively, to configure all interface parameters run:

```
SDE# add config service dhcp interface ipv6 <name> port <int:1..65535> ip <ipv4-address>
encapsulated <false|true>
```

- After you have added the required interfaces, you can change the port or IP address using the `set` command:

```
SDE# set config service dhcp interface ipv6 <name> port <int:1..65535>
SDE# set config service dhcp interface ipv6 <name> ip <ipv6-address>
```

3. When you are finished with all DHCP configurations, commit the changes:

```
SDE# commit
```

4.2.1.2.1 DHCP IPv6 Interface Parameters

Parameter	Mandatory	Description	Default
ip	N	IPv6 address on which the SDE listens for this type of traffic. If not defined, the SDE listens on all addresses on all interfaces (ANY).	"(ANY)"
name (string)	Y	Unique name for this interface	--
port	Y	Port the SDE uses to listen on the interface. Usually port 3129 for DHCPv6. Range is 1-65535.	--

4.2.1.3 DHCP General Configuration Parameters

DHCP general configuration parameters set global configurations for the DHCP service. It is recommended that you use the defaults values; however, the SDE CLI allows you to change the value of the `app-to-stack-queue-size`, `max-active-transactions` or `stack-to-app-queues-size` parameters:

1. To change the value of any of the global configurations, from the SDE CLI run:

```
SDE> configure
SDE# set config service dhcp app-to-stack-queue-size <int:0..>

SDE# set config service dhcp max-active-transactions <int:0..10000000>
SDE# set config service dhcp stack-to-app-queues-size <int:0..>
```

2. When you are finished with the configurations, commit the changes:

```
SDE# commit
```

Parameter	Mandatory	Description	Default
app-to-stack-queue-size	N	Maximum number of outgoing lease queries waiting to be processed. Valid values are: 0-infinity.	10000
max-active-transactions	N	Maximum number of pending DHCP transactions to be processed. Range is: 0-10000000.	20000
stack-to-app-queues-size	N	Maximum number of incoming transaction events and lease query replies. Valid values are: 0-infinity.	100000

4.2.1.4 Verifying DHCP Configurations

After adding DHCP interfaces or modifying the configurations, you can verify your changes:

1. To view all DHCP configurations, in CLI operational mode run:

```
SDE> show config service dhcp
```

2. To view only DHCP interface configurations, run:

```
SDE> show config service dhcp interface
```

4.3 Configuring the SDE for DHCP Leasequery

The SDE can be configured so that the Sandvine Subscriber Mapping application can reconcile subscriber mapping information using DHCP leasequery.

The DHCP leasequery group of commands defines the configurations for the bidirectional traffic between the SDE (the host) and the DHCP servers, or peers. The DHCP subsystem has one IPv4 and one IPv6 leasequery host. Each host sends lease queries only to configured peers.

In general, one SDE communicates with several peers. Because different DHCP servers—or at least different IP addresses—are used for IPv4 and IPv6, you need to configure a different peer for each IP network.

If site number is not enabled that means the value 0, that is no site number is in use. If the site number is enabled then, query only DHCP with the same site number as in the reconcile event. Site number can be defined for the DHCP peer using this CLI command:

```
SDE# set config service dhcp lease-query ipv4 peer <peer_name> site-number <value>
```

4.3.1 Configuring IPv4 Hosts and Peers

1. To configure the SDE as a DHCPv4 leasequery host, from the CLI run:

```
SDE> configure
SDE# set config service dhcp lease-query ipv4 enabled <false|true>
SDE# set config service dhcp lease-query ipv4 host <host>
SDE# set config service dhcp lease-query ipv4 port <int:1..65535>
```

2. Add at least one IPv4 leasequery peer to the configuration. This is the DHCP server that will reconcile the lease queries. To add a leasequery peer with minimum configuration, run:

```
SDE# add config service dhcp lease-query ipv4 peer <name> host <ipv4-address>
```

To configure all available attributes when adding the peer, run:

```
SDE# add config service dhcp lease-query ipv4 peer <name> host <ipv4-address>
max-pending-queries <int:1..1000000> timeout-sec <int:10..30> max-retries <int:0..65535>
max-rate <int:0..100000> max-not-active-rate <int:0..100000> interoperability <cisco|standard>
```

3. Run these commands, as required, to change a peer's attributes after adding the peer to the SDE configuration:

```
SDE# set config service dhcp lease-query ipv4 peer <name> host <host>
SDE# set config service dhcp lease-query ipv4 peer <name> interoperability <cisco|standard>

SDE# set config service dhcp lease-query ipv4 peer <name> max-not-active-rate <int:0..100000>

SDE# set config service dhcp lease-query ipv4 peer <name> max-pending-queries
<int:1..1000000>
SDE# set config service dhcp lease-query ipv4 peer <name> max-rate <int:0..100000>
SDE# set config service dhcp lease-query ipv4 peer <name> max-retries <int:0..65535>
SDE# set config service dhcp lease-query ipv4 peer <name> timeout-sec <int:10..30>
```

4. Run this command for the list of options DHCP server provides:

```
SDE# set config service dhcp lease-query ipv4 oro <51 82>
```

Default options are 51 (IpAddressLeaseTime) and 82 (RelayAgentInformation).

5. When you are finished with all DHCP configurations, commit the changes:

```
SDE# commit
```

4.3.1.1 DHCP IPv4 Leasequery Host Parameters

Parameter	Mandatory	Description	Default
enabled	Y	Activates/deactivates IPv4 leasequery: true false	false
host	Y	Interface on which the DHCP server replies to leasequeries. Must be a valid local IPv4 address.	--
port	N	Port used to communicate with the DHCP client (SDE). When changing this port, you also must open it on the SDE.	67
oro	Y	List of options the DHCP server provides.	51 and 82

4.3.1.2 DHCP IPv4 Leasequery Peer Attributes

Attribute	Mandatory	Description	Default
peer	Y	Name of the leasequery peer, defined as a string	--
host	Y	Valid DHCPv4 leasequery server IP address	--
interoperability	N	Leasequery interoperability mode: cisco: Cisco CNR DHCP servers only standard: all DHCP servers	standard
max-not-active-rate	N	Maximum allowed request rate (messages per second) for a specific DHCPv4 server that is not active. Range is 0-100000.	0
max-pending-queries	N	Maximum number of queries the SDE can queue in the DHCP server. Range is 1-10000000.	10000
max-rate	N	Maximum allowed request rate (messages per second) for a specific DHCPv4 server that is active. Range is 0-100000.	0
max-retries	N	Maximum number of times the SDE resends the leasequery if there is no response. Range is 0-65535.	3
site-number	N	In some deployments IP address space is reused among multiple sites in the deployment. The session_ipv4_site_number is used as an additional part of the key used to distinguish among IP sessions. The value 0 means that no site number is in use.	0
timeout-sec	N	Amount of time in seconds the SDE waits for a response before timing out. Range is 10-30.	10

4.3.2 Configuring IPv6 Hosts and Peers



Note:

You cannot change the local firewall configuration (iptables) using the SDE CLI. You need to modify the iptable rules to allow access to additional ports.

1. To configure the SDE as a DHCPv6 leasequery host, from the CLI in configuration mode, run:

```
SDE# set config service dhcp lease-query ipv6 enabled <false|true>
SDE# set config service dhcp lease-query ipv6 host <ipv6-address >
SDE# set config service dhcp lease-query ipv6 port <int:1..65535>
```

2. Add at least one IPv6 leasequery peer to the configuration. This is the DHCP server that will reconcile the lease queries. To add a leasequery peer with minimum configuration, run:

```
SDE# add config service dhcp lease-query ipv6 peer <name> host <host>
```

To configure all available attributes when adding the peer, run:

```
SDE# add config service dhcp lease-query ipv6 peer <name> host <host> max-pending-queries
<int:1..10000000> timeout-sec <int:10..30> max-retries <int:0..65535> max-rate <int:0..100000>
max-not-active-rate <int:0..100000> interoperability <cisco|standard>
```

3. You can change a peer's attributes after adding the peer to the SDE configuration by running these commands as needed:

```
SDE# set config service dhcp lease-query ipv6 peer <name> host <host>
SDE# set config service dhcp lease-query ipv6 peer <name> interoperability <cisco|standard>

SDE# set config service dhcp lease-query ipv6 peer <name> max-not-active-rate <int:0..100000>

SDE# set config service dhcp lease-query ipv6 peer <name> max-pending-queries
<int:1..10000000>
SDE# set config service dhcp lease-query ipv6 peer <name> max-rate <int:0..100000>
SDE# set config service dhcp lease-query ipv6 peer <name> max-retries <int:0..65535>
SDE# set config service dhcp lease-query ipv6 peer <name> timeout-sec <int:10..30>
```

4. Run this command for the list of options DHCP server provides:

```
SDE# set config service dhcp lease-query ipv6 oro <51 82>
```

Default options are 51 (IpAddressLeaseTime) and 82 (RelayAgentInformation).

5. When you are finished with all DHCP configurations, commit the changes:

```
SDE# commit
```

4.3.2.1 DHCP IPv6 Leasequery Host Parameters

parameter	Mandatory	Description	Default
enabled	Y	Activates/deactivates IPv6 leasequery: true false	false
host	Y	Interface on which the DHCP server replies to leasequeries. Must be a valid IPv6 address (for example: 2001:db8:85a3::8a2e:370:7334).	--
port	N	Port used to communicate with the DHCP client (SDE). When changing this port, you also must open it on the SDE.	546
oro	N	List of options the DHCP server provides	""

4.3.2.2 DHCP IPv6 Leasequery Peer Attributes

Attribute	Mandatory	Description	Default
peer	Y	Name of the leasequery peer, defined as a string	--
host	Y	DHCP server's IP address. Must be a valid DHCPv6 server IPv6 address.	--
interoperability	N	Peer type: cisco: Cisco CNR DHCP servers only standard: all DHCP servers	standard
max-not-active-rate	N	Maximum allowed request rate in messages per second for a specific DHCPv6 server that is not active. Range is 0-100000.	0
max-pending-queries	N	Maximum number of queries the SDE can queue in the DHCP server. Range is 1-10000000.	10000
max-rate	N	Maximum allowed request rate in messages per second for a specific DHCPv6 server that is active. Range is 0-100000.	0
max-retries	N	Maximum number of times the SDE resends the leasequery if there is no response. Range is 0-65535.	3
timeout-sec	N	Amount of time in seconds the SDE waits for a response before timing out. Range is 10-30.	10

4.3.3 Verifying DHCP Leasequery Configurations

After configuring the SDE for DHCP leasequery or modifying the configurations, you can verify your changes:

1. To view all DHCP configurations, in CLI operational mode run:

```
SDE> show config service dhcp
```

2. To view only DHCP leasequery configurations, run:

```
SDE> show config service dhcp lease-query
```




5

Diameter

- ["Diameter Subsystem Overview" on page 44](#)
- ["Configuring Diameter" on page 44](#)
- ["Editing Diameter Message Parameters" on page 47](#)
- ["Diameter Stack Base Protocol Messages" on page 48](#)

5.1 Diameter Subsystem Overview

The Diameter subsystem enables the SDE to act as a Diameter server to communicate with other systems over Diameter. The SDE supports multiple Diameter dictionaries.

5.2 Configuring Diameter

Diameter commands and AVPs are defined in the dictionary file. The sample dictionaries are located under `/usr/local/sandvine/etc/diameter/dictionary/`. The dictionary files are activated when the SDE is reloaded. Multiple dictionaries are supported, and the dictionary name and file path to the dictionary are configured in the general Diameter configuration file.

Each dictionary file is validated against its corresponding Document Type Definition (DTD) file. For example, the Rf dictionary file is validated against `/usr/local/sandvine/etc/dictionaryRf.dtd`. The DTD files must not be changed, and should be kept in the same directory as the dictionaries.

To fully enable the SDE Diameter library to communicate properly with the Diameter client, configure the `diam_config.xml` file, the `diam_peer_config.xml` file, and `/etc/hosts`.

5.2.1 Configuring `diam_config.xml`

Configure the `diam_config.xml` file to allow the SDE to recognize supported Diameter dictionaries:

1. If `/usr/local/sandvine/etc/diam_config.xml` does not exist, copy the Diameter server configuration sample file:

```
cp /usr/local/sandvine/etc/diam_config.xml.sample /usr/local/sandvine/etc/diam_config.xml
```
2. Open the `/usr/local/sandvine/etc/diam_config.xml` file for editing.
3. Inside the `<dictionaries>` tag, define the Diameter dictionaries:
 - The dictionary's name is the actual application.
 - The file should point to the absolute location where the dictionary is installed.

For example:

```
<dictionary name="Rf"
file="/usr/local/sandvine/etc/diameter/dictionary/dictionaryRf.xml"></dictionary>
```

4. Save the file.



Note:

Verify if the file `/usr/local/sandvine/etc/diam_peer_config.xml` is present. If the file is not present, configure `diam_peer_config.xml`. To configure `diam_peer_config.xml`, see [Configuring `diam_peer_config.xml`](#) on page 45

5. `svreload`

5.2.2 Configuring *diam_peer_config.xml*

1. If */usr/local/sandvine/etc/diam_peer_config.xml* does not exist, copy the Diameter configuration sample file:

```
cp /usr/local/sandvine/etc/diam_peer_config.xml.sample  
/usr/local/sandvine/etc/diam_peer_config.xml
```

2. Open the */usr/local/sandvine/etc/diam_peer_config.xml* file for editing.

3. For each Diameter client, inside the `<peer>` tags:

- a. Update the hostname, identity and realm of the peer. For example:

```
<identity>Testpeer.sandvine.com</identity>  
<hostname>Testpeer.sandvine.com</hostname>  
<realm>sandvine.com</realm>
```

- b. Configure the dictionary names of the applications supported by the Diameter client:

```
<dictionaries>  
<dictionary>Rf</dictionary>  
</dictionaries>
```

4. In the `<local-identity>` tag, configure the server's local Diameter identity:

- a. In the `<identity>` tag, configure the SDE's hostname:

```
<identity>SDE-server.sandvine.com</identity>
```

- b. Configure the realm as:

```
<realm>sandvine.com</realm>
```

- c. Configure supported dictionaries. For example:

```
<dictionaries>  
<dictionary>Rf</dictionary>  
</dictionaries>
```

- d. In the `<server-config>` tag, configure the Diameter server's IP and listening port:

```
<ip>10.10.10.10</ip>  
<port>3868</port>
```

Where `<10.10.10.10>` is the IP address of the server. The port should be 3868.

- e. Configure the Watch-Dog keep alive transmission interval:

```
<watchdog-timeout>16</watchdog-timeout>
```

- f. Configure the Capabilities Exchange Acknowledge (CEA) interval timeout:



Note:

The CEA interval timeout is the amount of time in seconds that the CEA waits for a Credit Control Answer before closing the connection.

```
<cer-timeout>10</cer-timeout>
```

- g. In the `<accept>` tag, configure the list of accepted peers. If the list is empty, all peer connections are accepted.

5. Save the file, and perform an `svreload`.

5.2.3 Example *diam_peer_config.xml* file

The following is an example of the *diam_peer_config.xml* file:

```
<?xml version="2.0" encoding="UTF-8"?>
<diameter-peer>
  <peers>
    <peer>
      <identity>TestPTS.sandvine.com</identity>
      <hostname>TestPTS.sandvine.com</hostname>
      <realm>sandvine.com</realm>
      <dictionaries>
        <dictionary>Rf</dictionary>
      </dictionaries>
      <security>
        <CA-file>CApath</CA-file>
        <CERT-file>CERTpath</CERT-file>
        <KEY-file>KEYpath</KEY-file>
      </security>
      <reachable-realms>
        <realm>sandvine.com</realm>
      </reachable-realms>
    </peer>
  </peers>
  <identities>
    <local-identity>
      <identity>user-linux.sandvine.com</identity>
      <ip>10.10.10.10</ip>
      <realm>sandvine.com</realm>
      <dictionaries>
        <dictionary>Rf</dictionary>
      </dictionaries>
      <security>
        <CA-file>CApath</CA-file>
```

5.2.4 Configuring */etc/hosts*

For each hostname, ensure that */etc/hosts* is configured with the peer's IP, hostname and alias.

1. On the SDE, at the command line, run the following:

```
vi /etc/hosts
```

A result similar to the following should appear:

```
# Do not remove the following line, or various programs  
# that require network functionality will fail.
```

```
127.0.0.1    localhost.localdomain localhost
```

```
:::1        localhost6.localdomain6 localhost6
```

```
<xxx.xxx.xxx.xxx>    <SDE-hostname>
```

Where <xxx.xxx.xxx.xxx> is the SDE machine's local IP address and <SDE-hostname> is the name that appears in the 'hostname' command output.

2. Save the file.

5.3 Editing Diameter Message Parameters

You can modify the settings for Diameter messages:

1. At the CLI prompt, run:

```
SDE> configure
```

```
SDE# set config service diameter messages <parameter> <value>
```

2. When you have finished editing Diameter messages details, commit the changes:

```
SDE# commit
```

5.3.1 Message Maximum Parameters

This table contains parameters for Diameter message queues.

Parameter	Mandatory	Description	Default
incoming-queued	N	Maximum time a message can wait in the Diameter stack outgoing queue. Range is 1-infinity.	20000
outgoing-pending-answers	N	Size of the pending answer queue, which stores the outgoing Diameter responses. Range is 1-infinity.	8000
outgoing-pending-requests	N	Size of the pending request queue, which stores pending outgoing Diameter requests. Range is 1-infinity.	8000
outgoing-per-peer	N	Maximum size of the outgoing message queue per Diameter peer. Range is 1-infinity.	20000

5.3.2 SandScript Parameters

This table contains values for changing the total number of maximum instances allowed for an AVP.

Parameter	Mandatory	Description	Default
max-avp-instances	N	Maximum number of instances allowed for an AVP. Valid values are 1-8192. Outgoing Diameter messages cannot have more than 32 instances of the same AVP.	32

5.3.3 Request-retransmission Parameters

This table contains parameters for retransmitting Diameter messages.

Parameter	Mandatory	Description	Default
request-retransmission-attempts	N	Number of times a Diameter message will be transmitted if no answer is received for the sent Diameter request. Range is 1-infinity.	3
request-retransmission-interval	N	Time in ms the Diameter stack waits before retransmitting a message. Range is 1-infinity.	1000

5.4 Diameter Stack Base Protocol Messages

The Diameter stack supports RFC 3588 Section 2.5 Connections vs. Sessions, and Section 3.2 Command Code ABNF specification establishing and maintaining Diameter sessions between peers.

**Note:**

Optional AVPs are indicated with an “O”. Mandatory AVPs are indicated with an “M”.

The Diameter subsystem supports certain Diameter messages for establishing and maintaining Diameter sessions between peers.

A session begins when the Diameter stack sends a Capabilities Exchange Request (CER) to one of its configured Diameter peer servers. If an acceptable Capabilities Exchange Answer (CEA) is received, the stack moves into the connected state and begins to send a periodic Device Watchdog Request (DWR) and expects to receive a Device Watchdog Answer (DWA) Message in response. An appropriate DWA responds to each DWR received by the Diameter stack. Disconnect Peer Requests (DPR) are handled by closing the connection; no Disconnect Peer Answers (DPA) are sent. The Diameter stack does not generate DPR requests and thus does not handle DPA messages.

5.4.1 Capabilities Exchange Messages

AVP	Details
Outgoing CER	The Diameter stack initiates a session by sending a CER message with the following format: <CER> ::= < Diameter Header: 257, REQ > M { Origin-Host } M { Origin-Realm } M { Host-IP-Address }

AVP	Details
	M { Vendor-Id } M { Product-Name } M { Origin-State-Id } M { Inband-Security-Id } M { Firmware-Revision } O [Supported-Vendor-Id] O [Auth-Application-Id] O [Acct-Application-Id] O [Vendor-Specific-Application-Id]
Incoming CER	The Diameter stack drops any incoming CER messages.
Incoming CEA:	The Diameter stack expects any incoming CEA messages to be of the format: <CEA> ::= < Diameter Header: 257 > M { Result-Code } M { Origin-Host } M { Origin-Realm } O [Vendor-Specific-Application-Id] O [Auth-Application-Id] O [Acct-Application-Id]



Note:

The Diameter stack does not check Host-IP-Address, Vendor-ID and Product-Name.

If any required AVPs are missing in a CEA, the Diameter stack will close the connection. If there is no set of common supported Application IDs, the connection is also closed.

5.4.2 Device Watchdog Messages

AVP	Details
Outgoing DWR	The Diameter stack periodically sends DWR messages with the following format: <DWR> ::= < Diameter Header: 280, REQ > M { Origin-Host } M { Origin-Realm } M { Origin-State-Id } Note: The Result-Code AVP is always set to DIAMETER_SUCCESS in outgoing DWA messages
Incoming DWR	The Diameter stack expects any incoming DWA messages to be of the format: <DWA> ::= < Diameter Header: 280 > O [Result-Code] O [Origin-Host] O [Origin-Realm] O [Error-Message] O [Failed-AVP] O [Original-State-Id] Note: Result-Code, Origin-Host and Origin-Realm are not checked by the Diameter stack.

5.4.3 Disconnect Peer Messages

AVP	Details
Outgoing DPR	The Diameter stack does not support sending of DPR messages.
Incoming DPR	<p>The Diameter stack expects any incoming DPR message to be of the format:</p> <pre><DPR> ::= < Diameter Header: 282, REQ > O [Origin-Host] O [Origin-Realm] O [Disconnect-Cause]</pre> <p>Note: The format of the incoming DPR must only have a valid header and command code. Origin-Host, Origin-Realm and Disconnect-Cause are not checked by the Diameter stack.</p>
Outgoing DPA	Because incoming DPR messages result in the connection being immediately closed, no outgoing DPA message is sent.
Incoming DPA:	Because outgoing DPR messages are not currently supported, any unexpected incoming DPA messages are dropped.

5.4.4 Supported AVPs for ACR Message

This table lists the possible Associated Value Pairs (AVPs) for an Account Credit Request (ACR) message. The table also specifies the source of the values.



Note: When “Generated by policy” appears in the Details column, the AVP changes based on the SandScript logic.

AVP	Category	Details	User configurable
Session-Id	M	Define as RF_SESSION_ID	N
Origin-Host	M	Configurable as RF_ORIGIN_HOST	Y
Origin-Realm	M	Configurable as RF_ORIGIN_REALM	Y
Destination-Realm	M	Configurable as RF_DESTINATION_REALM	Y
Acct-Application-Id	M	Define as RF_ACCT_APPLICATION_ID. Note: In our context, a vendor-specific value is used instead to uniquely identify the Rf+ application (versus Rf). Suggested value is 0x01000100.	N
Service-Context-Id	M	Define as RF_SERVICE_CONTEXT_ID. Must be set as 660.32251@3gpp.org for v6.6 dictionary and 770.32251@3gpp.org for v7.7 dictionary. This would be generated based on the RF_VERSION.	N
Accounting-Record-Type	M	Generated by SandScript. Values are: START_RECORD SERVICE_START_RECORD SERVICE_INTERIM_RECORD SERVICE_STOP_RECORD STOP_RECORD	NA
Accounting-Record-Number	M	Generated by SandScript.	NA
Event-Timestamp	O _C	Generated by SandScript.	NA
Destination-Host	O _C	Configurable as RF_DEFAULT_DESTINATION_HOST (Not mandatory). However the define is only used in the	Y

AVP	Category	Details	User configurable
		ACR-I message, all subsequent ACR messages for the same session must use the Origin-Host AVP from the CCA replies. Unless for failover, then Destination-Host will be defined by RF_DEFAULT_FAILOVER_DESTINATION_HOST. If it is empty, then stack will pick, but if defined, then will use that.	
User-Name	O _C	Configurable as RF_USER_NAME	Y
Origin-State-Id	O _C	Configurable as RF_ORIGIN_STATE_ID. Can only be NULL or true. If set to true, will use the value supplied from stack because the stack needs to generate this number for other diameter base messages anyways	Y
Subscription-Id	O _M	Configurable by the following two AVPs	NA
Subscription-Id-Type	O _M	Configurable as RF_SUBSCRIPTION_ID_TYPE. Can only be END_USER_E164 (0), END_USER_IMSI (1), END_USER_SIP_URI (2), END_USER_NAI (3), END_USER_PRIVATE (4) or NULL	Y
Subscription-Id-Data	O _M	Configurable as RF_SUBSCRIPTION_ID_DATA. Can be anything that uniquely identifies the subscriber. Default to use <i>IpAssignment.Subscriber.Name</i> . Can be changed to use attributes that are settable by RADIUS messages (eg. <i>Subscriber.Attribute.*</i>)	Y
Subscriber-Parameter-Info	O _C	Generated by SandScript. Used to propagate subscriber attributes info to the SDE needed on the CDR. Note: This AVP can occur 0 or more times in one request	NA
Subscriber-Parameter-Type	O _C	Generated by SandScript.	N
Subscriber-Parameter-Value	O _C	Generated by SandScript.	N
Termination-Cause	O _C	Generated by SandScript.	N
Multiple-Services-Indicator	O _M	Configurable as RF_MULTIPLE_SERVICES_INDICATOR. Can only be MULTIPLE_SERVICES_NOT_SUPPORTED (0), MULTIPLE_SERVICES_SUPPORTED (1), and NULL (which is same as 0).	Y
Multiple-Services-Credit-Control	O _M	---	NA
Used-Service-Unit	O _C	Generated by SandScript. Used to communicate to SDE the used service units for each service type/ rating group.	N
Reporting-Reason	O _C	Generated by SandScript. In our context, generally use the “THRESHOLD” reason, indicating that an accumulation threshold was reached. Also use a customized reason “ERROR” to indicate the need for creating an erred CDR. Other standard values are not used here.	N
CC-Time	O _C	Generated by SandScript.	N
CC-Total-Octets	O _C	Generated by SandScript.	N
CC-Input-Octets	O _C	Generated by SandScript.	N
CC-Output-Octets	O _C	Generated by SandScript.	N
CC-Service-Specific-Units	O _C	Generated by SandScript.	N

AVP	Category	Details	User configurable
Envelope	O _C	Used to wrap the start/end time.	NA
Envelope-Start-Time	M	Generated by SandScript. Time when 1st byte of the Used Units reported was consumed.	N
Envelope-End-Time	O _C	Generated by SandScript. Time when last byte of the Used Units reported was consumed.	
Event-Charging-Timestamp	O _C	Generated by SandScript.	N
Service-Identifier	O _C	Generated by SandScript.	N
Rating-Group	O _C	Generated by SandScript.	N
Reporting-Reason	O _C	Generated by SandScript.	N
Trigger	O _C	Generated by SandScript. Only present in 32.299 version 7.7	N
Trigger-Type	O _C	Generated by SandScript. In 32.299 version 6.6, it is right under <i>MSCC</i> AVP. In version 7.7, this is under <i>Trigger</i> AVP	N
Service-Information	O _M	Configurable by the following AVPs	NA
PS-Information	O _C	Configurable by the following AVPs. Basically only supports the ones that can be sent over from RADIUS, as defined in 3GPP TS 29.061, section 16.4.	NA
PDP-Address		Configurable as RF_PS_INFO_PDP_ADDRESS. Should be just IpAssignment.IpAddress	Y
3GPP-PDP-Type		Configurable as RF_PS_INFO_3GPP_PDP_TYPE. Has to be using attributes that are settable by RADIUS messages (eg. Subscriber.Attribute.*).	Y
3GPP-GPRS-Negotiated-QoS-Type		Configurable as RF_PS_INFO_3GPP_GPRS_NEG_QOS_TYPE. Has to be using attributes that are settable by RADIUS messages (eg. Subscriber.Attribute.*).	Y
SGSN-Address		Configurable as RF_PS_INFO_SGSN_ADDRESS. Has to be using attributes that are settable by RADIUS messages (eg. Subscriber.Attribute.*).	Y
Called-Station-Id		Configurable as RF_PS_INFO_CALLED_STATION_ID. Has to be using attributes that are settable by RADIUS messages (eg. Subscriber.Attribute.*).	Y
3GPP-SGSN-MCC-MNC		Configurable as RF_PS_INFO_3GPP_SGSN-MCC-MNC. Has to be using attributes that are settable by RADIUS messages (eg. Subscriber.Attribute.*).	Y

5.4.5 Supported AVPs for ACA Message

This table lists the possible Associated Value Pairs (AVPs) for an Account Credit Answer (ACA) message. It indicates which table values each received AVP updates.

All category 'M' AVPs are checked to see if they are present in the CCA message by the library.

AVP	Category	Table entries affected	Description
Session-Id	M	Match Session.Id	Must check to match an existing session, if not, log an error.
Result-Code	M	Store to Session.Result_Code	Error handling logic manages any Result-Code not equal to 2001 at this level.
Origin-Host	M	Store to Session.DestinationHost	Used as "Destination-Host" in any subsequent CCR sent for the session.
Origin-Realm	M	Match Session.Destination_Realm	Ignore.
Acct-Application-Id	M	---	Should have matched at the stack level to be the value as defined in the ACR.
Accounting-Record-Type	M	Match ACRequest.RequestType	Must match the original ACR request type. Will log if this AVP does not match the pending ACR request-type.
Accounting-Record-Number	M	Match ACRequest.RequestNumber	Must match the original ACR request number. Will log if this AVP does not match the pending ACR request number.
CC-Session Failover	O _C	Store to Session.CCSF	Indicates CCSF, can override default configuration RF_CCSF behavior.
Multiple-Services-Credit-Control	O _M	---	Will always be required. Log if this AVP does not exist.
Service-Identifier	O _C	Match against Service.Service_Id	This field contains the identifier of the service ID.
Rating-Group	O _C	Match against Service.Rating_Group	This field contains the identifier of a rating group.
Result-Code	O _C	Store to Service.Result_Code	This field contains the result of the query for the specified service.
Acct-Interim-Interval	O _C	Store to Service.Time.Quota	When this quota is reached the PTS triggers an interim report of used units.
Acct-Interim-Octet-Interval	O _C	Store to Service.TotalBytes.Quota	When this quota is reached the PTS triggers an interim report of used units.
Acct-Interim-Occurrence-Interval	O _C	Store to Service.Occurrence.Quota	When this quota is reached the PTS triggers an interim report of used units.
Failed-AVP	O _C	---	If a CCR then PTS sent has error, this AVP is returned to indicate which AVP has error. If available, the Result-Code would have been error code, and should output to svlog.



6

GTP-C

- ["GTP-C Subsystem Overview" on page 56](#)
- ["GTP-C Configuration" on page 56](#)

6.1 GTP-C Subsystem Overview

The GPRS Tunneling Protocol (GTP) is a group of IP-based communications protocols used to carry General Packet Radio Service (GPRS) within GSM, UMTS and LTE networks.

The GTP-C protocol is the control section of the GTP standard. GTP-C is used within the GPRS core network for signaling between Gateway GPRS Support Nodes (GGSN) and Serving GPRS Support Nodes (SGSN). This allows the SGSN to activate a session. In the Sandvine context, the PTS tees GTP-C messages sent within the network to the SDE for subscriber mapping. Once the mapping has been completed, subscriber-specific statistics can be collected and SandScript may be applied. The PTS may be deployed on a Gn or Gp interface in a 3G network and on the S5, S8, or S11 interfaces in an LTE network. In all cases, mapping configuration will take place on the SDE.

The GTP-C subsystem supports receiving GTP-C messages through the Encapsulation Tee mode. When encapsulation mode is used, the PTS encapsulates the entire GTP-C packet in an UDP datagram. This allows the SDE to make use of both the address of the PTS which Teed the packet as well as the addresses on the original encapsulated packet. You need to modify the *policy.conf* file in the PTS for the Encapsulation tee mode used. For the Encapsulation Tee mode, the destination should be declared with the PTS as the source address and the SDE as the destination address. For instructions, see the *Subscriber Mapping User Guide*.

6.2 GTP-C Configuration

To enable GTP-C, you must:

- Configure GTP-C on the SDE.
- Configure the PTS to tee GTP-C traffic to the SDE. For information about how to configure teeing, see the *Subscriber Mapping User Guide*.

6.2.1 Configuring the GTP-C Interface and Port on the SDE

On the SDE, configure the IP address and port that are expected to receive incoming GTP-C traffic.



Note:

You cannot change the local firewall configuration (iptables) using the SDE CLI. You need to modify the iptable rules to allow access to additional ports.

1. From the CLI, set the IP address to match the interface that will be receiving GTP-C traffic:

```
SDE> configure
SDE# set config service gtpc listen-address <0.0.0.0-255.255.255.255>
```

Where <IP_address> is the actual IP address of the SDE interface that receives GTP-C traffic.

2. Set the listening port for listening to GTP-C traffic:

```
SDE# set config service gtpc listen-port <port>
```

Where <port> is the port number

3. Optionally configure the buffer size:

```
SDE# set config service gtpc buffer-size <value>
```


- When you've finished making changes, commit the changes:

```
SDE# commit
```

6.2.1.1 GTP-C Parameters

Parameter	Mandatory	Description	Default value
buffer-size	N	Size in bytes of the buffer used to store incoming GTP-C packets. Range is 65536-134217728. A larger buffer allows GTP-C to handle bigger bursts of control traffic without dropping packets. However, using a larger buffer consumes additional system memory and may cause latency issues.	32000000
listen-address	N	Valid IPv4 or IPv6 address used by an SDE interface to receive GTP-C traffic teed from the PTS. Range is 0.0.0.0-255.255.255.255. The default value, 0.0.0.0, allows the SDE to listen on all interfaces.	0.0.0.0
listen-port	N	UDP port used by an SDE interface to receive GTP-C traffic teed from the PTS. Range is 1-65535.	54222
gtpcv1	--	Used when defining the configuration for GTPv1-C	gtpcv1
gtpcv2	--	Used when defining the configuration for GTPv2-C	gtpcv2

6.2.2 Configuring Individual Parameters for GTPv1-C and GTPv2-C

Some parameters are local to either GTPv1-C or GTPv2-C. GTPv1-C and GTPv2-C are different versions of the GTP-C protocol that may have slight variations in headers, fields and flags. Although the same parameters are present for both supported versions of GTP-C, they may be configured independently if different settings are required. To configure GTPv1-C or GTPv2-C individual parameters:

- From the CLI, run:

```
SDE> configure
```

```
SDE# set config service gtpc [v1|v2] [parameter] <value>
```

- When you've finished making changes, commit the changes:

```
SDE# commit
```

6.2.2.1 GTPv1-C and GTPv2-C Individual Parameters

Parameters	Mandatory	Description	Default value
create-response-timeout	N	Time to wait in seconds for a response to a GTPv1-C GTPv2-C request message to start a new session. If a response is not detected after this timeout, the partially created session state on the SDE is removed. Range is 0-134217728.	60
delete-response-timeout	N	Time to wait in seconds for a response to the GTPv1-C GTPv2-C request message to delete an existing session. If the response is not received after this time, the session is deleted. If the response is received after the session	60

Parameters	Mandatory	Description	Default value
		is deleted, it is counted in the subsystem as an unsolicited response. Range is 0-134217728.	
max-sessions	N	Maximum number of active GTPv1-C GTPv2-C sessions. Valid range is 0-10000000.	5000000
session-timeout	N	Timeout in seconds after the last GTPv1-C GTPv2-C message is detected for a session before the session is deleted and the subscriber is unmapped. This is required for cases in which the GTP-C message terminating a session is not seen and the subscriber needs to be logged out. Range is 0-134217728. Note: By default, the session timeout is 259200 seconds (3 days). If a session is alive and inactive after the defined session timeout, the session will be lost. You can set the timeout to a longer duration but, if you have multiple sessions (both active and inactive) running for longer duration, they consume more SDE memory. You need to plan your policy for the session timeout to effectively manage the sessions.	259200

6.2.3 Verifying Configurations

After configuring the SDE for GTP-C traffic, you can verify your changes:

To view all GTP-C configurations, in CLI operational mode run:

```
SDE> show config service gtpc
```



7

ID Allocation

- ["ID Allocation Subsystem Overview" on page 60](#)
- ["Configuring the ID Allocation Subsystem Variables" on page 60](#)

7.1 ID Allocation Subsystem Overview

The ID allocation subsystem allows the SDE to communicate with the SPB to map a given identifier to a value which is used uniquely across the elements in the Sandvine deployment. The SDE is capable of creating, retrieving, and deleting these values from the SPB where they are stored. Some SDE applications require this functionality for centralized mapping between the names and identifiers, where the names and identifiers are unique.

The ID allocation subsystem provides a SandScript API that performs:

- A query to retrieve an identifier by name.
- A query to retrieve a name by identifier.
- Identifier generation—When querying a name that does not exist, the SDE communicates to the SPB to generate an identifier for that name and store it.
- Identifier to name map deletion—Deletes the map based on the identifier or the name.

See the *SDE SandScript Configuration Guide* for more information on ID Allocation SandScript policies. See the *SDE Operations Reference Guide* for more information on the CLIs and alarms.

The ID allocation subsystem contains several queues that carry messages between the policy engine and the subsystem. If a queue is full and if there is an attempt to insert another message, then the message is dropped. The `show service id-allocation stat` CLI command displays the number of dropped messages for each queue. CLI commands are also available to configure the size of each queue.

Queue	Drop Counter	Queue Size Configuration Variable
Policy engine to subsystem	ToSubsystemDropped	policy-to-subsystem-queue-size
Retry	RetryDropped	retry-queue-size
Subsystem to policy engine	ToPolicyDropped	subsystem-to-policy-queue-size
Subsystem to policy immediate	ToPolicyImmediateDropped	subsystem-to-policy-immediate-queue-size

See [Configuring the ID Allocation Subsystem Variables](#) on page 60 for more information on configuration variables.

7.2 Configuring the ID Allocation Subsystem Variables

This section describes various configuration variables of the ID Allocation subsystem and the corresponding CLI commands to configure them. See the *SDE Operations Reference Guide* for more information on the CLIs. See the *SDE SandScript Configuration Guide* for more information on SandScript policies.

7.2.1 Configuring Batch Interval

The interval (in milliseconds) that the subsystem waits before sending a bulk request to the SPB.

The ID allocation subsystem provides these configuration commands to show, set, and reset the batch interval variable:

```
show config service id-allocation batching-interval
set config service id-allocation batching-interval
reset config service id-allocation batching-interval
```

7.2.2 Configuring Maximum Batch Size

The maximum number of requests that the subsystem processes simultaneously and sends to the SPB.

The subsystem provides these configuration commands to show, set, and reset the maximum batch size variable:

```
show config service id-allocation max-batch-size
set config service id-allocation max-batch-size
reset config service id-allocation max-batch-size
```

7.2.3 Configuring Policy to Subsystem Queue Size

The size of the queue containing SandScript action requests between the policy engine on the SDE and the subsystem. See [ID Allocation Subsystem Overview](#) on page 60 for an overview on the ID allocation queues.

The subsystem provides these configuration commands to show, set, and reset the policy to subsystem queue size variable:

```
show config service id-allocation policy-to-subsystem-queue-size
set config service id-allocation policy-to-subsystem-queue-size
reset config service id-allocation policy-to-subsystem-queue-size
```

7.2.4 Configuring Subsystem to Policy Queue Size

The size of the queue between the subsystem and the policy engine on the SDE returning the completed events. The queue returns the `IsComplete` events. See [ID Allocation Subsystem Overview](#) on page 60 for an overview on the ID allocation queues.

The subsystem provides these configuration commands to show, set, and reset the Subsystem to policy queue size variable:

```
show config service id-allocation subsystem-to-policy-queue-size
set config service id-allocation subsystem-to-policy-queue-size
reset config service id-allocation subsystem-to-policy-queue-size
```

7.2.5 Configuring Subsystem to Policy Immediate Queue Size

The size of the queue between the subsystem and the policy engine on the SDE, returning completed events for records that failed. This queue returns the `IsComplete` events for records that failed due to the `StatMgr` is down and `RetryOnFailure=false`. See [ID Allocation Subsystem Overview](#) on page 60 for an overview on the ID allocation queues.

The subsystem provides these configuration commands in order to show, set, and reset the Subsystem to policy immediate queue size variable:

```
show config service id-allocation subsystem-to-policy-immediate-queue-size
set config service id-allocation subsystem-to-policy-immediate-queue-size
reset config service id-allocation subsystem-to-policy-immediate-queue-size
```

7.2.6 Configuring Latency Histogram Lookback

The latency histogram is used to report the round trip time of a record from the policy engine to the subsystem and from the subsystem to the policy engine. The latency histogram lookback value configures the latency histogram lookback window. This value is the time (in seconds) for which the subsystem retains the latency histogram.

The subsystem provides these configuration commands in order to show, set, and reset the Latency histogram lookback variable:

```
show config service id-allocation latency-histogram-lookback
set config service id-allocation latency-histogram-lookback
reset config service id-allocation latency-histogram-lookback
```

7.2.7 Configuring Retry Interval

The interval (in minutes) that the subsystem waits before resending an action that had failed previously because the SPB was not working.

The ID allocation subsystem provides these configuration commands to show, set, and reset the retry interval variable:

```
show config service id-allocation retry-interval
set config service id-allocation retry-interval
reset config service id-allocation retry-interval
```

7.2.8 Configuring Maximum Retry Attempts

The maximum number of retries that the subsystem attempts for completing an action.

The ID allocation subsystem provides these configuration commands to show, set, and reset the maximum retry attempts variable:

```
show config service id-allocation max-retry-attempts
set config service id-allocation max-retry-attempts
reset config service id-allocation max-retry-attempts
```

7.2.9 Configuring Retry Queue Size

The size of the queue holding requests that the subsystem has to resend to the SPB. See [ID Allocation Subsystem Overview](#) on page 60 for an overview on the ID allocation queues.

The ID allocation subsystem provides these configuration commands to show, set, and reset the retry queue size variable:

```
show config service id-allocation retry-queue-size
set config service id-allocation retry-queue-size
reset config service id-allocation retry-queue-size
```



8

IPDR

- ["IPDR Subsystem Overview" on page 64](#)
- ["Installing the IPDR Software" on page 67](#)
- ["Post-installation Verification" on page 68](#)
- ["Configuring IPDR Connectivity" on page 71](#)
- ["Configuring CMTSs" on page 74](#)
- ["Upgrading IPDR" on page 76](#)

8.1 IPDR Subsystem Overview

**Warning:**

IPDR is currently not supported on RHEL 6.

The IPDR subsystem lets the SDE receive Internet Protocol Detail Record (IPDR) data regarding subscriber topology and usage directly from CMTSSs or an external IPDR data collector within a cable network via the SAMIS/SAMIS-TYPE-1 IPDR schemas.

When using the IPDR subsystem, you are required to install and configure additional SDE software. The steps must be completed in this order:

1. Install the SDE software.
2. Install the IPDR subsystem software.
3. Configure the SDE for IPDR.
4. Configure the SDE for high availability.

Connect to the SDE servers using SSH to install the SDE IPDR software and for all subsequent connections.

8.1.1 Additional Red Hat Enterprise Linux Requirements

Before installing the IPDR software, you must perform these additional checks and procedures for the Red Hat Enterprise Linux operating system on *every* SDE device:

1. Check that each SDE machine is assigned a hostname. Do **NOT** use the default hostname, `localhost.localdomain`. Run the `domainname` command if the hostname does not contain a domain name. If the command returns `(none)`, do not add a domain name to the hostname.
2. Check that the host name has been configured properly in `/etc/hosts`. The information should be similar to the following:

```
127.0.0.1    localhost.localdomain localhost
::1         localhost6.localdomain6 localhost6
<xxx.xxx.xxx.xxx> <SDE-hostname>
```

Where `<xxx.xxx.xxx.xxx>` is the SDE machine's local IP address and `<SDE-hostname>` is the name that appears in the `'hostname'` command output.

3. Check that `/etc/sysconfig/network` contains information similar to:

```
NETWORKING=yes
NETWORKING_IPV6=no
HOSTNAME=<SDE-hostname>
```

Where `<SDE-hostname>` is as it appears in the `hostname` command output

4. Check that service portmap is running by using the following command:

```
service portmap status
```

This response (with the appropriate PID) should appear:


```
portmap (pid xxxx) is running...
```

Enable portmap, if it is not already running.

5. Check that `/etc/redhat-release` contains the correct version of Red Hat Enterprise Linux Server (depending on your operating system).

8.1.1.1 Additional Configurations for RHEL 5.5

If you have installed RHEL 5.5 on the SDE servers and the server has a bnx2 interface driver, this additional configuration is required on every SDE device:

Open `/etc/modprobe.conf`: for editing and add:

```
bnx2 disable_msi=1
```

The file should now look like this:

```
# cat /etc/modprobe.conf
alias eth0 bnx2
alias eth1 bnx2
alias eth2 bnx2
alias eth3 bnx2
alias scsi_hostadapter megaraid_sas
alias scsi_hostadapter1 ata_piix
options bnx2 disable_msi=1
```

8.1.1.2 Recommended Pre-installation Checks

Sandvine highly recommends that you also perform these checks on every server before installing the IPDR software:

1. Verify that the network interface was configured properly on the SDE server. Run:

```
/sbin/ethtool ethx
```

Where 'ethx' is the name of the interface. (For example, 'eth0'.)

Output similar to this, where the appropriate interface appears instead of 'ethx', should appear:

Settings for ethx:

```
Supported ports: [ TP ]
Supported link modes:   10baseT/Half 10baseT/Full
                        100baseT/Half 100baseT/Full
                        1000baseT/Full

Supports auto-negotiation: Yes
Advertised link modes:  10baseT/Half 10baseT/Full
                        100baseT/Half 100baseT/Full
                        1000baseT/Full

Advertised auto-negotiation: Yes
Speed: 1000Mb/s
Duplex: Full           Port: Twisted Pair
PHYAD: 0
Transceiver: internal
Auto-negotiation: on
```

```
Supports Wake-on: d      Wake-on: d
Current message level: 0x00000007 (7)
Link detected: yes
```

Reconfigure the interface to the default if the output is similar to:

```
Settings for ethx:
Cannot get device settings: No such device
Cannot get wake-on-lan settings: No such device
Cannot get message level: No such device
Cannot get link status: No such device
No data available
```

2. Run this command to check RPC connectivity:

```
rpcinfo -p
```

Output similar to this should appear:

```
program vers proto  port
100000    2   tcp    111  portmapper
100000    2   udp    111  portmapper
100024    1   udp    791  status
100024    1   tcp    794  status
```

8.1.1.3 Additional Ports Used for IPDR

After installing the IPDR software, you are required to open port 4737 on the network for the IPDR stream from the CMTS.

These ports are opened automatically on the SDE when you install the IPDR software:

Source IP	Destination IP	Destination port	Application	Usage
SDE physical IP	SDE physical IP	4803,4804 (UDP)	spread	Spread heartbeat and communication layer.
SDE physical IP	SDE physical IP	7000-7017 (TCP/UDP)	SDE management service, PS, WSAM	Java RMI between EMS client /server and between SDEs machines; RPC connection between SDE management service and PS and WSAM.
SDE physical IP	SDE physical IP	5555	IPDR collector tool (TCP)	Remote CLI access to IPDR collector.
SDE physical IP	SDE physical IP	8191	Tier injection	Used for web services.
SDE local host	SDE physical IP	22 (TCP)	NetReports	User authentication for NetReports.
SDE management service	SDE management service physical IP	7000-7005, 7011-7017	(TCP/UDP)	Java RMI between SDEs machines; RPC connection between SDE management service and PS and WSAM.

Source IP	Destination IP	Destination port	Application	Usage
NMS server	SDE management VIP	161/162 (UDP)	SNMP	SNMP port to query SDE MIBs.
EMS client IP	SDE management VIP	22	SSH	Authentication of the EMS connection.
EMS client IP	SDE management VIP	1099	EMS	Connection to SDE management service.
EMS client IP	SDE management VIP	7006-7010 (TCP/UDP)	Java RMI	EMS client remote connection to SDE.
EMS client IP	SDE management VIP	8085	Web EMS	EMS connection using Web browser.
CMTS	SDE edge VIP	6210	IPDR file streaming (TCP)	IPDR file streaming listening port.
3rd-party IPDR relay	SDE edge VIP	6210	IPDR file streaming (TCP)	IPDR file streaming listening port.
3rd-party IPDR relay	SDE edge VIP	4737 (TCP)	XDR relay	IPDR/SP listening port.
SDE edge VIP	CMTS IP; 3rd-party IPDR relay IP	4737	IPDR/SP	IPDR stream.

8.2 Installing the IPDR Software

SDE IPDR capability is installed using yum. The instructions below are for installing the SDE software from the official Sandvine FTP site.



Note:

When using the local yum install, instead of the SDE install command, use the special `sde-ipdr install` command described here.

1. Connect to the SDE machine as root and add this section to the `svsde.repo` file you created for installing the SDE.

```
[sde-ipdr]
name=SDE IPDR Subsystem
baseurl=ftp://<user_name>:<password>@ftp.support.sandvine.com/SDE/SDE-<x.xx>/sde-<x.xx>
enabled=1
protect=0
gpgcheck=0
```

Where:

- `<user_name>`—Sandvine Customer Support user name. The username should use a '.' instead of '@'.
- `<password>`—Sandvine Customer Support password.
- `<x.xx>`—Specifies the release number you are upgrading to.



Caution:

Baseurl (in this case the address of the FTP site) must be a single line of code.

2. Run:

```
yum clean all
```

3. Run:

```
yum install sde-ipdr
```

**Note:**

Use this command to create a complete log of the yum installation:

```
mkdir -p /opt/install
```

```
logsave -a /opt/install/sde_full_install.log yum install sde-ipdr -y
```

In this non-interactive mode, no questions are asked and the SDE is installed automatically.

4. If you are installing SDE without creating a log, after initial installation of packages, a transaction summary should appear. Enter 'y' to continue.

This notification appears in the output, for both installation types, when the installation process is complete:

```
End Post-Install script
```

8.2.1 Missing Dependencies

If net-snmp RPMs are missing during yum installation, a message similar to this appears:

```
1:net-snmp-perl-5.3.2.2-7.el5.x86_64 from sde-retail has depsolving problems
```

```
--> Missing Dependency: net-snmp = 1:5.3.2.2-7.el5 is needed by package
```

```
1:net-snmp-perl-5.3.2.2-7.el5.x86_64 (sde-retail)
```

```
Error: Missing Dependency: net-snmp = 1:5.3.2.2-7.el5 is needed by package
```

```
1:net-snmp-perl-5.3.2.2-7.el5.x86_64 (sde-retail)
```

To solve this issue:

1. Verify that you have access to the RHEL installation folder. You must have access to the official RHEL support site or to the official Red Hat Enterprise Linux 5.x either locally or on an FTP or HTTP site.
2. Rerun the SDE install command.

8.3 Post-installation Verification

Perform these steps, once the software is installed, to verify that the SDE installation was successful.

**Note:**

If you created a yum install log when installing the software, you can check the log, located at `/opt/install`, for further troubleshooting if any of the installation verifications fail.

1. Run this command to verify that all SDE processes are running successfully:

```
service sde status
```

This response (with the appropriate PID) should appear:

```
scdpd process (pid xxxx) is running ...
msd process (pid xxxx) is running ...
svsde process (pid xxxx) is running ...
wsam_wdog (pid xxxx) is running...
svWsam (pid xxxx) is running...
ps_agent_wdog (pid xxxx) is running...
svAgent (pid xxxx) is running...
fs_am_wdog (pid xxxx) is running...
svFSAS (pid xxxx) is running...
dbm_wdog (pid xxxx) is running...
svDBMaintenance (pid xxxx) is running...
ipdr_wdog (pid xxxx) is running...
svIPDRCollector (pid xxxx) is running...
wdogReplication.sh (pid xxxx) is running...
db_wdog ((pid xxxx) is running...
```



Note:

In the event that the above response shows that the SDE Agent is stopped (svAgent stopped....), restart the SDE using `service sde start` and then repeat the step. Contact Sandvine Customer Support or its authorized partner if the SDE Agent remains stopped

2. Verify that the spread watchdogs are running:

```
service spread status
```

This response (with the appropriate PID) should appear:

```
svSpread (pid xxxx) is running...
spread_wdog (pid xxxx) is running...
```

If spread is stopped, restart it:

```
service spread restart
```

3. Verify that portmap is running:

```
service portmap status
```

This response (with the appropriate PID) should appear:

```
portmap (pid xxxx) is running...
```

4. Verify that portmap levels 3 and 5 are enabled:

```
chkconfig --list | grep portmap
```

If the appropriate response does not appear:

a. Run this command to stop portmap:

```
service portmap stop
```

b. Run this command to enable portmap levels 3 and 5:

```
chkconfig --levels 35 portmap on
```

- c. Run this command to verify that the portmap rules are enabled:

```
chkconfig --list | grep portmap
```

Run this command if you need to turn off other levels :

```
chkconfig --levels <level number> off
```

- d. Run this command to start portmap:

```
service portmap start
```

- e. Run this command to verify that portmap is running and that levels 3 and 5 are on:

```
service portmap status
```

8.3.1 Synchronizing Time Zones

Sandvine highly recommends that you use the same time zones in the SDE and CMTS. To ensure time zone synchronization after installing the IPDR subsystem:

1. On the SDE machine, at the root prompt, enter:

```
date
```

A response with the appropriate date and time appears. For example:

```
Mon Mar 28 13:01:26 EDT 2011
```

2. If the SDE time zone does not match that of the CMTSs, activate time zone support on the SDE:

- a. Run this command to open the */opt/SDE/IPDRC/config/ipdrc_conf.properties* file for editing.

- b. Run this command to change the value of the timezone support parameter to '1':

```
com.cmx.odsp.ipdr.enable_timezone_support=1
```

- c. Run this command to restart the SDE:

```
service sde restart
```

8.3.1.1 SDE Device Hostname

If the SDE device hostname was not changed from localhost.localdomain before you installed the SDE software, the SDE agent fails to mount, and spread does not work properly. Change the hostname on the machine to resolve this issue. To do this:

1. Run `hostname` and add the hostname to the machine, substituting the new hostname for <sde hostname>. Then, save the file.

```
hostname <sde hostname>
```

2. Edit and save the `/etc/hosts` file for the new hostname:

```
/etc/hosts
```

Do not remove the following line, or various programs that require network functionality will fail.

```
::1          localhostX.localdomainX localhostX
127.0.0.1    localhost.localdomain localhost
<x.x.x.x>    <sde_hostname>
```

Where `<sde_hostname>` is the new hostname and `<x.x.x.x>` is the IP address of the SDE node.

3. Edit and save the `/etc/sysconfig/network` file for the new hostname :

```
/etc/sysconfig/network
NETWORKING=yes
NETWORKING_IPV6=yes
HOSTNAME=<sde_hostname>
```

4. Restart the SDE and Spread services:

- a. Run this command to stop the SDE processes:

```
service sde stop
```

- b. Run this command to stop Spread:

```
service spread stop
```

- c. Wait 5 seconds and then run this command to start Spread:

```
service spread start
```

- d. Wait 5 seconds and then run this command to restart the SDE:

```
service sde start
```

8.4 Configuring IPDR Connectivity

After installing the IPDR software, configure the IPDR subsystem in every SDE cluster, in the order specified here. For this configuration, you should have two VIPs at hand:

- The special VIP required for the IPDR subsystem. This is referred to as the Management VIP.
- The VIP used in the failover cluster (cluster of two SDE nodes) to provide high availability and ensure continuation of service if the active SDE node fails. In the IPDR subsystem, this VIP is referred to as the edge VIP.

To configure the IPDR subsystem:

1. Designate one SDE node in the cluster as the active node in the failover cluster. This is the node you will configure first.
2. Using SSH, connect to the real IP address of the active SDE node as root.
3. Access the SDE IPDR's Element Management System (EMS) by entering:

```
cd /opt/SDE/SDE_EMS
```

4. If your network uses an interface other than `eth0`, assign the correct interface to the IPDR subsystem:

```
./ems_cli editconfig cops InterfaceName <ethx>
```

Where 'ethx' is the name of the interface.

A message indicating "Success" should appear.



Note:

You don't have to use eth0, but you MUST define it in the system so SDE IPDR can work.

5. Run this command to configure the management VIP on the active node:

```
./ems_cli addconfig vip "Management Service" <IP> <netmask> <gateway>
```

Where:

- IP = the IP address used for the VIP
- netmask = the IP's netmask
- gateway - the IP's default gateway

6. Assign the active node the edge VIP. The SDE uses this VIP to communicate with the CMTSS configured to the system for IPDR data collection:

```
./ems_cli addconfig vip "Edge Service" <IP> <netmask> <gateway>
```

Where IP is the IP address of the VIP also used in the failover cluster.



Caution:

If a failover cluster is already configured for your system, define another VIP to use as the edge VIP. You also need to add this VIP to the *vip_service_list.xml* list.

7. Run this command to enable the IPDR pipe:

```
./ems_cli editconfig DataCollection General EnableCSV Yes
```



Note:

You can stay in the SDE EMS as a root user ([root@host-xxx-xxx-xxx-xxx SDE_EMS]#).

8. Open an EMS graphical user interface to the IPDR subsystem:

- a. Open a supported Web browser and navigate to `http://<management VIP>:<port>/sde_ems`.

Where:

- <management VIP>—Identifies the virtual IP you assigned to the first SDE node in this procedure.
- <port>—identifies the port, usually port 8085, configured for Tomcat.

The EMS Web portal appears.

- b. Click **Launch SDE EMS**.

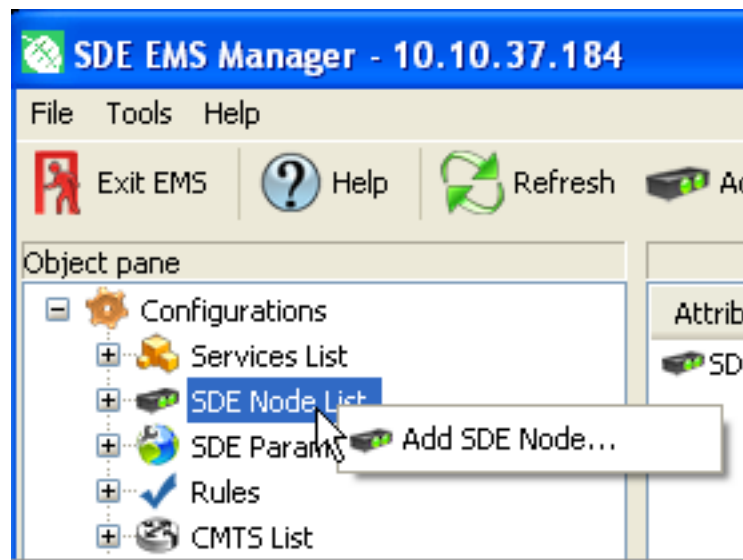
Java Web is activated, and the SDE EMS login dialog appears.

- c. Enter your user name and password and click **OK**.

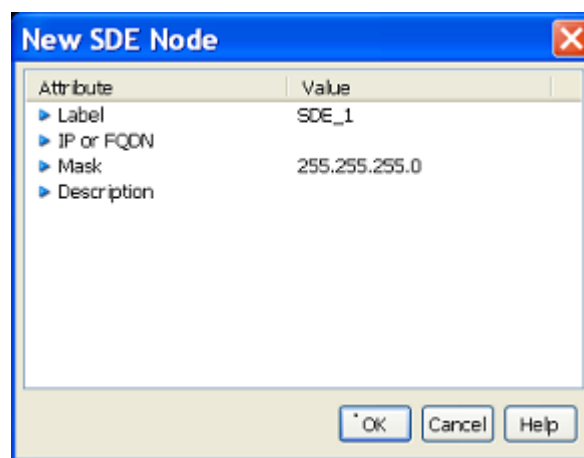
The EMS GUI appears.

9. Add the passive SDE node to the IPDR subsystem:

- a. In the EMS Configurations tree (left pane), right-click **SDE Node List** and select **Add SDE Node**:



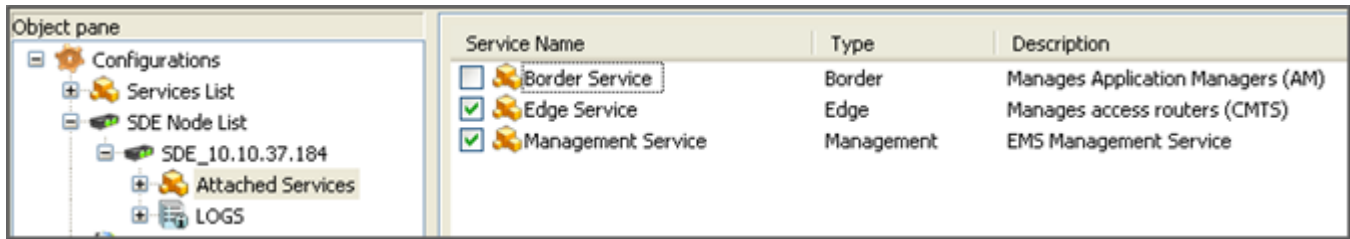
The New SDE Node dialog appears:



- b.** Type the SDE's physical IP address or FQDN, and the netmask assigned to the machine upon OS installation, and optionally give the node a name and description. Then click **OK**.

It may take up to 2 minutes to add the node to the system. A Progress Information bar appears to inform you of the configuration's progress. When the configuration is complete, the node appears in the SDE Node List.

10. Attach the management and edge services to the second SDE node:
 - a. In the SDE Node List, expand the passive SDE node.
 - b. Select **Attached Services**. A list of services appears in the EMS right pane:



- c. Select every service shown in the Attributes pane.

8.4.1 Installation Checks and Troubleshooting

After adding the passive SDE node to the system, perform this procedure to verify that the SDE is properly configured:

1. In the EMS GUI's **Status > SDE system** node, verify that the active SDE node is green and the standby node is yellow. Ensure that both VIPs are attached to both nodes.
2. In the EMS **SDE Nodes List > Logs** node, verify that all logs are free of errors.
3. Exit the EMS GUI.
4. Log in to the SDE server as root and run this command to verify that the correct VIPs are listed:

```
ifconfig
```

If any of these checks failed, halt installation and contact Sandvine Customer Support or its authorized partner.

8.5 Configuring CMTSS

After both SDE nodes are attached to the VIPs, configure your network's CMTSS to relay IPDR data to the SDE. Perform these configurations only on the active SDE node.

1. As root, connect to the VIP of the active SDE node (the first VIP you assigned in "Configuring IPDR Connectivity").
2. Enter the SDE_EMS directory ([root@host-xxx-xxx-xxx-xxx SDE_EMS]#), enter:

```
cd /opt/SDE/SDE_EMS
```

3. Create a list of CMTSSs, in a text editor, that you want to configure in the SDE. Each row in the list should appear as:

```
./ems_cli addconfig cmts <CMTS label> <CMTS IP> <edge service name> <edge VIP> <vendor> no
```

Where:

- **CMTS label**—Is the unique CMTS name.
- **CMTS IP**—CMTS's unique IPv4 IP address or host name.
- **edge service name**—Specifies the name of the edge service to which the CMTS will connect (the default is "Edge Service").
- **edge VIP**—identifies the VIP configured to the edge service.

- `vendor`—Identifies the CMTS vendor, for example: Cisco, BigBand, Motorola, Arris or Casa.
- `no`—Disables the SNMP data collection.



Note:
Always enclose values that are more than one word in quotes.

For example:

```
./ems_cli addconfig cmts CMTS_1 10.10.10.1 "Edge Service" 10.10.10.10 Cisco no
./ems_cli addconfig cmts CMTS_2 10.10.10.1 "Edge Service" 10.10.10.10 Cisco no
./ems_cli addconfig cmts CMTS_3 10.10.10.1 "Edge Service" 10.10.10.10 Casa no
./ems_cli addconfig cmts CMTS_4 10.10.10.1 "Edge Service" 10.10.10.10 Arris no
```

4. Paste the list at the SDE prompt and press **Enter**.

Configure the CMTSSs one at a time; a message indicating “Success” appears after each CMTS is configured successfully.

5. Add an IPDR session for each CMTS:

- a. In the text editor, create a list that includes this command for each CMTS:

```
./ems_cli addconfig IPDRSessions <CMTS_label> IPDRSession <session name> <IPDR schema type> <Session ID>
```

Where:

- `Session ID`—Matches the session ID configured on the CMTS
- `IPDR schema type`—Is SAMIS-TYPE-1 or SAMIS

For example:

```
./ems_cli addconfig IPDRSessions CMTS_1 IPDRSession SAMIS_1_SESSION "SAMIS-TYPE-1" 1
./ems_cli addconfig IPDRSessions CMTS_2 IPDRSession SAMIS_1_SESSION "SAMIS-TYPE-1" 1
./ems_cli addconfig IPDRSessions CMTS_3 IPDRSession SAMIS_1_SESSION "SAMIS-TYPE-1" 1
./ems_cli addconfig IPDRSessions CMTS_4 IPDRSession SAMIS_1_SESSION "SAMIS-TYPE-1" 1
```

- b. Paste the list at the prompt and press **Enter**.

A “Success” message appears for each CMTS.

6. If the SDE does not initiate the IPDR connection, change each CMTS session’s connection mode to ‘CMTS’ (the SDE’s IPDR collector waits for the CMTS to initiate connections):

- a. In the text editor create a list that includes this command for each CMTS:

```
./ems_cli editconfig cmts <CMTS_label> IPDRSessions <IPDR session name> ConnectionMode CMTS
```

For example:

```
./ems_cli editconfig cmts_1 IPDRSessions SAMIS_1_SESSION ConnectionMode CMTS
./ems_cli editconfig cmts_2 IPDRSessions SAMIS_1_SESSION ConnectionMode CMTS
./ems_cli editconfig cmts_3 IPDRSessions SAMIS_1_SESSION ConnectionMode CMTS
./ems_cli editconfig cmts_4 IPDRSessions SAMIS_1_SESSION ConnectionMode CMTS
```

- b. Paste the list at the prompt and press **Enter**.

A “Success” message appears for each CMTS.

7. Configure the CMTSs so that the SDE only collects usage data:

- a. In the text editor create a list that includes this command for each CMTS:

```
./ems_cli editconfig cmts <CMTS name> CollectOnly Yes
```

For example:

```
./ems_cli editconfig cmts CMTS_1 CollectOnly Yes
./ems_cli editconfig cmts CMTS_2 CollectOnly Yes
./ems_cli editconfig cmts CMTS_3 CollectOnly Yes
./ems_cli editconfig cmts CMTS_4 CollectOnly Yes
```

- b. Paste the list at the prompt and press **Enter**.

A "Success" message appears for each CMTS.



Note:

You should now configure the SDE failover cluster.

8.6 Upgrading IPDR

You can upgrade the IPDR software at any time without updating the SDE platform. The upgrade procedure preserves platform and CMTS configurations. It is performed on the SDE device with the management VIP and also automatically upgrades the passive SDE node.

1. On both SDE devices, log in as root to the SDE machine with the management VIP and update the yum repository to point to the new IPDR repository:

- a. Open the yum repository definition file for editing:

```
vi /etc/yum.repos.d/svsde.repo
```

- b. Add the updated SDE information:

```
[sde]
name= Sandvine Service Delivery Engine
baseurl=ftp://<user_name>:<password>@ftp.support.sandvine.com/SDE/SDE-<x.xx>/sde-<x.xx>
enabled=1
protect=0
gpgcheck=0
[sde-ipdr]
name=SDE IPDR Subsystem
baseurl=ftp://<user_name>:<password>@ftp.support.sandvine.com/SDE/SDE-<x.xx>/sde-<x.xx>
enabled=1
protect=0
gpgcheck=0
```

Where:

- <user_name>—Sandvine Customer Support user name. The username should use a '.' instead of '@'.
- <password>—Sandvine Customer Support password.
- <x.xx>—Identifies the release number you are upgrading to.



Caution:

Baseurl (in this case the address of the FTP site) must be a single line of code.

c. Save and close the file.

2. On the device that owns the management VIP (the management device), clean the yum cache:

```
yum clean all
```

3. On the management device, upgrade the IPDR software:

```
/opt/install/upgrade_sde_ipdr
```

A result similar to this appears:

```
To update the components, if you want to use the default yum repository (/etc/yum.repos.d)
enter [yes]
```

```
else if you want to use a local directory enter [no]
```

4. Enter 'y' to confirm the upgrade.

When the upgrade process is complete, a script similar to this, including a list of updated packages, appears. The script ends with a notification similar to this, signifying that the upgrade is complete:

```
<Weekday> <Month> <Day> hh:mm:ss <timezone> <Year> SDE upgrade output log files for this
session are : /opt/install/sde_upgrade_mm_dd_yyyy_hh_mm.log and
/opt/SDE/logs/svUpgrademm_dd_yyyy_hh_mm.log
```

```
*****
```

```
<Weekday> <Month> <Day> hh:mm:ss <timezone> <Year> **** System upgrade is complete. ***
```

```
*****
```

The upgrade version is now installed on both SDE devices.



9

LDAP

- ["LDAP Subsystem Overview" on page 80](#)
- ["Adding LDAP Servers" on page 80](#)
- ["Configuring an LDAP Server as Default Server" on page 81](#)
- ["Configuring LDAP Client Parameters" on page 81](#)
- ["Deleting LDAP Servers" on page 82](#)

9.1 LDAP Subsystem Overview

The Lightweight Directory Access Protocol (LDAP) subsystem communicates between the SDE policy engine and external LDAP servers. The LDAP subsystem retrieves subscriber information and provides it to the policy engine for applying SandScript rules. The LDAP subsystem allows connection to multiple LDAP servers and manages actions and responses for each client. The LDAP subsystem supports LDAP Version 3 (LDAPv3), Simple Authentication and Security Layer (SASL) authentication method, and read and search operations.

See the *SDE Operations Reference Guide* for more information on LDAP CLIs and Alarms. See the *SDE Sandscript Configuration Guide* for more information on LDAP SandScript policies.

9.2 Adding LDAP Servers

You can add multiple LDAP servers to the server list in SDE. You can edit the server parameters, after adding the server to the SDE. See the *SDE Operations Reference guide* for more information on how to access and use the CLI.

1. Run this CLI command to enter the configuration mode:

```
configure
```

2. Run this CLI command to add the LDAP server to the SDE:

```
add config service ldap-client server <server-name> hosts <host address/URL> username  
<username> password <password> path <path>
```



Note:

Type **y** to confirm the change.

3. Run this CLI command to commit the changes:

```
commit
```

4. Run this CLI command to verify the LDAP server configuration in SDE:

```
show config service ldap-client server
```

9.2.1 LDAP Server Parameters

This table provides a list of LDAP server parameters.

Acceptable identifier	Mandatory	Description	Default value
hosts	Y	Valid IP address or URL of the LDAP server.	—
maximum-number-of-results	N	Maximum number of results returned per request. Range is from 0 to 2147483647. Note: The value '0' returns infinite number of results.	0
maximum-operation-time	N	Amount of time (in seconds) allowed for returning results per request. Range is from 0 to 6000.	0

Acceptable identifier	Mandatory	Description	Default value
		Note: The value '0' sets the timeout to infinity.	
password	Y	Password to access the LDAP server (string).	—
path	Y	Default search path to access information in the LDAP tree (string).	—
port	N	Valid port value through which the SDE accesses the LDAP server. Note: You cannot change the local firewall configuration (iptables) using the SDE CLI. You need to modify the iptable rules to allow access to additional ports.	389
sasl	N	Enable or disable Simple Authentication and Security Layer (SASL) Valid values are enable disable.	—
search-scope	N	Defines how deep into the LDAP tree searches are performed. Valid values are Base, One-level and Subtree.	Subtree
server	Y	Name of the LDAP server.	—
username	Y	Unique user name to access the LDAP server.	—

9.3 Configuring an LDAP Server as Default Server

You can configure an LDAP Server as default server in SDE.

1. Run this CLI command to enter the configuration mode:

```
configure
```

2. Run this CLI command to configure an LDAP server as a default server in SDE:

```
set config service ldap-client default-server <servername>
```

9.4 Configuring LDAP Client Parameters

You can configure the queue sizes, reconnection delay, and time out parameters for the added LDAP server.

1. Run this CLI command to enter the configuration mode:

```
configure
```

2. Run this CLI command to configure an LDAP client parameter:

```
set config service ldap-client server <ldap_server_name> [parameter] <value>
```

See [LDAP Client Parameters](#) on page 82 for more information on the available parameters.



Note:
Type **y** to confirm the change.

3. Run this CLI command to commit the configuration changes:

```
commit
```

4. Run this CLI command to verify the configuration changes:

```
show config service ldap-client server
```

9.4.1 LDAP Client Parameters

This table provides a list of LDAP client parameters.

Acceptable identifier	Mandatory	Description	Default value
in-queue-size	N	Size of the incoming messages queue for LDAP.	100000
out-queue-size	N	Size of the outgoing messages queue for LDAP.	100000
reconnection-delay	N	Delay (in seconds) between each connection retry if the LDAP client is disconnected.	60
timeout	N	Pending timeout in milliseconds.	30

9.5 Deleting LDAP Servers

You can delete an LDAP server from the server list in SDE.

1. Run this CLI command to delete an LDAP server:

```
delete config service ldap-client server <server_name>
```

2. Run this CLI command to commit the changes:

```
commit
```



10

Logging

This chapter explains the components of the logging subsystem. It includes information about the logging components, as well as the logging process.

- ["Logging Subsystem Overview" on page 84](#)
- ["Logging Configuration" on page 84](#)
- ["File Management" on page 106](#)

10.1 Logging Subsystem Overview

The logging subsystem integrates with the SDE policy engine to create and manage different kinds of log files, such as Usage Data Records (UDRs). It also provides file management capability.

**Note:**

The logging subsystem does not include general SDE log creation, such as the syslog or error logs.

For maximum flexibility, the SDE uses an XML configuration dictionary file for each application that defines the available log files used by the subsystem, together with the structures and formats of the log files. The subsystem loads the configuration dictionaries as part of its initialization during the launch process.

In the configuration dictionary, you can define one or more events—such as file size or number of records—that close the current file. When the event triggers the log closing, the file is moved to the target directory. It is renamed by concatenating it with a unique suffix such as a timestamp, index number, or text string, as defined in the XML dictionary.

Then, a new, empty log file with the same name as the previous one is created in a local directory to record data until the next event trigger. If a user configures more than one trigger, the log file is moved when the first event is triggered, and the new file is created.

When the SDE shuts down, the logging subsystem closes the log files and moves them to their target destinations.

To produce log files, the operator must write rules using SandScript. The rules dictate which information should be saved in the log files, as well as offer the ability to manually flush and close the log buffer.

10.2 Logging Configuration

It is necessary to configure logging values such as the type of log, the file paths, and information to be included in the logs in the SDE logging XML dictionary configuration file. Each SDE application has its own logging XML configuration dictionary file.

- Configure basic logging function parameters, such as the queue sizes and disk full warning in the SDE EMS GUI or CLI
- Configure logging values such as the type of log, the file paths, and information to be included in the logs in the SDE logging XML dictionary configuration file.

10.2.1 Logging XML Dictionary Configuration

The SDE logging XML dictionary configuration files, define the parameters for generating logging files within Sandvine policy application—for example, usage data records for the Sandvine Record Generator. You can also use the logging dictionary files to output debugging information. You do not need to define values for any log parameters defined through SandScript.

The SDE logging XML dictionary configuration files are located at `/usr/local/sandvine/etc/logging/`. Sandvine products and applications that create logging files may install additional logging file definitions on the SDE. The logging dictionary configuration for each of these application on the SDE is defined in their respective product guide and must be added to the respective SDE logging dictionaries.

**Note:**

For SDE Releases 6.30 and earlier, a single logging XML dictionary file is stored in the location `/usr/local/sandvine/etc/logging_dictionary.xml`. For backward compatibility, this `logging_dictionary.xml` file remains in the same location (`/usr/local/sandvine/etc/logging_dictionary.xml`). Sandvine recommends you not to overwrite the existing `/usr/local/sandvine/etc/logging_dictionary.xml` file with new information. Create new logging configuration files with the required information in the location `/usr/local/sandvine/etc/logging/`. For example: `/usr/local/sandvine/etc/logging/<logging file name>.xml`.



Warning:

Different log files cannot have the same LogId. Having the same LogId in different log files results in system failure on reload.

10.2.1.1 Sample Skeleton of Logging XML Dictionary

The following is an example of how an XML dictionary should appear, without the values configured.



Note:

For an example of a fully-configured XML dictionary, see [Sample Logging Configuration Dictionary](#) on page 97.

```
<Logs>
  <Log>
    <LogId> </LogId>
    <LogType>Text</LogType>
    <Destinations>
      <File>
      </File>
      :
      <File>
      </File>
    </Destinations>
    <Header>
      <Field>
      </Field>
      :
      <Field>
      </Field>
    </Header>
    <Footer>
      <Field>
      </Field>
      :
      <Field>
      </Field>
    </Footer>
    <Record>
      <Field>
      </Field>
      :
      <Field>
      </Field>
    </Record>
  </Log>
  <Log>
  :
  </Log>
</Logs>
```

10.2.2 Logging Dictionary Parameters

When logs are written to destination files, the XML configuration dictionary must include the parameters listed in the logging dictionary parameters tables (see [Logging Dictionary — Log Tag Parameters](#) on page 87, [Logging Dictionary — File Tag Parameters](#) on page 87, and [Logging Dictionary — Field Tag Parameters](#) on page 91).

You do not have to define non-mandatory parameters in the logging dictionary. If you do not configure the non-mandatory parameters, default parameters are used.


10.2.2.1 Logging Dictionary — Log Tag Parameters

This table includes the parameters for the log tag inside the logging XML dictionary configuration file.

Parameter	Mandatory	Description	Valid values	Default value
LogId	Y	Name of the log, as referred in the SandScript rules. Note: Different log files cannot have the same LogId. Having the same LogId in different log files results in system failure on reload.	<string>	--
LogType	N	Log format. SDE supports only text files.	Text	Text

10.2.2.2 Logging Dictionary — File Tag Parameters

The table below contains the general parameters for the logging dictionary file tag. Within the file tag, it is possible to configure the destination and paths of the files, file names and extensions, and define parameters for rotating the files.

 **Note:** It is possible to define one or all of the “RotateOn...” fields. The first one triggered rotates the files, and the others are reset, except for date-specific triggers. Date-specific triggers remain until changed.

Logging dictionary — file tag parameters

Parameter	Mandatory	Description	Default value
DestinationId	Y	Destination of the log, as specified in SandScript, expressed as a string	---
LocalRootPath	Y	Together with the SubPath parameter, designates the location of the log as it is being written, relative to root path /usr/local/sandvine/var/spool/logging/local/ Caution: The local path must be on a local disk, not on a remote SDE server. The full location path will be: /usr/local/sandvine/var/spool/logging/local/<LocalRootPath>/<SubPath>.	---
TargetRootPath	Y	Together with the SubPath parameter, designates the destination of the output files when the files are closed and rotated, relative to root path /usr/local/sandvine/var/spool/logging/target, which is preconfigured during disk partitioning. The actual location of the output files is: /usr/local/sandvine/var/spool/logging/target/<TargetRootPath>/<SubPath> The root path itself is hardcoded but can be redefined through a symlink to any other path. For instructions, see Changing the Target Root Path on page 109.	---

Parameter	Mandatory	Description	Default value
SubPath	N	Concatenated to both the LocalRootPath and the TargetRootPath to define the local and target paths (respectively). Use the allowed metadata parameters.	---
FileName	Y	Name of file to be created, expressed using allowed metadata parameters	---
FileExtension	Y	Type of file to be created, expressed using allowed metadata parameters	---
FileSuffix	Y	Values such as day, month, year or hour. File suffixes should be unique, such as index or time stamp. The suffix is concatenated to the file name after it is moved into the target directory. Valid values are: Index, TimeStamp, TimeStampWithIndex, <string>. Note: For String variables, see File Tag Parameters — Log File Date Suffixes on page 89 and File Tag Parameters — Log File Time Suffixes on page 89.	Index
EOR	If LogType = text, 'EOR' is mandatory	End of Record: Unix = LF Win = CRLF Mac = CR <string>	Unix
RecordsBufferSize	Y	Number of records to flush at once to the local destination directory, expressed as an integer	---
RecordsBufferTimer	N	Amount of time, in seconds, after which the buffer is flushed to the local directory. Valid values are: None, <sec>.	None
RotateOnFileSize	N	Once this size is reached, the last record is included, the file is moved to the destination directory, and a new, empty file is created. Valid values are: None, <Kbytes>.	None
RotateOnRecordsNumber	N	Once this number of records is written, the file is moved to the destination directory, and a new, empty file is created. Valid values are: None, integer.	None
RotateOnTime	N	Once this number of seconds is reached, the file is moved to the destination directory, and a new one is created. Valid values are: None, <sec>.	None
RotateOnCalendar	N	Rotates files based on a calendar event such as time, day of month, day of week, day of year. Upon rotation, the file is moved to the destination directory, and a new, empty one is created. Valid fields are: Daily, Weekly, Monthly, Yearly. Note: For RotateOnCalendar fields and values, see File Tag Parameters — RotateOnCalendar on page 90.	None
RotateOnTimeInterval	N	Rotates files at specific time intervals, such as every x minutes. Upon rotation, the file is moved to the destination directory, and a new, empty one is created. Valid fields are: StartOffsetInMinutes, IntervalInMinutes. Note: For RotateOnTimeInterval fields and values, see File Tag Parameters — RotateOnTimeInterval on page 91.	None

10.2.2.3 File Tag Parameters — Log File Date Suffixes

Log file date suffixes

Format specifier	Description	Valid values	Example
%y	Two-digit year	--	10
%Y	Four-digit year	--	2010
%m	Numeric month	[01...12]	--
%b	Abbreviated month	--	Jan
%B	Full month	--	January
%d	Numeric day	[01...31]	--
%w	Weekday as decimal, where 0-6 = Sun-Sat	[0...6]	--
%u	Weekday as decimal, where 1-7 = Mon-Sun	[1...7]	--
%a	Weekday abbreviated	--	Wed
%A	Full weekday	--	Wednesday
%U	Week number of the current year as a decimal number, range 00 to 53, starting with the first Sunday as the first day of week 01	[00...53]	--
%j	Day of year as decimal from 001 to 366 for leap years, 001 - 365 for non-leap years	[001...366]	--

10.2.2.4 File Tag Parameters — Log File Time Suffixes

Log file time suffixes

Format specifier	Description	Valid values	Example
%H	Hour of the day, in 24-hour format	[00...23]	
%I	Hour of the day, in 12-hour format	[01...12]	
%k	Hour of the day, in 24-hour format, with single digits preceded by blank	[0...23]	
%l	Hour of the day, in 12-hour format, with single digits preceded by blank	[1...12]	
%M	Minutes in the hour	[00...59]	
%S	Seconds in the minute	[00...59]	
%f	Fractional seconds used, even with their value is zero	--	13:15:16:000000
%F	Fractional seconds used only when their value is not zero	--	13:15:16:001234
%p	Either 'am' or 'pm' according to the given time value	am/pm	
%P	Either 'AM' or 'PM' according to their given time value	AM/PM	

10.2.2.5 File Tag Parameters — Log File Counter Suffixes

Log file counter suffixes

Format specifier	Description
%t	Rotation Number
%n	File Records Number
%N	Total Records Number

10.2.2.6 File Tag Parameters — Pre-defined Log File Suffixes

The following table contains a list of pre-defined acceptable file suffixes for the log files.

File tag parameters — Pre-defined log file suffixes

Format specifier	Description	Example
.%t	Index	.1
.%Y%m%dT%H%M%S	Timestamp	.20100119T194423
.%Y%-dT%H%M%S.%t	TimestampWithIndex	.20100119T194423.1

10.2.2.7 File Tag Parameters — RotateOnCalendar

File tag parameters — RotateOnCalendar

Field	Sub-Field	Mandatory	Description	Default value
Daily		N	Rotates files daily at a certain time. Valid field is: Time.	None
	Time	Y	Time of day at which to close file and create a new one. Valid value is "Time" in HH:MM:SS format. For example: 13:30:00	---
Weekly		N	Rotates files weekly, on a particular day, at a certain time. Valid fields are: DayOfWeek, Time.	None
	DayOfWeek	Y	Rotates files based on day of week. Valid value is "Day" in 3-letter format. For example: Sun, Mon, Tue, and so on. Case insensitive.	---
	Time	Y	Time of day at which to close file and create a new one. Valid value is "Time" in HH:MM:SS format. For example: 13:30:00.	---
Monthly		N	Rotates files monthly, on a particular day, at a certain time. Valid fields are: DayOfMonth, Time.	None
	DayOfMonth	Y	Rotates files based on day of month. Valid values are: 1-31. Note: If the selected day of month does not exist, such as being configured as '30' during the month of February, the rotation occurs on the last day of the month.	End of month Caution: If RotateOnCalendar Monthly is enabled, this field must not remain empty.
	Time	Y	Time of day at which to close file and create a new one. Valid value is "Time" in HH:MM:SS format. For example: 13:30:00.	---

Field	Sub-Field	Mandatory	Description	Default value
Yearly		N	Rotates files yearly, on a particular day, at a particular time. Valid fields are: DayOfYear, Time.	None
	DayOfYear	Y	Rotates files based on day of year. Valid value is a date expressed numerically in day.month (DD.MM) format. For example, 31.12 = December 31st.	---
	Time	Y	Time of day at which to close file and create a new one. Valid value is "Time" in HH:MM:SS format. For example: 13:30:00.	---

10.2.2.8 File Tag Parameters — RotateOnTimeInterval

Logging dictionary parameters — RotateOnTimeInterval tag

Parameter	Mandatory	Description	Default value
StartOffsetInMinutes	Y	From the time of configuration, the first rotation should happen on the x minute after the time configured in the IntervalInMinutes tag. For example, if the time is now 13:17, and the start offset is 9, the first rotation will occur at 14:09. Valid values are: 0-59.	---
IntervalInMinutes	Y	From the beginning of the rotation, the system continues to rotate files every x minutes. For example, if the first rotation occurred at 13:26, and the interval is 10, the system rotates the file at 13:36, 13:46, 13:56, and so on. Valid values are: 1-1440 (up to 24 hours, configurable in minutes).	---

10.2.2.9 Logging Dictionary — Field Tag Parameters

The field tag consists of variables, constant and function tags.

10.2.2.10 Field Tag Parameters — Variable

Field tag parameters — variable

Parameter	Mandatory	Description	Default value
Name	Y	Name of the field, expressed as a string	None
DataType	Y	Data types supported by the policy engine. Valid values are: String, Integer, Float, Boolean.	None
Type	Y	Value, expressed as a variable, comes from the SandScript rule.	None
Mandatory	N	If the field is set as mandatory, this field must come from a value in the SandScript rule. If it isn't mandatory, the default value is taken. Valid values are: Yes, No.	Yes
Length	Y	Field length, expressed as an unsigned integer. Note: When this value is '0', the field length is up to 1024, and no padding is added. Length cannot exceed 10,000 characters.	None
Alignment	N	Alignment of the text in the field space. Valid values are: Left, Right.	Left
Truncation	N	When the text is longer than the assigned length, it is possible to truncate the text at the assigned length from the defined side. Valid values are: None, Left, Right.	Right

Parameter	Mandatory	Description	Default value
Padding	N	If the value is shorter than the length of the column, space or characters are added to make the length the same length as the field. Valid values are: None, Spaces, Zeros, <character>.	None
DefaultValue	N	If in the <mandatory> field, the value is set as 'no', the default value must be assigned. Valid values are: String, Integer, Float, Boolean.	Depends on field's data type: String = empty string Integer or Float = 0 Boolean = False
NullValue	N	If the value is 'Null', the field is set to this string. If <NullValue> is not defined, the <DefaultValue> (see above) is taken.	<DefaultValue> (If applicable)
Precision	Float only	Only relevant if the data type is 'Float'. If float number (number of digits to the right of the decimal point) is longer than the precision length assigned, it will be truncated to the defined length. Valid values are: 0-15. (Note: The value is rounded.)	3
LeftQuote	N	Attached to the left of the field's content before padding or truncating it. Valid values are: None, <string>.	None
RightQuote	N	Attached to the right of the field's content before padding or truncating it. Valid values are: None, <string>.	None
LeftSeparator	N	Attached to the left side of the field after padding and truncating. Valid values are: None, Space, Tab, <string>.	None
RightSeparator	N	Attached to the right side of the field after padding and truncating. Valid values are: None, Space, Tab, <string>.	None

10.2.2.11 Field Tag Parameters — Constant

Field tag parameters — constant

Parameter	Mandatory	Description	Default value
Name	Y	Name of the field, expressed as a string.	None
DataType	Y	All data types supported by the policy engine. Valid values are: String, Integer, Float, Boolean.	None
Type	Y	Uses the default value from logging XML dictionary file. Valid value is a constant.	None
Length	Y	Field length. Valid value is an unsigned integer. Note: When this value is '0', the field length is up to 1024, and no padding is added. Length cannot exceed 10,000 characters.	None
Alignment	N	Alignment of the text in the field length. Valid values are: Left, Right.	Left
Truncation	N	When the text is longer than the assigned length, it is possible to truncate the text at the assigned length. Valid values are: None, Left, Right.	Right
Padding	N	If the value is shorter than the length of the column, space or characters are added to make the length the same length as the field. Valid values are: None, Spaces, Zeros, <character>.	None
DefaultValue	Y	Value which the field contains.	None
Precision	Float only	Only relevant if the data type is 'Float'. If float number (number of digits to the right of the decimal point) is longer than the	3

Parameter	Mandatory	Description	Default value
		precision length assigned, it will be truncated to the defined length. Valid values are 0-15. Note: The value is rounded.	
LeftQuote	N	Attached to the left of the field's content before padding or truncating it. Valid values are: None, <string>.	None
RightQuote	N	Attached to the right of the field's content before padding or truncating it. Valid values are: None, <string>.	None
LeftSeparator	N	Attached to the left side of the field after padding and truncating. Valid values are: None, Space, Tab, <string>.	None
RightSeparator	N	Attached to the right side of the field after padding and truncating. Valid values are: None, Space, Tab, <string>.	None

10.2.2.12 Field Tag Parameters — Functions

Field tag function parameters

Parameter	Mandatory	Description	Default value
Name	Y	Name of the field, expressed as a string.	None
DataType	Y	Data type supported by the policy engine. Valid values are: Integer, <string>.	According to function type
Type	Y	Function that uses the default value	None
Length	Y	Length of field. Valid value is an unsigned integer. Note: When this value is '0', the field length is up to 1024, and no padding is added. Length cannot exceed 10,000 characters.	None
Alignment	N	Alignment of the text in the log itself. Valid values are: Left, Right.	Left
Truncation	N	When the text is longer than the assigned length, it is possible to truncate the text at the assigned length. Valid values are: None, Left, Right.	Right
Padding	N	If the value is shorter than the length of the column, a space or characters are added to make the length the same length as the field. Valid values are: None, Spaces, Zeros, <characters>.	None
StartValue	N	StartValue is the first number of the sequence. Valid value is an integer.	1
FunctionType	Y	Type of function. Valid functions are: TotalRecordNumber, FileRecordNumber, RotateNumber, CurrentTime, OpenDestinationTime, CloseDestinationTime, CloseDestinationReason, FirstRecordTime, LastRecordTime, FileName, FileSize, HostName. Note: For more information about FunctionType values, see Field Tag Parameters — Function types on page 94.	None
LeftQuote	N	Attached to the left of the field's content before padding or truncating it. Valid values are: None, <string>.	None
RightQuote	N	Attached to the right of the field's content before padding or truncating it. Valid values are: None, <string>.	None

Parameter	Mandatory	Description	Default value
Args	Y	List of arguments needed for function. See Field Tag Parameters — Function types on page 94 for details.	None
LeftSeparator	N	Attached to the left side of the field after padding and truncating. Valid values are: None, Space, Tab, <string>.	None
RightSeparator	N	Attached to the right side of the field after padding and truncating. Valid values are: None, Space, Tab, <string>.	None

10.2.2.13 Field Tag Parameters — Function types

Function fields allow writing values in the log files that are not taken from the SandScript language. Functions can be used in headers, footers and/or records, although there are some functions that do not work as record fields. Functions contain arguments that define the correct values for the functions.

Functions are contained within the Field tag, within the Type tag:

```
<Field>
  <Type>Function<Type>
    <FunctionType> </FunctionType>
    <Args>
      <Arg_1> </Arg_1>
      <Arg_2> </Arg_2>
      <Arg_N> </Arg_N>
    </Args>
</Field>
```

The following tables contain descriptions of the different function types, as well as the parameters for the arguments contained within them.

Counters

Counters provide information about the numbers of records, as well as the order in which they have been rotated.

FunctionType fields — TotalRecordNumber Counter

Arguments (Args)	Valid values	Example
StartValue	<integer>	1

FunctionType fields — FileRecordNumber Counter

Arguments (Args)	Valid values	Example
StartValue	<integer>	1



Note:
The FileRecordNumber Counter field resets after rotation.

FunctionType fields — RotateNumber Counter

Arguments (Args)	Valid values	Example
StartValue	<integer>	1

CurrentTime

The CurrentTime function provides the current time for the record.

FunctionType fields — CurrentTime

Arguments (Args)	Valid values	Example
Format	<string> (See File Tag Parameters — Log File Date Suffixes on page 89 and File Tag Parameters — Log File Time Suffixes on page 89 for details.)	%Y-%m-%d,%H-%M:%S

OpenDestinationTime

The OpenDestinationTime function provides the time when the destination file was opened.

FunctionType fields — OpenDestinationTime

Arguments (Args)	Valid values	Example
Format	<string> (See File Tag Parameters — Log File Date Suffixes on page 89 and File Tag Parameters — Log File Time Suffixes on page 89 for details.)	%Y-%m-%d,%H-%M:%S

CloseDestinationTime

The CloseDestinationTime function provides the time when the destination file was closed. If this field is contained in the header, it is updated when the file is closed.



Note:

CloseDestinationTime should not be used inside records, because the closing time is unknown at the time of record generation.

FunctionType fields — CloseDestinationTime

Arguments (Args)	Valid values	Example
Format	<string> (See File Tag Parameters — Log File Date Suffixes on page 89 and File Tag Parameters — Log File Time Suffixes on page 89 for details.)	%Y-%m-%d,%H-%M:%S

CloseDestinationReason

The CloseDestinationReason function provides the reason why the destination file is closed. For each type of rotation, it is possible to attach a title that describes the reason. If a reason is not defined, the default title is used. If this field is contained in the header, it is updated when the file is closed.



Note:

CloseDestinationReason should not be used inside records, because the closing reason is unknown at the time of record generation.

FunctionType fields — CloseDestinationReason

Arguments (Args)	Valid values	Default value
CloseOnUnknownReason	<string>	Unknown
CloseOnRecordsNumber	<string>	Normal
CloseOnFileSize	<string>	File Size Threshold

Arguments (Args)	Valid values	Default value
CloseOnCalendar	<string>	On Hour
CloseOnTimeInterval	<string>	Time Interval
CloseOnPolicy	<string>	Manually
CloseOnShutdown	<string>	Shutdown
CloseOnError	<string>	Abnormal Close

FirstRecordTime

The FirstRecordTime function provides the time when the first record of the current file was entered.

FunctionType fields — FirstRecordTime

Arguments (Args)	Valid values	Example
Format	<string> (See File Tag Parameters — Log File Date Suffixes on page 89 and File Tag Parameters — Log File Time Suffixes on page 89 for details.)	%Y-%m-%d,%H-%M:%S

LastRecordTime

The LastRecordTime function provides the time when the last record of the current file was entered.



Note:

LastRecordTime should not be used inside records, because the last record time is unknown at the time of record generation.

FunctionType fields — LastRecordTime

Arguments (Args)	Valid values	Example
Format	<string> (See File Tag Parameters — Log File Date Suffixes on page 89 and File Tag Parameters — Log File Time Suffixes on page 89 for details.)	%Y-%m-%d,%H-%M:%S

FileName

The FileName function provides the file name at the time the record was closed, after the FileSuffix is added.

FunctionType fields — FileName

Arguments (Args)	Valid values	Example
None	N/A	N/A

FileSize

The FileSize function provides the size of the file in KBytes.

FunctionType fields — FileSize

Arguments (Args)	Valid values	Example
None	N/A	N/A

HostName

The HostName function provides the host name of the SDE running.

FunctionType fields — HostName

Arguments (Args)	Valid values	Example
None	N/A	N/A

10.2.3 Metadata

Metadata is dynamic data that can be used to add information to the log files at run time. Metadata can include any data available to the application. Three possible attributes can be used to hold metadata:

- FileName
- FileExtension
- SubPath

All metadata parameters get their values in the SandScript action arguments. Metadata is drawn from the SandScript during runtime.

Within the logging XML dictionary file, the metadata convention is:

`${metadata_parameter}`

For example:

```
<File>
  <DestinationId>Mvnos</DestinationId>
  <FileName>billing-${mvno}-PrePaid</Filename>
  <FileExtension>udr_${ext}</FileExtension>
  <LocalRootPath>/tmp/local</LocalRootPath>
  <TargetRootPath>/tmp/target</TargetRootPath>
  <SubPath>${mvno}</SubPath>
</File>
```



Note:

The same metadata can be used several times within the logging XML dictionary file, even within the same tag. Additionally, the same value is used at every instance of the same metadata name, even within different tags.

10.2.4 Sample Logging Configuration Dictionary

Below is an example of a logging configuration dictionary.

```
<Logs>
  <DictVersion>6.20.00</DictVersion>
  <Log>
    <LogId>Billing</LogId>
    <LogType>Text</LogType>
```

```

<Destinations>
  <File>
    <DestinationId>Postpaid</DestinationId>
    <FileName>UDR_${md_mvno}_${md_bundle}</FileName>
    <FileExtension>csv</FileExtension>
    <FileSuffix>TimeStampWithIndex</FileSuffix>
    <LocalRootPath>/tmp/local</LocalRootPath>
    <TargetRootPath>/tmp/target</TargetRootPath>
    <SubPath>${md_mvno}</SubPath>
    <CharacterEncoding>Ascii</CharacterEncoding>
    <EOR>Unix</EOR>
    <RecordsBufferSize>20000</RecordsBufferSize>
    <RecordsBufferTimer>1</RecordsBufferTimer>
    <RotateOnFileSize>100000</RotateOnFileSize>
    <RotateOnRecordsNumber>5000000</RotateOnRecordsNumber>
    <RotateOnCalendar>
      <Daily>
        <Time>10:00:00</Time>
      </Daily>
    </RotateOnCalendar>
    <RotateOnCalendar>
      <Weekly>
        <Time>00:00:00</Time>
        <DayOfWeek>Sat</DayOfWeek>
      </Weekly>
    </RotateOnCalendar>
    <RotateOnCalendar>
      <Monthly>
        <Time>00:00:00</Time>
        <DayOfMonth>1</DayOfMonth>
      </Monthly>
    </RotateOnCalendar>
    <RotateOnCalendar>
      <Yearly>
        <Time>02:00:00</Time>
        <DayOfYear>31.12</DayOfYear>
      </Yearly>
    </RotateOnCalendar>
    <RotateOnTimeInterval>
      <StartOffsetInMinutes>00</StartOffsetInMinutes>
      <IntervalInMinutes>60</IntervalInMinutes>

```

```
        </RotateOnTimeInterval>  
    </File>  
</Destinations>
```

```

<Header>
  <Field>
    <Name>H_SHARP</Name>
    <Type>Constant</Type>
    <DataType>String</DataType>
    <Length>1</Length>
    <DefaultValue>H</DefaultValue>
    <LeftSeparator>[</LeftSeparator>
    <RightSeparator>]</RightSeparator>
  </Field>
  <Field>
    <Name>H_Index</Name>
    <Type>Function</Type>
    <FunctionType>RotateNumber</FunctionType>
    <Args>
      <StartValue>1</StartValue>
    </Args>
    <DataType>Integer</DataType>
    <Length>5</Length>
    <Alignment>Right</Alignment>
    <Padding>Zeros</Padding>
    <LeftSeparator>Space</LeftSeparator>
    <RightSeparator>,</RightSeparator>
  </Field>
  <Field>
    <Name>H_FileName</Name>
    <Type>Function</Type>
    <FunctionType>FileName</FunctionType>
    <DataType>String</DataType>
    <Length>30</Length>
    <Alignment>Left</Alignment>
    <Padding>Spaces</Padding>
    <Truncation>Right</Truncation>
    <LeftSeparator></LeftSeparator>
    <RightSeparator></RightSeparator>
  </Field>
  <Field>
    <Name>H_FileSize</Name>
    <Type>Function</Type>
    <FunctionType>FileSize</FunctionType>
    <Args>

```

```
</Args>
<DataType>Integer</DataType>
<Length>10</Length>
<Alignment>Right</Alignment>
<Padding>None</Padding>
<LeftSeparator></LeftSeparator>
<RightSeparator>KB),</RightSeparator>
</Field>
<Field>
  <Name>H_CloseReason</Name>
  <Type>Function</Type>
  <FunctionType>CloseDestinationReason</FunctionType>
  <Args>
    <CloseOnUnknownReason>Unknown</CloseOnUnknownReason>
    <CloseOnRecordsNumber>Records Number</CloseOnRecordsNumber>
    <CloseOnFileSize>File Size</CloseOnFileSize>
    <CloseOnCalendar>Calendar Event</CloseOnCalendar>
    <CloseOnTimeInterval>Time Interval</CloseOnTimeInterval>
    <CloseOnShutdown>Shutdown</CloseOnShutdown>
    <CloseOnError>Abnormal</CloseOnError>
  </Args>
  <DataType>String</DataType>
  <Length>16</Length>
  <Alignment>Left</Alignment>
  <Padding>Spaces</Padding>
  <LeftQuote>"</LeftQuote>
  <RightQuote>"</RightQuote>
  <LeftSeparator></LeftSeparator>
  <RightSeparator>,</RightSeparator>
</Field>
<Field>
  <Name>H_OpenTime</Name>
  <Type>Function</Type>
  <FunctionType>OpenDestinationTime</FunctionType>
  <Args>
    <Format>%Y/%m/%d(%H:%M:%S)</Format>
  </Args>
  <DataType>String</DataType>
  <Length>20</Length>
  <Alignment>Left</Alignment>
  <Padding>Spaces</Padding>
```

```

    <LeftSeparator>open{</LeftSeparator>
    <RightSeparator>},</RightSeparator>
</Field>
<Field>
    <Name>H_FirstRecord</Name>
    <Type>Function</Type>
    <FunctionType>FirstRecordTime</FunctionType>
    <Args>
        <Format>%Y/%m/%d(%H:%M:%S)</Format>
    </Args>
    <DataType>String</DataType>
    <Length>20</Length>
    <Alignment>Left</Alignment>
    <Padding>Spaces</Padding>
    <LeftSeparator>firstRec{</LeftSeparator>
    <RightSeparator>},</RightSeparator>
</Field>
<Field>
    <Name>H_HostName</Name>
    <Type>Function</Type>
    <FunctionType>HostName</FunctionType>
    <DataType>String</DataType>
    <Length>30</Length>
    <Alignment>Left</Alignment>
    <Padding>None</Padding>
    <Truncation>Right</Truncation>
    <LeftSeparator></LeftSeparator>
    <RightSeparator></RightSeparator>
</Field>
</Header>
<Footer>
    <Field>
        <Name>F_SHARP</Name>
        <DataType>String</DataType>
        <Type>Constant</Type>
        <Length>1</Length>
        <DefaultValue>F</DefaultValue>
        <LeftSeparator>[</LeftSeparator>
        <RightSeparator>]</RightSeparator>
    </Field>
    <Field>

```

```
<Name>F_Records</Name>
<Type>Function</Type>
<FunctionType>FileRecordNumber</FunctionType>
<Args>
  <StartValue>1</StartValue>
</Args>
<DataType>Integer</DataType>
<Length>10</Length>
<Alignment>Right</Alignment>
<Padding>Spaces</Padding>
<LeftSeparator>#</LeftSeparator>
<RightSeparator>,</RightSeparator>
</Field>
<Field>
  <Name>F_TotalRecords</Name>
  <Type>Function</Type>
  <FunctionType>TotalRecordNumber</FunctionType>
  <Args>
    <StartValue>1</StartValue>
  </Args>
  <DataType>Integer</DataType>
  <Length>10</Length>
  <Alignment>Right</Alignment>
  <Padding>Zeros</Padding>
  <LeftSeparator>#</LeftSeparator>
  <RightSeparator>,</RightSeparator>
</Field>
<Field>
  <Name>F_CloseTime</Name>
  <Type>Function</Type>
  <FunctionType>CloseDestinationTime</FunctionType>
  <Args>
    <Format>%Y/%m/%d(%H:%M:%S)</Format>
  </Args>
  <DataType>String</DataType>
  <Length>20</Length>
  <Alignment>Left</Alignment>
  <Padding>Spaces</Padding>
  <LeftSeparator>close{</LeftSeparator>
  <RightSeparator>},</RightSeparator>
</Field>
```

```

<Field>
  <Name>F_LastRecord</Name>
  <Type>Function</Type>
  <FunctionType>LastRecordTime</FunctionType>
  <Args>
    <Format>%Y/%m/%d(%H:%M:%S)</Format>
  </Args>
  <DataType>String</DataType>
  <Length>20</Length>
  <Alignment>Left</Alignment>
  <Padding>Spaces</Padding>
  <LeftSeparator>lastRec{</LeftSeparator>
  <RightSeparator>}</RightSeparator>
</Field>
</Footer>

```



```
<Record>
  <Field>
    <Name>R_Records</Name>
    <Type>Function</Type>
    <FunctionType>FileRecordNumber</FunctionType>
    <Args>
      <StartValue>1</StartValue>
    </Args>
    <DataType>Integer</DataType>
    <Length>7</Length>
    <Alignment>Right</Alignment>
    <Padding>Zeros</Padding>
    <RightSeparator>,</RightSeparator>
  </Field>
  <Field>
    <Name>R_TotalRecords</Name>
    <Type>Function</Type>
    <FunctionType>TotalRecordNumber</FunctionType>
    <Args>
      <StartValue>1</StartValue>
    </Args>
    <DataType>Integer</DataType>
    <Length>10</Length>
    <Alignment>Right</Alignment>
    <Padding>Zeros</Padding>
    <RightSeparator>,</RightSeparator>
  </Field>
  <Field>
    <Name>CC_Request_Type</Name>
    <Type>Variable</Type>
    <DataType>String</DataType>
    <Length>10</Length>
    <Alignment>Left</Alignment>
    <Padding>Spaces</Padding>
    <Mandatory>Yes</Mandatory>
    <RightSeparator>,</RightSeparator>
  </Field>
  <Field>
    <Name>CC_Request_Number</Name>
    <Type>Variable</Type>
    <DataType>Integer</DataType>
```

```
<Length>10</Length>
<Alignment>Left</Alignment>
<Padding>Spaces</Padding>
<Mandatory>Yes</Mandatory>
<RightSeparator>,</RightSeparator>
</Field>
<Field>
  <Name>Session_Id</Name>
  <Type>Variable</Type>
  <DataType>String</DataType>
  <Length>10</Length>
  <Alignment>Left</Alignment>
  <Padding>Spaces</Padding>
  <Mandatory>Yes</Mandatory>
  <NullValue>N/A</NullValue>
  <RightSeparator>,</RightSeparator>
</Field>
<Field>
  <Name>Application_Id</Name>
  <Type>Variable</Type>
  <DataType>Integer</DataType>
  <Length>10</Length>
  <Alignment>Left</Alignment>
  <Padding>Spaces</Padding>
  <Mandatory>No</Mandatory>
  <DefaultValue>-1</DefaultValue>
  <NullValue>N/A</NullValue>
</Field>
</Record>
</Log>
</Logs>
```

10.3 File Management

The logging file management system (LFMS) compresses the logging files to save disk space. The feature also includes automatic deletion of the oldest files, once either the volume threshold or partition threshold has been reached.

The LFMS comes pre-configured to scan the logging root directory every 60 seconds. It compresses new logging files, keeping the original name and adding a compression suffix. It monitors the directory disk usage and checks to see if the thresholds have been reached. If so, the LFMS frees 20% of the threshold:

- If the volume threshold is set to 5GB, it removes 1 GB - 20% of 5GB
- If the partition threshold is set to 80%, it removes 16% - 20% of 80%

Files are always removed from oldest to newest, then the LFMS continues to manage all other sub-directories. Once all sub-directories are managed, the LFMS checks the global threshold and removes files if necessary.

10.3.1 Configuring the Logging File Management System

The logging file management system is pre-configured, and the default values are contained in `/usr/local/sandvine/etc/logging_file_management.conf.default`. You can edit the configuration to suit the needs of your system. If you choose to change the configuration, include the changes in the `/usr/local/sandvine/etc/logging_file_management.conf` file, and the changes overwrite the pre-configured parameters in the default file.



Caution:

Do not make changes in the default file.

To configure the logging file management system:

1. Open the `/usr/local/sandvine/etc/logging_file_management.conf.default` file for editing.

The file appears as:

```
# Default configuration file used by /usr/local/sandvine/scripts/logging_file_management.sh

#####
# IF YOU WANT TO CHANGE ANY VARIABLE, PLEASE DO SO IN
# /usr/local/sandvine/etc/logging_file_management.conf
# DO NOT CHANGE THIS FILE
#####

SDE_HOME=/usr/local/sandvine

# Enable or disable file management system.
# 0 for disable 1 for enable
ENABLE_MANAGEMENT=1

# Verbose mode for debugging
# 0 for disable 1 for enable
VERBOSE=0

# FOLLOW_SYMLINKS: if this option is set to 1
# the file management will follow symlinks in the
# LOGGING_TARGET_HOME directory and the
# LOGGING_TARGET_HOME itself can be a symlink.
FOLLOW_SYMLINKS=0
```

```
# Root path. The file management system will search
# for any logging file under this path
LOGGING_TARGET_HOME=$SDE_HOME/var/spool/logging/target

# Threshold VOLUME in GB for the whole
# $LOGGING_TARGET_HOME directory and his folders.
ROOT_LOGGING_TOTAL_MAX_SIZE=100

# Partition threshold percentage of the
# $LOGGING_TARGET_HOME partition.
PARTITION_TRESHOLD=90

# Define in percent how much data you want to
# remove each time a threshold is passed
SLICE_DELETION=20

ONE_GB_IN_KB=1048576

# Define how many jobs you allow the file management system
# to run simultaneously.
SIMULTANEOUS_JOBS=3

# Pattern automatically added after the file has been fetched
# by another server
TODELETE_PATTERN=*.downloaded

# Define default behaviour to manage the folders
# COMPRESSION_STATUS 1 for yes and 2 for no compression
# COMPRESSION_TYPE can be tgz tar or bz2
# COMPRESSION_TIME: 1 for immediate (on each turn) or 2 for on threshold
#                      (only if threshold is reached)
# TRESHOLD_DIRECTORY in GB. Leave a big number if you don't want this to
#                      influence and only the ROOT_LOGGING_TOTAL_MAX_SIZE
#                      to be the main threshold
# TRESHOLD_PARTITION in percent.

# DEFAULT VALUES FOR DIRECTORIES
DEFAULT_COMPRESSION_STATUS=1
DEFAULT_COMPRESSION_TYPE=tgz
DEFAULT_COMPRESSION_TIME=1
DEFAULT_TRESHOLD_DIRECTORY=1000
DEFAULT_TRESHOLD_PARTITION=100
```

```
# In this part, you can configure folders with other definitions than the
# default behaviour

# NUMBER_OF_DIRECTORIES: how many directories you specially define
NUMBER_OF_DIRECTORIES=0
# Need to be names DIR_NUMBER and to have at least 5 values. Otherwise,
# the default values will be taken instead.

# DIR_X="FULL_PATH COMPRESSION_STATUS COMPRESSION_TYPE COMPRESSION_TIME TRESHOLD_DIRECTORY
# (TRESHOLD_PARTITION optional)"
# DIR_1="/usr/local/sandvine/var/spool/logging/target/dir1      1      tgz      1      1"
# DIR_2="/usr/local/sandvine/var/spool/logging/target/dir2      2      bz2      3      2
#        60"

# UPLOAD SUPPORT :
# set UPLOAD_TO_SERVER to 1 to activate the feature.
# Fill ALL the values.
UPLOAD_TO_SERVER=0
UPLOAD_SERVER_IP=
UPLOAD_SERVER_DIRECTORY=/var/spool/sandvine
UPLOAD_USERNAME=
UPLOAD_PASSWORD=
# UPLOAD_FILE_PREFIX define the prefix added to the file
# that was uploaded in order to delete it after that.UPLOAD_FILE_PREFIX=LFM_UP

[ -f $SDE_HOME/etc/logging_file_management.conf ] && source
$SDE_HOME/etc/logging_file_management.conf
```

2. Copy the parameter(s) you wish to change.
3. Paste the parameter(s) into the `/usr/local/sandvine/etc/logging_file_management.conf` file.



Caution:

If you disable file management, then choose to re-enable it, you must restart the SDE services. See the *SDE Software Installation Guide* for more information on restarting the SDE services.

4. Save the file.

10.3.1.1 Changing the Target Root Path

The target root path for logging event files, `LOGGING_TARGET_HOME`, is hardcoded and cannot be changed in `/usr/local/sandvine/etc/logging_file_management.conf`. This path is `/usr/local/sandvine/var/spool/logging/target/` and by default is linked to `/var/sandvine/logging/target`.

To specify a different location for the target directory, you are required to create a symbolic link to the new location in the Linux operating system:

1. On the SDE shell, stop the SDE processes:

```
service sde stop
```

2. In the logging directory, specify the new target location:

```
cd /usr/local/sandvine/var/spool/logging
```

```
mv target target.old
```

```
ln -fs <target root path as defined during partitioning> target
```

Where <target root path> matches the exact partition path for the new target directory. (See [Partitioning Requirements](#) on page 10)

3. Restart the SDE processes:

```
service sde start
```



11

RADIUS

- ["RADIUS Subsystem Overview" on page 112](#)
- ["Configuring the SDE for a RADIUS Server" on page 112](#)
- ["Configuring the SDE as a RADIUS Client" on page 115](#)

11.1 RADIUS Subsystem Overview

The SDE can be configured as a RADIUS server or client. When configured as a RADIUS server, it receives and parses incoming RADIUS messages and raises events that are evaluated using SandScript. When configured as a RADIUS client, it allows SDE SandScript to transmit RADIUS messages. The RADIUS client and server interfaces also offer control over RADIUS protocol procedures such as shared-secret-based cryptography, resending and failover.

The RADIUS subsystem supports receiving RADIUS messages through two tee modes:

- **Encapsulation:**

When encapsulation mode is used, the PTS encapsulates the entire RADIUS packet in an UDP datagram. This allows the SDE make use of both the address of the PTS which Teed the packet as well as the addresses on the original encapsulated packet.

- **IP rewrite:**

In this mode, the PTS strips out the IP header of the original RADIUS packet and replaces it with a new IP-compatible header in which the PTS is the source address and the SDE is the destination address. It then sends the packet to the SDE.

When this mode is used both the original source and destination IP data are lost.

On the PTS, *policy.conf* needs to be modified for each tee mode used. For both modes, the destination should be declared with the PTS as the source address and the SDE as the destination address. For instructions, see the *Subscriber Mapping User Guide*.

11.2 Configuring the SDE for a RADIUS Server

The SDE RADIUS server receives messages from the network and places them in a SandScript policy queue. The SDE checks the validity of each message it receives.

Depending on network requirements, you can configure multiple listeners for the RADIUS server so that different types of RADIUS traffic or RADIUS requests with different shared secrets can be directed to specific listening addresses and ports.

11.2.1 Configuring the Primary RADIUS Server Listener

The SDE comes with one RADIUS server listener, which is considered the "main", or primary, listener. To configure the SDE as a RADIUS server, you are required to configure the listener's listening address.

1. From the CLI, run:

```
SDE> configure
SDE# set config service radius server listen-address <listen-address>
```

2. Depending on your system's configuration, you can also change the listener's listening port, operating mode and shared secret:

```
SDE# set config service radius server listen-port <int:1..65535>
SDE# set config service radius server operating-mode <operating-mode>
SDE# set config service radius server shared-secret <shared-secret>
```

3. When you've finished all RADIUS configurations, commit the changes:

```
SDE# commit
```


Main server listener parameter	Mandatory	Description	Default value
listen-address	Y	Valid IPv4 address on which the RADIUS server listens for packets. Caution: This value should not be set as '0.0.0.0', because responses from the server may not contain the expected source address.	127.0.0.1
listen-port	N	Port on which the RADIUS server listens for packets. Valid range is 1-65535. Note: You cannot change the local firewall configuration (iptables) using the SDE CLI. You need to modify the iptable rules to allow access to additional ports.	1812
operating-mode	N	Specifies whether the RADIUS traffic is normal or encapsulated when RADIUS is deployed in tee mode. Options are encapsulated or normal.	normal
shared-secret	N	Secure password used between the RADIUS client and server. The client must know this value to send requests to the server. Note: Although the RADIUS server uses "sandvine" as the default shared secret, the CLI will display increasing InvalidSharedSecret counters if the remote client doesn't use same shared secret. Sandvine recommends that you change the value to the shared secret used by the RADIUS client.	sandvine

11.2.2 Changing the RADIUS Server Listener Settings

You can optionally change the RADIUS server's default global settings, including queue and cache sizes. These settings affect both the primary RADIUS server listener and any additional listeners you configure to the server.



Caution:

Sandvine recommends that you do not change these parameters without first contacting customer support.

1. From the CLI, run:

```
SDE> configure
```

```
SDE# set config service radius server [parameter] <new value>
```

2. When you've finished all RADIUS configurations, commit the changes:

```
SDE# commit
```

Parameter	Mandatory	Description	Default value
app-to-stack-queue-size	N	Maximum capacity of the queue from the policy engine to the RADIUS server subsystem. Valid range is 100-10000000.	1000000
cache-size	N	Maximum capacity of the duplicate detection cache. Range is 0-10000000.	1000000

Parameter	Mandatory	Description	Default value
cache-timeout	N	Amount of time in ms that a request remains in the duplicate detection cache. Range is 5000-30000.	10000
dictionary-name	N	RADIUS dictionary name.	dictionary
dictionary-path	N	RADIUS dictionary path.	/usr/local/sandvine/ etc/radius/dictionary
stack-to-app-queue-size	N	Maximum capacity of the queue from the RADIUS server subsystem to the policy engine. Valid range is 100-10000000.	1000000
udp-transport-queue-size	N	Maximum capacity of the queues to and from the underlying transport node. Valid range is 100-10000000.	1000000

11.2.3 Configuring Additional RADIUS Server Listeners

You can configure additional listeners to the RADIUS server as required. For example, if the network will support both encapsulated and teed RADIUS messages, or the SDE will receive RADIUS requests from different clients using different shared secrets, add enough listeners to support the total number of shared secrets or both operating modes.

1. From the CLI, run:

```
SDE> configure
SDE# add config service radius server listener <name> address <IPv4_address> port
<int:1..65535> shared-secret <shared-secret>
```

2. When you've finished all RADIUS configurations, commit the changes:

```
SDE# commit
```

Parameter	Mandatory	Description	Default value
string	Y	RADIUS listener name. Valid value is a string.	--
address	Y	Valid IPv4 address for receiving RADIUS requests	--
port	Y	Port on which this listener listens for RADIUS messages. Valid range is 1-65535. Note: You cannot change the local firewall configuration (iptables) using the SDE CLI. You need to modify the iptable rules to allow access to additional ports.	--
shared-secret	Y	Secure password used between the RADIUS client and server. The client must know this value to send requests to the server. Define the value as the same shared secret used by the RADIUS client.	--

11.2.4 Verifying RADIUS Server Configurations

After adding a RADIUS server listener or modifying the RADIUS server configuration, you can verify your changes:

1. To view all RADIUS server configurations, in CLI operational mode run:

```
SDE> show config service radius server
```

2. To view only RADIUS server listener configurations, run:

```
SDE> show config service radius server listener
```

11.3 Configuring the SDE as a RADIUS Client

The SDE RADIUS client interface allows the SDE SandScript to transmit RADIUS messages to any configured RADIUS peer. When an acknowledgement is received, the RADIUS client raises an event to the policy engine with both the original message and the acknowledgement message available as context.

If the RADIUS client does not receive an acknowledgement within a defined time period, it resends the message. If no acknowledgement is received after the retransmission maximum has been reached, the client sends an alarm and may fail over to another RADIUS component. The related alarms are alarm model 68, "RADIUS remote server failed", and alarm model 69, "RADIUS transactions are failing".

The SDE supports both primary and secondary peers. These are configured via the CLI.

11.3.1 Configuring the RADIUS Client

To configure the SDE as a RADIUS client, add at least one RADIUS remote server as a RADIUS client peer. You can optionally configure new values for default settings at the same time.

1. From the configuration mode of the CLI, run:

```
SDE# add config service radius client peer <name> address <IP-address> shared-secret  
<shared-secret> [optional attribute] <new value>
```

2. When you've finished all RADIUS configurations, commit the changes:

attribute	Mandatory	Description	Default value
name	Y	Peer name (string)	--
address	Y	Valid IPv4 address in dotted-decimal notation or FQDN of the primary peer	--
shared-secret	Y	Shared secret used by the RADIUS peer. It assumed that both the primary and secondary servers have the same shared secret. Valid value is a string, or can be set to "".	--
port	N	Port number of the peer. Valid range is 1-65535. Note: You cannot change the local firewall configuration (iptables) using the SDE CLI. You need to modify the iptable rules to allow access to additional ports.	1812
secondary-address	Y	Valid IPv4 address in dotted-decimal notation or FQDN of secondary server	--

attribute	Mandatory	Description	Default value
secondary-port	Y	Port number of the secondary peer. Valid range is 1-65535.	--
failover-interval	N	failover interval in ms	Valid values are 1-100000.
retransmission-initial-time	N	Amount of time (in ms) to wait before resending a message for the first time. Range is 1-100000. Caution: Sandvine recommends you do not change this parameter without consulting Sandvine Customer Support or its authorized partner.	2000
retransmission-max-count	N	Maximum number of times a message may be resent. If an acknowledgment is not received after this number of retransmission attempts, the transaction fails. Range is 0-50. Caution: Sandvine recommends you do not change this parameter without consulting Sandvine Customer Support or its authorized partner.	5
retransmission-max-time	N	Maximum amount of time to wait (in ms) between successive message resend attempts. Range is 0-500000. Caution: Sandvine recommends you do not change this parameter without consulting Sandvine Customer Support or its authorized partner.	16000
retransmission-max-duration	N	Maximum lifetime (in ms) of a transaction. If an acknowledgement is not received before this timer expires, the transaction fails. Range is 1-3600000. Caution: Sandvine recommends you do not change this parameter without consulting Sandvine Customer Support or its authorized partner.	30000

11.3.2 Configuring the SDE with a Secondary RADIUS Client Peer

You can configure the SDE for both a primary and secondary RADIUS client peer. If the primary client peer stops responding, all pending and new messages are sent to the secondary peer. Only if the secondary peer stops responding does the system attempt to fall back to the primary peer.



Note:

You cannot change the local firewall configuration (iptables) using the SDE CLI. You need to modify the iptable rules to allow access to additional ports.

1. You can configure the SDE with both primary and secondary RADIUS client peers in a single action. From the CLI run:

```
SDE# add config service radius client peer <name> address <IP-address> shared-secret
<shared-secret> secondary-address <secondary-address> secondary-port <secondary-port>
```

2. To add a secondary RADIUS client peer to an existing configuration, run:

```
SDE# set config service radius client peer <name> secondary-address <secondary IPv4 address>
```

```
SDE# set config service radius client peer <name> secondary-port <int:1..65535>
```

3. When you've finished all RADIUS configurations, commit the changes.



Note:

For an explanation of the configuration parameters, see [Configuring the RADIUS Client](#) on page 115.

11.3.3 Changing RADIUS Client Peer Settings

After adding a RADIUS client peer, it is possible to change the configuration attributes. You can changing only one attribute at a time.

1. From the configuration mode of the CLI, for each attribute you want to change for either the primary or secondary peer, run:

```
SDE# set config service radius client peer <name> [attribute] <new value>
```
2. When you've finished all RADIUS configurations, commit the changes.



Note:

For an explanation of the configuration attributes, see [Configuring the RADIUS Client](#) on page 115.

11.3.4 Changing RADIUS Client Settings

You can optionally change the parameters that define how the RADIUS client treats messages. It is recommended, however, that you do not make any changes without consulting Sandvine Customer Support or its authorized partner.

1. From the configuration mode of the CLI, for each parameter you want to change for either the primary or secondary peer, run:

```
SDE# set config service radius client [parameter] <new value>
```
2. When you've finished all RADIUS configurations, commit the changes.

Parameter	Mandatory	Description	Default value
app-to-stack-queue-size	Y	Outgoing message queue size for RADIUS client. Valid range is 0-10000000.	1000000
dictionary-name	N	Dictionary file name for RADIUS client, expressed as a string.	dictionary
dictionary-path	N	Dictionary folder path for RADIUS client.	/user/local/sandvine/ etc/radius/dictionary
peer		Name of the RADIUS client peer, expressed as a string, for which you are editing the configuration. (The RADIUS client peer must first be added to the configuration using the <code>add config service radius client peer</code> command.)	--
stack-to-app-queue-size	N	Incoming message queue size for RADIUS client. Valid range is 0-10000000.	1000000
tx-local-address	N	Local IPv4 address that is used when sending request	0.0.0.0

Parameter	Mandatory	Description	Default value
tx-local-ports	N	Number of local ports to use to originate requests. This permits a larger number of open outstanding transactions on the network. Valid range is 0-500.	100
udp-transport-queue-size	N	Incoming and outgoing message queue size for UDP transport layer. Valid range is 0-10000000.	1000000

11.3.5 Verifying RADIUS Client Configurations

After adding a RADIUS client peer or modifying the RADIUS client configuration, you can verify your changes:

1. To view all RADIUS client configurations, in CLI operational mode run:

```
SDE> show config service radius client
```

2. To view only RADIUS client peer configurations, run:

```
SDE> show config service radius client peer
```



12

Sessions and Provisioning

- ["Sessions" on page 120](#)
- ["Provisioning" on page 121](#)

12.1 Sessions

The SDE includes a session subsystem that provides support for subscriber-aware policy. Subscriber awareness is achieved by mapping a subscriber to an IPv6 address, or to an IPv4 address and a site number (called a session qualifier). Subscriber awareness requires an SPB to be configured and connected to the PTS and SDE. The ability to map a subscriber is a prerequisite for any subscriber-aware policies, such as subscriber statistics collection or Top Talkers. An active-IP-address-to-subscriber mapping is called a session for that subscriber.

Attributes are type-value pairs, such as 'servicelevel=gold', that can be attached to a particular subscriber or to any of that subscriber's sessions. Each subscriber, or session, may have any number of attributes. These attributes may be used in policy conditions and typically represent the type of policies and type of service the subscriber will receive. For example, collect statistics, shape traffic, allow/deny.

The SPB is the authoritative source of subscriber mapping information in the Sandvine system but the SDE also maintains a cache of active sessions until the mapping times out.

Both the IP-subscriber mapping and all subscriber or session attributes are maintained by the SPB, which pushes notifications to, and accepts queries from, the PTS elements and SDEs as needed. When traffic from an unknown subscriber IP address is received by the PTS, the subscriber who owns that IP address and all attributes of that subscriber are looked up in the SPB. If the SPB doesn't find the subscriber, it sends a cache miss request to the SDE.

Changes in IP-subscriber mapping and subscriber-attribute mapping are detected on the basis of modification time, ensuring that changes are detected immediately.

12.1.1 Session Qualifiers Overview

A session qualifier represents a site number, port range, or any other identifier. It is used in combination with an IPv4 address to identify a unique subscriber session.

All Sandvine elements use the subscriber's IP address as the default session identifier. However, as IPv4 addresses become exhausted, Communications Service Providers (CSP) are implementing services, such as network address translation (NAT), that result in private overlapping IPv4 addresses on the network.

For networks that use such services, session qualifiers can uniquely identify subscribers that have overlapping IPv4 addresses, and thereby enable features such as subscriber mapping and subscriber lookup.

A site number is a positive 32-bit integer that you assign to an area of the network that sees only unique IP addresses. A site number is commonly derived from either a PTS cluster or a VLAN tag. The SDE's Subscriber Mapping application provides the site number to the SPB, through either SPB CLI commands or through Simple Object Access Protocol (SOAP) requests from other equipment.

The value of 0 is reserved for the default, or global, session qualifier. If no session qualifier is provided in the provisioning of a session, then the SPB assigns the 0 value.

The PTS uses the IP address and session qualifier together to uniquely identify sessions when applying SandScript policy.

12.1.2 Changing the Default Session Subsystem Settings

Defaults are defined for all settings for the session subsystem. However, you can change these settings, depending on your system's requirements.

Define new values for session subsystem parameters through the CLI using this command:

```
SDE# set config service subscriber-management [parameter] <value>
```


Parameter	Mandatory	Description	Default value
login-events handle-notification	N	Determines whether the element will process IP assignment notifications. Valid values are true false.	true
timeout inactivity	N	Number of seconds after which a mapped IP address with no activity will be unmapped. Range is 1-1209600.	1200
timeout late	N	Maximum delay, in seconds, for an IP to be mapped 'on-time' after lookup. Range is 1-120.	30
timeout lookup initial	N	Initial delay in seconds between IP-to-subscriber lookups. Range is 1-86400.	1
timeout lookup max	N	Maximum delay in seconds between IP-to-subscriber lookups. Range is 1-86400.	32400

12.2 Provisioning

The provisioning subsystem allows the SDE to create, look up, update and delete subscriber profile and session data on the SPB. It is used primarily for the Subscriber Mapping application and, as such, is not often used directly.

The provisioning subsystem also allocates resources, specifically IP addresses, and subscriber and session attributes. The allocation of IP addresses is done through the Subscriber Mapping application, which uses the DHCP subsystem to associate between a given IP and the subscriber it is assigned to.

The subsystem transmits three types of messages:

- Mapping update actions such as updating a subscriber's tier from silver to gold in the mapping
- Status messages that relate to the action (success/failure)
- Reconciliation messages, wherein transactions are flagged for further investigation

Provisioning actions are used by the Subscriber Mapping application. For information about provisioning actions, see the *Subscriber Mapping User Guide*.

12.2.1 Changing the Default Provisioning Settings

Defaults are defined for all settings for the provisioning subsystem. However, you can change these settings, depending on your system's requirements.

Define new values for provisioning parameters through the CLI using this command:

```
SDE# set config service subscriber-provisioning [parameter] <value>
```

Parameter	Mandatory	Description	Default
backoff-max-limit	N	Maximum delay (ms) between retries, calculated as the minimum between backoff-max-limit * backoff-multiplier and backoff-upper-limit Valid values are 0-600000.	40000
backoff-min-limit	N	<int:> Minimum delay (ms) between retries. Valid values are 0-600000.	31000
backoff-multiplier	N	<int:> Factor used in the calculation of the maximum backoff delay algorithm (as the multiplier of backoff-max-limit). Valid values are 0-100.	2

Parameter	Mandatory	Description	Default
backoff-upper-limit	N	Defines the upper delay (ms) boundary. It is calculated as the minimum between: backoff-max-limit * backoff-multiplier and backoff-upper-limit Valid values are 0-600000.	120000
batch-size	N	Maximum number of requests that are processed at the same time and sent to the Stats Manager. Valid values are 1-1000000.	1000
batching-interval	N	Batching interval (ms) to SPB. Valid values are 0-1000.	20
batching-timeout	N	Number of milliseconds to wait in the main thread loop of the subscriber provisioning service. Valid values are 0-500000.	1
cache-miss-queue-size	N	Maximum size of the cache miss queue from StatsMgr. Valid values are 20000-500000.	1000000
current-sessions	N	Maximum current tracked sessions. Valid values are 20000-20000000.	20000000
current-tracked-ips	N	Maximum tracked IP prefixes. Valid values are 0-20000000.	200000000
enable-tracking	N	Activate/deactivate the reconcile mechanism (if true the provisioning subsystem saves all the sessions with a TTL >0). Valid values are true false.	true
deleted-records-queue-size	N	Maximum size of the deleted records queue. Valid values are 20000-500000.	1000000
latency-histogram-lookback	N	Number of samples to retain in the mapping latency histogram (one sample per stats-sampling-interval). Valid values are 60 - 3000000.	
latency-threshold-for-95th-percentile	N	The threshold, in milliseconds, to alarm against the 95th percentile.	
latency-threshold-for-99-percentile	N	The threshold in, in milliseconds, to alarm against the 99th percentile.	
login-to-policy-queue-size	N	Maximum size of the login to policy queue. Valid values are 500000-10000000.	1000000
logout-to-policy-queue-size	N	Maximum size of the logout to policy queue. Valid values are 500000-10000000.	1000000
max-provision-ip	N	Maximum number of IP addresses (IPv4+IPv6) that can be provided in the provisioning request. This setting applies to both IPv4 and IPv6 addresses. Therefore, if you configure it to 5, then you can have 5 IPv4 addresses and 5 IPv6 addresses. Valid values are 1-10.	10
nat-number-reconciles	N	Maximum number of times that a NAT reconcile event is generated for a specific session	
number-reconciles	N	Maximum number of times that a reconcile event will be generated for a specific session. Valid values are 1-5.	3
outstanding-transaction	N	Maximum number of outstanding transactions. Valid values are 1-20000000.	1000000
policy-to-subsystem-queue-size	N	Maximum size of the subsystem queue. Valid values are 20000-500000.	500000
reconcile-queue-size	N	Maximum size of the reconcile queue. Valid values are 20000-500000.	1000000

Parameter	Mandatory	Description	Default
reconcile-timeout	N	Default reconcile timeout (ms). Valid values are 60000-4294967295.	900000
reconcile-to-policy-queue-size	N	Maximum size of the reconcile events queue to policy engine. Valid values are 20000-500000.	1000000
request-retries	N	Number of times the SDE retries to send the request, if no response is received. Valid values are 0-20.	7
results-queue-size	N	Maximum size of the results queue from SPB. Valid values are 20000-500000.	1000000
stalled-mapping interval	N	Interval (sec) for counting the number of mappings. Valid values are 0-3600.	900
stalled-mapping percentage	N	An alarm is raised if an x% reduction in login transactions is detected from one interval to the next. Valid values are 0-100.	95
stalled-mapping threshold	N	The alarm is raised only if the current number of mappings is greater than this threshold. Valid values are 0-100000.	10000
stat-mgr-timeout	N	Maximum time (ms) to wait for the StatsMgr to respond. Valid values are 1000-10000000.	3600000
stats-sampling-interval	N	Interval (ms) to update the provisioning stats. Valid values are 10000-60000.	1000



13

SNMP

This chapter provides information about the location of the MIBs, as well as how to configure the SDE for sending SNMP trap receivers.

- ["SNMP Overview" on page 126](#)
- ["SDE Alarms" on page 126](#)

13.1 SNMP Overview

The SDE supports SNMP and uses the configuration for the standard `snmpd` daemon supplied by Red Hat Enterprise Linux distribution. For more instructions about general SNMP configuration, see the SNMP man documentation inside Linux.

13.1.1 MIB Locations

SDE MIBs are located on the SDE machine at `/usr/local/share/snmp/mibs` and on the Sandvine Customer Support site at <ftp://ftp.support.sandvine.com/SDE/SDE-6.40/mibs.sde-6.40>.

13.1.2 `snmpwalk`

If you encounter difficulties performing an `snmpwalk`, restart the SNMP daemon on the SDE machine by running:

```
service snmpd restart
```

13.2 SDE Alarms

The SDE automatically issues alarms on system faults that may require attention. You can view these alarms on the SDE server or set the system so that they are sent to an external SNMP trap receiver.

For information on viewing alarms, see [Alarms](#) on page 145

See the *SDE Software Installation Guide* for instructions on configuring the SDE for external trap receivers.



14

Text Input

- ["TextInput Subsystem Overview" on page 128](#)
- ["Configuring the TextInput Dictionary" on page 128](#)

14.1 TextInput Subsystem Overview

The TextInput subsystem allows the SDE to parse incoming textual data according to a configured schema. The subsystem breaks incoming records into fields according to the configured parsing rules and exposes the parsed fields as string values to SandScript:

```
TextInput.<SourceName>.<FieldName>
```

where <SourceName> is the configured source name and <FieldName> is the configured name of a parsed field.

The TextInput subsystem supports two parsing modes:

- **Legacy mode:** The fields in the records are separated by a one-character field delimiter.
- **Advanced (normal) mode:** The configuration defines a set of fields. Each field configuration entry defines rules for how to find a field's start and end, how the field value should be modified, whether the field is mandatory or not, etc.

The subsystem supports three types of data input:

- **Files:** The input data is represented as file stored on local disk.
- **Fifo (or pipes):** when the input data is injected using standard the named pipe mechanism.
- **UDP socket:** when the data is sent to a UDP socket. The UDP socket mode is mainly used for processing syslog messages from different devices.

The TextInput subsystem uses the XML format for the field schema configuration files.

14.2 Configuring the TextInput Dictionary

The TextInput subsystem contains an XML configuration file that allows you to create a dictionary of the expressions used in SandScript. The TextInput subsystem supports multi-file configuration as it loads all XML files from the folder `/usr/local/sandvine/etc/text_input`. The file loading order is not specified.

For backward compatibility the CSV subsystem reads its configuration from `/usr/local/sandvine/etc/cv_config.xml` file as well.

The expressions must exactly match the XML configuration. An example is located at `/usr/local/sandvine/etc/text_input/text_input_config.xml.sample` that you can use to help with the configuration.

1. To configure the text input dictionary, open the `/usr/local/sandvine/etc/text_input/text_input_config.xml.sample` file for editing.

The file contains two types of parameters:

- **General configuration parameters:** Parameters used to configure general aspects of the subsystem. Usually defaults can be used.
- **Sources:** Defines the data sources mapped in SandScript to events. Each line from the text input source file is considered a record containing fields, and the text input subsystem reflects this information as events in the SDE SandScript. The source names defined in the XML dictionary are used in the SandScript, and the mapped fields are used to access the actual field data.

The "SourceType/Name" tag determines how the generated SandScript field will look: The generated SandScript field is determined by: `TextInput.<SourceType/Name>.<Field/Name>` (eg. `TextInput.sample_csv.CMTShostName`)

You can define up to 250 total source types and sources under these types.

2. Configure all required data sources. See [Source Configuration Parameters](#).
3. Save the file with a .xml extension.

4. Perform an `svreload`.

14.2.1 Source Configuration Parameters

Except for 'IndexStartValue', the parameters define a schema in which each source is a type of Sandscript event.

TextInput field configuration parameters

Parameter	Description	Mandatory/Optional	Valid values	Default
IndexStartValue	Sets the starting index value for each field in <i>policy.conf</i> . The value should match the CSV SandScript.	O	integer	1
UnmappedFieldPrefix	Defines a generic name for sources so that explicit names in the SandScript are not required to access the source.	O	string	field
SourceType	Group. Add as many as required. The subsystem supports up to 250 source types and sources.	M	N/A	N/A
Mode	Defines the type of data input. The source type: <ul style="list-style-type: none"> Files FIFO UDP 	M	UDP – for UDP socket Stream – for named pipes FromFile - for files	Stream
FieldDelimiter	The field delimiter is used for the legacy parsing. FieldDelimiter separates two adjacent fields. The field is ignored in the normal parsing mode.	O	One char symbol. The default value is ',' (comma). Besides ASCII chars the delimiter can contain the following symbols: \t, \b, \', \", \\	, (comma)
DuplicateDelimiters	The field defines how to treat two adjacent delimiters (missed field) in the legacy parsing. The field is ignored in the normal parsing mode.	O	Null = Duplicate delimiters are treated as empty fields and appear as 'Null' in SandScript. EmptyString= Duplicate delimiters are treated as empty string (" ") fields. Ignore - Duplicate delimiters are treated as a single delimiter.	EmptyString
Sources	The source list. This group attribute contains list of instances. Definitions for the physical locations in the host file system from which to read data. List as many source locations as needed, each within a different 'source' tag. When working in stream mode (the current mode), these file paths must exist before loading and committing the configuration	M	UDP mode: [local_ip]:local_port. For example: "514","127.0.0.1:514":"0.0.0.0:514" Stream mode: pipe_name, for example: "/tmp/cmts_1" FromFile mode file name, for example "/usr/local/sandvine/data.txt"	--

Parameter	Description	Mandatory/Optional	Valid values	Default
	file. Otherwise the file will fail to load.			
Fields	The parsing schema. This group attribute contains list of field definition.	M	N/A	N/A
Field	Group: Contains the details for a single data field. Each field is used to define a data field in <i>policy.conf</i> .	M	N/A	N/A
Ordinal	Ordinals start from a specific IndexStartValue and define the number of the field in the data stream. If the IndexStartValue is '10', then the ordinal starts from '10'. The ordinal should match the field name.	M	integer	--
Name	SandScript uses the source name to access any record that this source provides: .<Name>.<FieldName> .	M	Printable Text	--

14.2.2 Fields

Each source has one field set that is configured in the "Fields" group.

Field Set Configuration

Parameter	Description	Mandatory/Optional	Valid values	Default
Filter	A regular expression that allows the parser to ignore a record that does not fit specifications. Ignored records are not reported as malformed.	O	Regular Expression	---

The TextInput subsystem supports two parsing modes: legacy and advanced. The subsystem distinguishes between the modes by the field configuration. If any advanced parameter is defined, the subsystem switches to advanced mode. Otherwise, it remains in legacy mode.

Field Configuration

Parameter	Description	Mandatory/Optional	Valid values	Legacy/Advanced
Ordinal	Unique number that defined the field position in the record. Ordinals start from a specific IndexStartValue and define the number of the field in the data stream. If the IndexStartValue is '10', then the ordinal starts from '10'. The ordinal should match the field name.	M	1-100	L,A
Name	The field name. This name is used by SandScript for accessing to the field value: TextInput.<Name>.<FieldName>	M	Printable Text	L,A

Parameter	Description	Mandatory/Optional	Valid values	Legacy/Advanced
Begin	The begin marker indicates field start. If it is empty (or omitted) the field will start from the current string point.	O	Printable text, Besides ASCII chars the delimiter can contain the following symbols: \t, \b , \', \", \\	A
End	The end marker indicates field end. If it is empty (or omitted), the field will the field will end with the string end. NOTE: Only the last field of the field set can have this marker empty (or omitted)	O	Printable text, Besides ASCII chars the delimiter can contain the following symbols: \t, \b , \', \", \\	A
Regex	The parser uses regular expression to perform substitution in the field value. For example, Regex is set to "(ALLOC) (RELEASE)" and the Replacement is set to "(?1Map)(?2Unmap)" In this case the parser will look for either 'ALLOC' or for 'RELEASE'. If the first entry was found, the parser replaces it by 'Map'. If the second entry was found, it will be replaced by 'Unmap'	O	Regular expression.	A
Replacement	The parser uses regular expression to perform substitution in the field value. For example, Regex is set to "(ALLOC) (RELEASE)" and the Replacement is set to "(?1Map)(?2Unmap)" In this case the parser will look for either 'ALLOC' or for 'RELEASE'. If the first entry was found, the parser replaces it by 'Map'. If the second entry was found, it will be replaced by 'Unmap'	O	String	A

14.2.3 Source Instance Configuration

Each source can have one or more instances. Instances are configured under the "Sources" group parameters.

Depending on the source type, the instance value is:

- **UDP mode:** [local_ip]:local_port, for example: ":514", "127.0.0.1:514", "0.0.0.0:514"
- **Stream mode:** pipe_name, for example: "/tmp/cmts_1"
- **FromFile mode:** file name, for example "/usr/local/sandvine/data.txt"

14.2.4 TextInput CLI Configuration

The TextInput subsystem configuration mostly relies on configuration files in XML format. The only parameters that can be configured due to CLI interface is input queue size.

Parameter	Description	Type and Range	Default
queue-size	Size of the incoming message queue	Integer 100-10000000	1000000

Too configure queue-size in the CLI:

1. Switch to configuration mode:

```
# configure
```

2. Set a new value:

```
# set config service text-input queue-size 2000000
```

3. Commit the changes:

```
# commit
```

14.2.5 Sample TextInput Configuration File

```
<SourceType>
  <Name>SP</Name>
  <Mode>UDP</Mode>
  <!-- Only default delimiters are used in this case -->
  <Fields>
    <!-- This regular expression allows the parser to ignore
    records that do not fit it. Such ignored records will not be
    considered as malformed-->
    <Filter>NAT_PORT</Filter>
    <Field>
      <!-- The field ordinal number must be unique -->
      <Ordinal>1</Ordinal>
      <!-- If this flag is set the field is mandatory in the record.
      if a mandatory field is not present the whole record
      will be dropped.
      Possible values are: 0, 1, true, false, yes, no
      -->
      <Mandatory>1</Mandatory>
      <!-- The field name as it appears in policy
      must be unique
      -->
      <Name>presence</Name>
      <!--
      Delimiters defines field limits. If no delimiter is defined for
      any field in the record, the default char delimiter will be used.
      Besides ASCII chars the delimiters can contain the following symbols
      \t, \b, \', \", \\
      -->
      <!-- The begin delimiter indicates field start
      if it is empty (or omitted ) the field will start from
      the current string point
      -->
      <Begin>ASP_NAT_PORT_BLOCK </Begin>
      <!-- The end delimiter indicates field end
      if it is empty (or omitted ) the field will end with the string end
      NOTE: Only last field can have the end delimiter empty (or omitted )
      -->
      <End>:</End>
      <!-- The parser uses regular expression to make
      substitution in the field value. In this example
      the parser looks for either 'ALLOC' or for 'RELEASE'
      if the first entry was found, the parser replaces it
      by 'Map'. If the second - by 'Unmap'
      -->
      <Replacement>( ?1Map ) ( ?2Unmap ) </Replacement>
      <Regex>(ALLOC) | (RELEASE) </Regex>
    </Field>
    <Field>
      <Ordinal>2</Ordinal>
```

```
<Mandatory>1</Mandatory>
<Name>internalIP</Name>
<!-- This begin delimiter is 'space'
-->
<Begin> </Begin>
<End> -></End>
</Field>
<Field>
  <Ordinal>3</Ordinal>
  <Mandatory>true</Mandatory>
  <Name>externalIP</Name>
  <Begin> </Begin>
  <End>:</End>
</Field>
<Field>
  <Ordinal>4</Ordinal>
  <Name>lowPort</Name>
  <!-- Optional field -->
  <Mandatory>false</Mandatory>
  <!-- This begin delimiter is empty. That means
the field starts immediately after the end delimiter
of the previous field.
-->
  <Begin></Begin>
  <End>-</End>
</Field>
<Field>
  <!-- The end delimiter indicates field end
if it is empty (or omitted ) the field will end with the string end
NOTE: Only last field can have the end delimiter empty (or omitted )
-->
  <Ordinal>5</Ordinal>
  <!-- Optional field -->
  <Mandatory>no</Mandatory>
  <Name>highPort</Name>
</Field>
</Fields>
<Sources>
  <!-- The source name has the following format local_ip:local_port
If the IP part is omitted the ANY (0.0.0.0) value is used instead
-->
  <Source>:1827</Source>
  <Source>0.0.0.0:1828</Source>
  <Source>10.10.32.28:1829</Source>
</Sources>
</SourceType>
```




15

Troubleshooting the SDE

This section outlines some options for troubleshooting issues.

- ["Troubleshooting the General System" on page 136](#)
- ["Additional Failover Cluster Information" on page 139](#)
- ["Additional Persistency Information" on page 142](#)
- ["Additional Troubleshooting" on page 144](#)
- ["Alarms" on page 145](#)

15.1 Troubleshooting the General System

The SDE CLI includes a number of `show system` commands that allow you to view general system information, such as process statuses and resources, for troubleshooting purposes.

15.1.1 show system log

This command allows you to view the SDE's primary log activity to determine whether the required processes are loaded and running successfully.

SDE> show system log

The log displays this output:

Output	Description
LogId	Unique ID for each log message
EventDate	Date and time at which the event occurred
Component	SDE component on which the event occurred
Severity	Severity level of the event. Depending on the SDE's configuration, can be one of: <ul style="list-style-type: none"> • debug • info • notice • warning • error
Message	Description of the event or issue being reported

15.1.2 show system overview

The `show system overview` command provides an overview of overall system health and configuration information. It lets you view at a glance the status of the failover cluster and VIPs, backups, disk space, subscriber sessions and system resources, rather than running the individual commands.

SDE> show system overview

The command output shows:

Failover cluster	Description
Enabled	Identifies whether the failover cluster is enabled (<code>true</code>) or disabled (<code>false</code>).
NodeRole	Identifies whether the SDE node is currently active or passive.
LastNodeRoleChangeTime	Specifies the last date and time of failover that resulted in a node role change.
RecoveryState	Identifies whether or not the last node recovery succeeded.

VIP Table	Description
Id	Identifies the VIP configured to the cluster.

VIP Table	Description
AddrType	Displays the IPv4 address type. This is either an integer or a string.
Ip	Displays the IPv4 address (IP/netmask or IP) used for the virtual IP.
Prefix	Identifies the prefix used for the IP address. This field is left blank when the interface name is used.
Gateway	Identifies the default gateway for the IP address.
InterfaceName	Specifies the name of the interface used for the IP address.
ServiceType	Identifies the service type that the VIP uses.
OperationalStatus	Identifies whether the VIP is configured on this node.
AdminStatus	Identifies whether the node is active or passive. When set to <code>true</code> , the VIP is assigned to this node and when set to <code>false</code> the VIP is assigned to the other node in the failover cluster.

Backups	Description
ServiceName	Identifies the SDE service.
Copies	Number of copies to retain in the backup directory before older copies are deleted.
Interval	Lists the frequency (in minutes) at which backups are created.
SourceFreeSpace	Identifies the amount of free space remaining for the resource backup.
SourceTotalUsage	Identifies the total amount of space used for the backup.
DestinationFreeSpace	Identifies the amount of free space available on the destination node.
DestinationTotalUsage	Identifies the amount of backup space used on the destination node.

Subscriber Sessions	Description
Active	The number of IP-to-subscriber mappings the SDE is tracking currently.
LookupInProgress	The number of IP addresses the SDE is looking up at this moment.
LookupRequests	Identifies the total number of IP address lookups that the SDE has sent to the SPB.

System Resources	Description
Id	Identifies the system resource.
Description	Identifies the resource description.
Size	Identifies the total allocated capacity.
Used	Identifies the amount of capacity used.
Free	Identifies the capacity remaining.
Capacity	Identifies the percent of capacity used.

15.1.3 show system resources

This command provides an expanded view of usage details for the system resources and processes that may impact proper functioning of the system. It also displays any allocation failures for these resources and processes.

```
SDE> show system resources
```

Output similar to the following should appear, with the correct resource usage data for your system:

Id	Description	Size	Used	Free	Capacity	AllocationFailures
2	Real memory	33.74G	2.32G	31.42G	6.9%	0
3	Swap space	17.18G	0.00	17.18G	0.0%	0
6	Filesystem /	10.87G	2.54G	8.33G	23.4%	0
7	Filesystem /boot	97.52M	24.12M	73.40M	24.7%	0
9	Filesystem /dev/shm	16.87G	0.00	16.87G	0.0%	0
10	Filesystem /d2	810.59G	207.62M	810.38G	0.0%	0
38	Measurements	2.00M	70.00	2.00M	0.0%	0
43	Classifiers	65.53k	15.00	65.52k	0.0%	0
44	SDE policy table rows	100.00M	19.00	100.00M	0.0%	0
50	Total memory	50.92G	2.32G	48.60G	4.6%	0
51	SDE Map Memory	41.94M	1.02k	41.94M	0.0%	0
59	Statistic Records	1.40M	0.00	1.40M	0.0%	0
65	Process memory	101.23G	2.29G	98.94G	2.3%	0
66	Process CPU (Hertz)	7.20G	1.94G	5.26G	27.0%	0
67	Processor CPU (Hertz)	38.40G	2.98G	35.42G	7.8%	0
75	SDE policy table row memory	20.00G	1.02k	20.00G	0.0%	0

Output	Description
Id	System resource ID
Description	Resource description
Size	Total allocated capacity
Used	Amount of capacity used
Free	Remaining capacity
Capacity	Percent of capacity used
AllocationFailures	Number of failures to allocate capacity for this resource
Module	SDE module number
Process	SDE process

15.1.4 show system services

Run this command to determine whether system services are operating properly. Command output also displays fault history information.

SDE> show system services

Output	Description
Name	System service name.
AdminStatus	Administrative status - up or down
OperStatus	Operational status: <ul style="list-style-type: none"> online — the service is functioning correctly degraded — some parts of the service is not functioning stopped — the service has been stopped, or has not started faulted — the service has experienced a fault reloading — the service is reloading

Output	Description
	<ul style="list-style-type: none">starting — the service has just startedinitializing — the service is initializingdisabled — the service has been administratively disabledunlicensed — the service is not licensed and will not run.diagnostic — the service is providing special functionality to validate the integrity of the software and/or hardware.
AdminStarts	Number of administrative starts of the service since it was initialized
AdminStops	Number of administrative stops of the service since it was initialized
Faults	Number of faults the service has had since initialization
LastFaultTime	Time and date of the last service fault
LastOnlineTime	Last time and date the service was online
LastReloadTime	Last time and date the service was reloaded

15.2 Additional Failover Cluster Information

The information below contains expanded information and additional commands for troubleshooting failover clusters.

15.2.1 show service failover-cluster backup

Use this command to troubleshoot replication database backups.

```
SDE> show service failover-cluster backups
```

Output	Description
Enabled	Whether the backup is enabled: true false
Copies	Number of copies retained in the backup directory
SourceDirectory	Location of the directory where the replication data is stored on any node
SourceAccessPermissions	Type of permissions granted for accessing the source replication data files
SourceFreeSpace	Available space in source directory
SourceTotalUsage	Total space used in the source directory
DestinationDirectory	Location of the directory to which the replication data is copied on any node
DestinationAccessPermissions	Type of permissions granted for accessing the copies of the replication data files
DestinationFreeSpace	Available space in the backup directory
DestinationTotalUsage	Total space used in the backup directory

Output	Description
FailedBackups	Cumulative number of backups that have failed since the backup was enabled
SuccessfulBackups	Cumulative number of successful backups since the backup was enabled
Interval	Time (minutes) between backups
AvailableBackups	Filename of each available backup

15.2.2 show service failover-cluster recovery

When replication tables are defined, this command displays information regarding a failover cluster's recovery following failover.

```
SDE> show service failover-cluster recovery
```

Output	Description
NodeRole	Current role (active/passive) of this SDE node.
LastNodeRoleChangeTime	Last date and time of failover resulting in node change.
RecoveryState	Whether or not the last node recovery succeeded.
Recovery Tables: Name	Name of the table to recover.
Recovery Tables: RecoveredRowCount	Number of rows recovered in the table.
Recovery Tables: RecoveryState	Whether or not the table recovery succeeded.

15.2.3 show service failover-cluster replication

This command displays information that allows you to determine whether data replication is working properly.

```
SDE> show service failover-cluster replication
```

Output	Description
Name	Name of the table row
SuccessfulSaves	Number of times the row was successfully replicated
FailedSaves	Number of times the row's replication failed
FailedDeleteRows	Number of times the replication process failed to delete the row. This happens when: <ul style="list-style-type: none"> You try to delete a row that does not exist (DB_NOT_FOUND). This might happen if the SandScript has errors The element is a slave and the database is read only. This often happens during failover
RecoveredRows	Number of times the replication process successfully recovered the row
DeletedRows	Number of times the replication process deleted the row
FailedTransactions	Number of transactions that were aborted. This can happen during election. For example, if you write or delete something when election starts. Transactions are also aborted if the element is a slave and the database is read only. This often happens during failover
TotalCommittedTransactions	Total number of transactions that succeeded (timeout + count)

Output	Description
CommittedOnCountTransactions	Total number of transactions committed. Each transaction contains the maximum number of writes/deletions defined in the persistency "transactions-commit-count" parameter
CommittedonTimeoutTransactions	Total number of transactions committed. Each transaction expires after the time defined in the persistency "transactions-commit-timeout" parameter
PendingWrites	Number of writes/deletes still waiting for insertion into the SandScript table
RuntimeErrors	Total number of errors for each table (transaction+delete+write). The RuntimeErrors counter is the sum of any runtime errors. For example, if there are 1 FailedSaves and 1 FailedDeleteRows entries, RuntimeErrors is equal to 2
RecoveryState	Success of the table recovery (success/fail/progress)
OverflowError	Number of writes/deletes that were dropped from the queue waiting for insertion into the database
LoadTimeDurectionSec	Amount of time it took to load a specific table from the database to the SandScript table
QueueSize	Size of the write/delete queue that is waiting for insertion into the database

15.2.4 show service failover-cluster stats

Use this command to view the general health of the failover cluster or troubleshoot malfunctions.

```
SDE> show service failover-cluster stats
```

Output	Description
EnvironmentState	True: The failover cluster is working properly. False: The failover cluster is not working properly.
CreationError	True: Errors occurred upon cluster creation. Note: This should only be "true" in cases where EnvironmentState is "false". False: No errors occurred upon cluster creation. Note: When EnvironmentState is "true", this parameter should always be false.
Corrupted	True: The failover cluster became corrupted. Note: This should only be "true" in cases where EnvironmentState is "false". False: The failover cluster is not corrupted. Note: When EnvironmentState is "true", this parameter should always be false.
NodeRole	Current role (active/passive) of this SDE node
NodeRoleChanges	Number of times this SDE node has changed roles
LastNodeRoleChangeTime	Last date and time of failover resulting in node change
RecoveryState	Whether or not the last node recovery succeeded

The output should show:

```
EnvironmentState: [true]
CreationError    : [false]
Corrupted        : [false]
```

If `EnvironmentState` is "false", from CLI operational mode run this command to fix the failover cluster environment:

```
SDE> set service failover-cluster environment-fixed true
```

For more information on troubleshooting failover clusters, see [Troubleshooting Failover Cluster Configuration](#) on page 20.

15.2.5 show service failover-cluster vip

Use this command to view failover activity and the current status of the assigned VIPs.

```
SDE> show service failover-cluster vip
```

Output	Description
VipsTimeToSetAll	Time it took to assign the VIP to this node
Id	VIP ID
AddrType	IP type
Ip	VIP address
Prefix	Prefix used for the VIP address (if no interface name is used)
Gateway	Default gateway for the VIP address
InterfaceName	Name of the interface used for the VIP address (if the VIP prefix isn't defined)
ServiceType	Name of the service for which the VIP is used
OperationalStatus	Whether the VIP is configured on this node
AdminStatus	Whether this node is active or passive. True: the VIP is assigned to this node; false: the VIP is assigned to the other node in the failover cluster.
SetCount	Number of times the VIP has been assigned to this node in the failover cluster
UnsetCount	Number of times the VIP has been reassigned to the other node in the failover cluster

15.3 Additional Persistency Information

The information in this section explains how to troubleshoot database persistency and backups in single-node deployments.

15.3.1 show service persistency backup

Use this command to displays information about the backups that are performed on the persistency database in single-node deployments.

```
show service persistency backup
```

Output	Description
Enabled	Whether the backup is enabled: true false
Copies	Number of copies retained in the backup directory
SourceDirectory	Location of the directory where the replication data is stored on any node
SourceAccessPermissions	Type of permissions granted for accessing the source replication data files
SourceFreeSpace	Available space in source directory
SourceTotalUsage	Total space used in the source directory
DestinationDirectory	Location of the directory to which the replication data is copied on any node
DestinationAccessPermissions	Type of permissions granted for accessing the copies of the replication data files
DestinationFreeSpace	Available space in the backup directory
DestinationTotalUsage	Total space used in the backup directory
FailedBackups	Cumulative number of backups that have failed since the backup was enabled
SuccessfulBackups	Cumulative number of successful backups since the backup was enabled
Interval	Time (minutes) between backups
AvailableBackups	Filename of each available backup

15.3.2 show service persistency persist-tables status

Use this command to show recovery information for all persisted SandScript tables.

```
SDE> show service persistency persist-tables status
```

Output	Description
Name	Name of the table row
SuccessfulSaves	Number of times the row was successfully replicated
FailedSaves	Number of times the row's replication failed
FailedDeleteRows	Number of times the replication process failed to delete the row. This happens when: <ul style="list-style-type: none">You try to delete a row that does not exist (DB_NOT_FOUND). This might happen if the SandScript has errorsThe element is a slave and the database is read only. This often happens during failover
RecoveredRows	Number of times the replication process successfully recovered the row
DeletedRows	Number of times the replication process deleted the row
FailedTransactions	Number of transactions that were aborted. This can happen during election. For example, if you write or delete something when election starts. Transactions are also aborted if the element is a slave and the database is read only. This often happens during failover
TotalCommittedTransactions	Total number of transactions that succeeded (timeout + count)

Output	Description
CommittedOnCountTransactions	Total number of transactions committed. Each transaction contains the maximum number of writes/deletions defined in the persistency "transactions-commit-count" parameter
CommittedonTimeoutTransactions	Total number of transactions committed. Each transaction expires after the time defined in the persistency "transactions-commit-timeout" parameter
PendingWrites	Number of writes/deletes still waiting for insertion into the SandScript table
RuntimeErrors	Total number of errors for each table (transaction+delete+write). The RuntimeErrors counter is the sum of any runtime errors. For example, if there are 1 FailedSaves and 1 FailedDeleteRows entries, RuntimeErrors is equal to 2
RecoveryState	Success of the table recovery (success/fail/progress)
OverflowError	Number of writes/deletes that were dropped from the queue waiting for insertion into the database
LoadTimeDurectionSec	Amount of time it took to load a specific table from the database to the SandScript table
QueueSize	Size of the write/delete queue that is waiting for insertion into the database

15.3.3 show service persistency status

Use this command to view information regarding the location and status of the persistency database.

```
SDE> show service persistency status
```

Output	Description
Corrupted	True: The database is working properly. False: The database has been corrupted.
CreationError	True: Errors occurred when persisting data. False: No errors occurred during persistency.
Active	True: Persistency snapshots are active. False: Persistency snapshots are not active
BaseDirectory	Location of persistent data used for recovery

The output should show:

```
Corrupted      : [false]
CreationError: [false]
Active         : [true]
BaseDirectory: /usr/local/sandvine/persistent_data
```

If Corrupted is "true", from CLI operational mode run this command to fix database persistency:

```
SDE> set service persistency environment-fixed true
```

15.4 Additional Troubleshooting

This section provides troubleshooting information for situations not outlined elsewhere in the chapter.

15.4.1 Restart Failure After a Power Outage

Occasionally following a power outage the SDE does not restart properly due to errors in the snmpd subsystem. If this occurs, stop snmpd by issuing these commands in order:

```
service sde stop
service snmpd stop
rm /var/lock/subsys/snmpd
```

Restart by issuing these commands in order:

```
service nfslock restart
service snmpd start
service sde start
```

15.5 Alarms

The CLI allows you to view alarms raised on the SDE.

```
sde> show alarms
sde> show alarms all
sde> show alarm history
```

If active, details include information about any variables associated with the alarm. Information that accompanied the clear notification is displayable for cleared alarms, but their indices are no longer shown in the general listing. The show alarms variant also notes the number of alarms that were not shown, because they are of a lower severity.

For example, for connection issues between the SDE and the DHCP server, this alarm information may appear:


AlarmId	Severity	EventTime	Model
59	[major]	2012-02-26 15:47:10	99
60	[major]	2012-02-26 15:47:10	99

Description

There is no connection between the SDE and the DHCP server: 2.0.0.1
There is no connection between the SDE and the DHCP server: 2008::200:1

Output	Description
AlarmId	ID for the alarm, used to identify the instance of the alarm. Numbered from 1.
Severity	Alarm severity. Can be one of: <ul style="list-style-type: none">critical - requires immediate attention.major - service is impacted.minor - service is not currently impacted, but the condition needs to be corrected.warning - notification of some event on the system.clear - a previously raised alarm has been cleared.
EventTime	Time at which the event was logged.
Model	Alarm model number.
Description	Description of the alarm.

For additional CLI commands for monitoring alarms and information regarding the alarms themselves, see the *SDE Operations Reference Guide*.

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