

# Troubleshooting SQL Server AlwaysOn

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## Quick Reference



# Troubleshooting SQL Server AlwaysOn

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**Summary:** SQL Server AlwaysOn is the latest High Availability (HADR) offering in Microsoft SQL Server. SQL Server AlwaysOn has been introduced in SQL 2012. This document is meant as a quick reference. This document has common troubleshooting information that may be have been encountered either by me or by my colleagues, with troubleshooting steps/commands that are publicly available in SQL Server Books Online (BOL) on MSDN. Rather than having this information in multiple blogs posts (there are already quite a few on the internet), I just felt a combined document may make this information more readable to a user, as a quick reference guide.

**Category:** Quick Reference

**Applies to:** SQL Server 2012, SQL Server 2014

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## Introduction

SQL Server AlwaysOn is the latest High Availability (HADR) offering in Microsoft SQL Server. SQL Server AlwaysOn has been introduced in SQL 2012. This document is meant as a quick reference. This document has common troubleshooting information that may have been encountered either by me or by my colleagues, with troubleshooting steps/commands that are publicly available in SQL Server Books Online (BOL) on MSDN. Rather than having this information in multiple blog posts (there are already quite a few on the internet), I just felt a combined document may make this information more readable to a user, as a quick reference guide. This is an evolving product, so hopefully I will also have future versions of this document. This document is for troubleshooting issues related to SQL Server AlwaysOn. For benefits, pre-requisites, and configuration, please refer below documents. Ideally the latest SQL 2012 SP/CU should be ensured after appropriate testing, since these may have fixes for known issues mentioned later in this document:

- <http://technet.microsoft.com/en-us/library/hh510230.aspx#Benefits> (Benefits)
- <http://technet.microsoft.com/en-us/library/ff878487.aspx> (Prerequisites, Restrictions, and Recommendations for AlwaysOn Availability Groups (SQL Server))
- <http://technet.microsoft.com/en-us/library/ff878265.aspx> (Creation and Configuration of Availability Groups (SQL Server))

**Tips to search** this document: Try searching on error number, or on part of error message, or on performance issue like "hang", wait type like "HADR\_SYNC\_COMMIT", or on database state like "RECOVERY\_PENDING" or "RESOLVING" (without quotes).

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## Section a - Troubleshooting Applications

- Application connectivity introduction.

Applications should use MultiSubnetFailover as indicated in <http://support.microsoft.com/kb/2792139> (Time-out error and you cannot connect to a SQL Server 2012 AlwaysOn availability group listener in a multi-subnet environment). Additional application connectivity links mentioned for reference.

<http://technet.microsoft.com/en-us/library/gg471494.aspx> (SQL Server Native Client Support for High Availability, Disaster Recovery)

<http://technet.microsoft.com/en-us/library/hh213417.aspx> (Availability Group Listeners, Client Connectivity, and Application Failover (SQL Server))

<http://technet.microsoft.com/en-us/library/gg558121.aspx> (JDBC Driver Support for High Availability, Disaster Recovery)

- Application connection string.

Connection string should use ODBC or SQL OLE DB in SNAC (application intent=readonly is optional and depends on whether read only connections are supported):

To use SQL Native Client SQL OLEDB, change your connection string to this (this one is using integrated security):  
provider=sqlncl11;data source= tcp:AGListener,1633;database=ag;integrated security=sspi;application intent=readonly;MultiSubnetFailover=True

To use .Net SQLClient:  
data source= tcp:AGListener,1633;database=ag;user=sa;password=Password2;applicationintent=readonly

Finally, to use SQL Native Client ODBC, connection string can be like below:  
driver={SQL Server Native Client 11.0};server= tcp: AGListener,1633;database=CGFData;trusted\_connection=yes;applicationintent=readonly;MultiSubnetFailover=True

- Application reconnects takes 1mins and 30 seconds, even though Failover of database takes 6 to 10 seconds.

Filter driver (like anti-virus etc.) may be causing the slowness in connection. Check if anti-virus is up to date, and if SQL files are excluded as indicated in <http://support.microsoft.com/kb/309422>.

- Application/osql using AlwaysOn database gets disconnected when executing a failover of the Availability Group.

This is expected. Application should have connection retry logic.

- Application hang after AlwaysOn group failover.

If Java based application, then Java does not have command timeout (be default, it is not limited). But .net has 30 sec default command timeout, that's why .NET has no issue. Set commandtimeout in Java.

- Application connects to primary replica every time even when the parameter Connection Intent =Read Only is specified in the connection string.

Check if Routing URL is defined for each server, and if Routing List was also not defined.

If the database part is omitted (in connection string that has AG listener), readonly routing does not work

- Intermittent timeout only for some applications. These applications are hosted on Linux/Unix.

Install SQL Server ODBC driver for Linux and check if issue reproduces with a string like "SQLCMD -SAGListenerFQDN.com -M" with appropriate credentials. This driver is available at <http://www.microsoft.com/en-us/download/details.aspx?id=28160> .

If issue does not occur with SQLCMD, then an option is to create a sample application (so that production apps are not impacted by this data capture attempt, since they can keep connecting directly to the SQL instance as currently done) on any one app server (or in different server in same subnet/datacenter) that attempts connection AGL say every 30 seconds. If this too encounters the issue, once every about 15 minutes, then we may have a repro. This too should not impact production.

If sample application too does not reproduce intermittent issue, then only other way to reproduce issue is to point application to AGL.

If we have a repro, then a simultaneous Wireshark capture can be made from application box and SQL active node so as to capture trace during issue occurrence (and noting issue time). The capture should be saved in .cap format to aid analysis. Based on this, additional traces may be required. Wireshark is third-party and runs on Windows/Linux/Unix as documented in their site <http://www.wireshark.org/faq.html#q1.1> .

- Always on Availability Group. Application is using SQL Login to access the databases. The application is not able access the database after the database is failed over to the secondary.

Security identifier (SID) of login may be different for the user in both instances. So a login with same SID (same as on primary) has to be created on secondary.

```
TSQL: SELECT name, sid FROM sys.database_principals;
```

```
TSQL: CREATE LOGIN [LLL] WITH PASSWORD='dddd', DEFAULT_DATABASE=[master],
DEFAULT_LANGUAGE=[us_english], CHECK_EXPIRATION=OFF,
CHECK_POLICY=OFF,SID=0xABC;
```

- Application encounters ODBC error after AlwaysOn group is failed over to secondary. Works fine when AlwaysOn group is on primary. [Microsoft][ODBC SQL Server Driver][SQL Server]The EXECUTE permission was denied on the object 'FN\_ADJUSTED\_DATE', database 'MyDB', schema 'dbo'.

SQL Native Client 11.x does support the new connection parameters. Older versions of SQL Native Client do NOT support ApplicationIntent parameter. Upgrade/install SQL Native client on the client application server. This will upgrade ODBC etc. components on application server.

- After fail over of Availability Group from one subnet to another, the ping command (to listener) from the remote client is not resolving to newly current active IP. DNS entry for the Listener network name shows IPs of both subnets.

If value of RegisterAllProvidersIP is set to 1 (default) for the listener on cluster nodes, then change to 0. Value change requires the cluster service to be cycled or for the listener network name (client access point, CAP) resources to be restarted. This generally occurs when CAP/listener is created using Failover Cluster Manager (FCM), rather than from SSMS (suggested).

Powershell:

```
Import-Module FailoverClusters
Get-ClusterResource yourListenerName|Set-ClusterParameter
RegisterAllProvidersIP 0
```

Cluster.exe:

```
cluster /cluster:<ClusterName> res <NetworkNameResource> /priv
RegisterAllProvidersIP=0
```

- HostRecordTTL is set to 60, RegisterAllProvidersIP is set to 0, but ping to listener is still returning wrong IP (after Availability Group failover to different subnet) for over a minute.

From client/application system, open administrator command prompt and try "ipconfig /flushdns".

## Section b - Troubleshooting Network

- Error – “TCP Provider, error: 0 - An operation on a socket could not be performed because the system lacked sufficient buffer space or because a queue was full”.

NetStat output may show hundreds of entries in TIME\_WAIT state leading to buffer/port exhaustion

Add registry setting for **MaxUserPort** <http://support.microsoft.com/kb/196271>

Add registry setting for TCPTIMEWAITDELAY.

App/IIS restart, machine reboot are additional options.

## Section c - Troubleshooting Performance

- Frequently Asked Questions (FAQs).

Please refer 'AlwaysOn Availability Groups - FAQ Part 1 and Part 2' site links mentioned below, since they have a lot of good questions. Please note this is a third party site and not an MS site. As indicated in the links, these are questions and answers when discussing with an MS Program Manager of AlwaysOn.

<http://communities.quest.com/community/data-protection/blog/2012/08/23/alwayson-availability-groups--common-questions-faq>

<http://communities.quest.com/community/data-protection/blog/2012/11/21/alwayson-availability-groups--faq-part-2>

- Want to increase number of SQL's default health monitor files. This is useful for maintaining history, especially where multiple failovers may be involved.

```
-- Below to change size/number of default system_health sessions
(\LOG\system_health_*.xel). -- Applicable for all systems, including
standalone.
-- Does not require session to be stopped.
ALTER EVENT SESSION [system_health] ON SERVER DROP TARGET package0.event_file
ALTER EVENT SESSION [system_health] ON SERVER ADD TARGET
package0.event_file (SET
filename=N'system_health.xel',max_file_size=(5),max_rollover_files=(4))

-- Below to change size/number of default AlwaysOn session
(\LOG\AlwaysOn_health_*.xel).
-- Application for system that have SQL availability groups.
-- Does not require session to be stopped.
ALTER EVENT SESSION [AlwaysOn_health] ON SERVER DROP TARGET
package0.event_file;
ALTER EVENT SESSION [AlwaysOn_health] ON SERVER ADD TARGET
package0.event_file (SET
filename=N'AlwaysOn_health.xel',max_file_size=(5),max_rollover_files=(4));

-- Below to change size/number of default FCI logs (\LOG\*_SQLDIAG_*.xel).
-- Applicable only for SQL FCI (Failover Cluster Instance).
ALTER SERVER CONFIGURATION SET DIAGNOSTICS LOG MAX_SIZE = 10 MB;
ALTER SERVER CONFIGURATION SET DIAGNOSTICS LOG MAX_FILES = DEFAULT;

-- Below to change number of ERRORLOG files.
-- Applicable for all systems.
-- SSMS > Management > right click SQL Server Logs > Configure > Check box
"Limit the number of error log files before they are recycled" > increase the
number from 6 to 99, or to an appropriate number.
```

- Disks are not detected if there is only one node at the secondary site.

This is a limitation of Windows 2008 R2 cluster. This issue does not occur in Windows 2012. PowerShell can be used in Windows 2008 R2 to add the disk and it will work. Will need to modify the Possible Owners for the resource, as by default it will have all nodes checked.

```
Add-ClusterResource -Group "Available Storage" - Cluster "myclustername" -  
Name "diskname" -ResourceType "Physical Disk"  
Get-ClusterResource "diskname" -Cluster "myclustername" | set-  
clusterparameter DiskPath "F:"  
# In above, F: is the drive letter assigned in disk management for the disk.
```

- Slow synchronization. Waittime for HADR\_SYNC\_COMMIT grows anywhere from 500ms to 900ms (compared to less than 15-20 ms).

If KB2723814 not applied, then try the KB workaround of suspend secondary replica and then resume, so that AlwaysOn knows that availability mode has changed back to synchronous commit.

- SQL Server Agent Jobs do not automatically failover, when participating in AlwaysOn.

This is by design. Suggestion is to create the job at both Primary and Secondary and enable them. Include logic in job step that checks the role\_desc in sys.dm\_hadr\_availability\_replica\_states of the database. If role\_desc is primary then execute the job, and if role\_desc is secondary then exit the job.

```
TSQL: select role_desc from sys.dm_hadr_availability_replica_states where  
is_local=1 and role=1;
```

- Reason why the secondary replica becomes unavailable when SQL Server service is stopped on primary node.

OR AlwaysOn failback is not working.

This is as expected. Increment "the maximum number of failures during this period" count. Its default value on n node cluster is n-1.

The secondary connects to the Primary and not the other way around. If secondary is trying to connect to the primary, and primary is down, the state will be RESOLVING. For example, if the SAN was taken offline that hosted the AlwaysOn database on the primary, the secondary was no longer able to connect to that database, so was not synchronized and could not come online. This is an expected behavior (By Design).

- Primary replica database becoming unresponsive

While checking root cause, ensure latest SQL/Windows fixes and can set the following on availability groups so they are not adversely effected by any non-yielding events temporarily.

Set the availability group FAILURE\_CONDITION\_LEVEL to 1 which will reduce the SQL Server symptoms that can result in health detection failure alert.

To specifically address the lease timeout, increase the availability group HEALTH\_CHECK\_TIMEOUT setting from default 30 seconds to a higher setting (e.g. 90 seconds). The signal interval for the lease is 1/3 the HEALTH\_CHECK\_TIMEOUT, so a 10 sec gap can result in lease expiration.

- Questions on secondary replicas. The function sys.fn\_hadr\_backup\_is\_preferred\_replica returns 0 no matter what the backup preference is set to.

Check if @@SERVERNAME returns correct value on that server.

```
TSQL: SELECT @@SERVERNAME;
```

- Linked server configuration with AlwaysOn listener.

```
TSQL: EXEC master.dbo.sp_addlinkedserver @server = N'MYLISTENER',  
@srvproduct=N'SQL2012', @provider=N'SQLNCLI11', @datasrc=N'MYLISTENER',  
@provstr=N'Provider=SQLNCLI11.1; Data  
Source=myListener;ApplicationIntent=READONLY', @catalog=N'DB1'
```

As in the previous version in order to use the SQL Server Native Client (11.x) in SQL Server 2012, Feature Pack 2012 must be installed. Microsoft® SQL Server® 2012 Feature Pack is available at <http://www.microsoft.com/en-us/download/details.aspx?id=29065>.

SQL Native Client (SNAC) can also be installed on application server by running SQL Setup and installing 'Client Tools Connectivity.' Client Tools includes components for communication between clients and servers, including network libraries for DB-Library, OLEDB for OLAP, ODBC, ADODB, and ADOMD+.

To verify, SQL Native Client DLL is available  
"C:\Windows\System32\sqlncli11.dll"

- SQL ERRORLOG indicates stack dump with expression "pcbActualData <= cbRemainingBuffer".

```
***Stack Dump being sent to E:\MSSQL11.MSSQLSERVER\MSSQL\LOG\SQLDump0007.txt  
* BEGIN STACK DUMP:  
* Location: HadrAvailabilityGroupReplica.cpp:943  
* Expression:      *pcbActualData <= cbRemainingBuffer
```

Check if memory messages in SQL ERRORLOG which indicates possible memory pressure. If such messages exist, then ensure sp\_configure 'max server memory' is set. Point to note is that CLR is part of SQL buffer pool memory in SQL 2012. If you're using CLR, it should be accommodated within Max Server Memory. If memory messages present and if LogPool memory appears to be high, are the replicas connected through a fast network? Also, it is possible that it is so heavily transactional that the number of log records generated is high and with the amount of databases it pushes this memory above the roof. As such, you may want to consider increasing the memory/RAM on the box.

- FAIL\_PAGE\_ALLOCATION 1 in SQL ERRORLOG when using AlwaysOn Functionality.

Check the max and min server memory correctly.

```
TSQL: EXEC sp_configure 'max server memory';
```

- Slow commit performance problem for replica in synchronous commit mode.

Check perfmon counters 'Replica:Transaction Delay counter', 'Replica:Log Send Queue'.

- High HADR\_WORK\_QUEUE wait.

This wait indicates AlwaysOn Availability Groups background worker thread waiting for new work to be assigned. This is an expected wait when there are ready workers waiting for new work, which is the normal state.

- High HADR\_LOGCAPTURE\_WAIT wait.

Check perfmon counters average log bytes flushed / sec, log bytes received /sec. If log bytes received /sec is much higher, then this may indicate that the log scan could be a bottleneck.

## Section d - Patching/updates

- Availability Group(s) with replicas on standalone instances.

Patching steps:

1. Patch the secondary replica (B)
2. Bring the secondary replica online (will be new version)
3. Log the original synchronization configurations for each replica. Change the secondary replica and primary replica to "Synchronous Commit" mode, waiting for the secondary replica (B) to be "synchronized."
  - a. This will ensure there is no data loss during failover.
  - b. You can check dashboard or dmvt: dm\_hadr\_database\_replica\_states for the status.
4. Issue a failover through SSMS or T-SQL to failover the AG to the secondary replica. So now the new primary is B, the new secondary is A.
5. Patch the original primary replica (A)
6. Bring the original primary replica (A) online (will be new version )
7. Wait for A to become "Synchronized"
8. Failover the AG back to A
9. Change each replica's synchronization mode to the original configurations you logged in step3.

Caveat list:

1. Before patching, can still keep automatic/manual failover setting with no change. Just a reminder: if during patching time, primary is down, automatic failover may fail even if the secondary hasn't completed the patching.
2. If primary and secondary replicas are in multi-subnet, clients may experience a little bit longer time of disconnection or timeout during failover.
3. Please do remember to switch back to original synchronization mode.

- Availability Group(s) with replica(s) on FCIs (Failover Cluster Instances).

Example environment:

- o Primary replica (A): FCI1 - Node1 is active, Node2 is passive.
- o Secondary replica (B): FCI2 - Node3 is active, Node4 is passive.

Choose between one of the following two options.

Longer downtime, less steps (FCI rolling patching). Patching steps (basic):

1. Patch Node4
2. Move FCI2 from Node3 to Node4
3. Patch Node3
4. Move FCI2 from Node4 to Node3
5. Patch Node2
6. Move FCI1 from Node1 to Node2
7. Patch Node1
8. Move FCI1 from Node2 to Node1

Optimized downtime, more steps (Leverage AG failover patching). Patching steps (optimized):

1. Patch Node4

2. Move FCI2 from Node3 to Node4
3. Patch Node3
4. Move FCI2 from Node4 to Node3
5. Log the original synchronization configurations for each replica. Change the secondary replica and primary replica to "Synchronous Commit" mode, waiting for the secondary replica (B) to be "synchronized".
6. Manually failover AG from FCI1 to FCI2 (now the new primary is on FCI2, the new secondary is on FCI1)
7. Patch Node2
8. Move FCI1 from Node1 to Node2
9. Patch Node1
10. Move FCI1 from Node2 to Node1
11. Manually failover AG from FCI2 back to FCI1
12. Change each replica's synchronization mode to the original configurations you logged in step #5.

Caveat list:

1. \*\* Please use basic patching steps if primary and secondary are on different data centers/subnets \*\*
2. FCI rolling patch guarantees zero data lost
3. Use synchronous commit secondary on a high latency network would impact OLTP performance
4. AG failover cross subnets might cause up to 20 seconds delay on client first connections.

## Section e - Hotfixes

- AlwaysOn hotfixes in SQL 2012 - PCUs / CUs (includes latest release cycle of service pack and cumulative updates).

These hotfixes may be directly related to AlwaysOn, and/or may be related to the working of a SQL instance using AlwaysOn.

Fix / KB article	Update	Build (11.00.n)	Release date	Remarks/KB
SQL Server 2012 RTM	RTM	2100		
FIX: Error code 20598 when a failover operation occurs during synchronization on a SQL Server 2012 AlwaysOn failover cluster instance	RTM CU1	2316	2012 Feb	
FIX: Secondary databases in a secondary replica may be in an "unknown" state if you join the secondary replica into availability groups two times in SQL Server 2012	RTM CU1			
FIX: Error 41009 when you try to create multiple availability groups in a SQL Server 2012 AlwaysOn failover clustering environment	RTM CU2	2325	2012 Apr	KB 2711145
FIX: Availability group failover takes a long time if a database in the availability group contains a FileTable in SQL Server 2012	SP1	3000	2012 Nov	
FIX: New Availability Group Wizard-generated scripts skip the steps for joining a secondary database to an availability group in SQL Server 2012	SP1			
You experience slow synchronization between primary and secondary replicas in SQL Server 2012	SP1			KB 2723814
FIX: Access violation in the sqlservr!ReplicaToPrimaryPageCopier::ReadIoCompletionRoutine function in SQL Server 2008 R2 or in SQL Server 2012	SP1 CU1	3321	2012 Oct	
SQL Server 2012 experiences out-of-memory errors	SP1 CU2	3339	2012 Dec	
Description of new features in SQL Server 2012 and SQL Server 2008 R2 SP2	SP1 CU2			KB 2792921. Expands the supported features of SQL Server Sysprep. Not directly related to AlwaysOn.
Improved Metadata Discovery process performance in SQL Server Native Client for SQL Server 2012	SP1 CU3	3349	2013 Feb	KB 2772525. Performance improvement in sp_describe_first_result_set.
FIX: Poor performance in SQL Server 2012 when you	SP1			KB 2803529. Memory

run a SQL Server trace	CU3			consumption by SQL trace (sp_TraceGetdata).
FIX: High "log write waits" counter value on a SQL Server 2012 node	SP1 CU3			
SQL Server 2012 performance issues in NUMA environments	SP1 CU3			KB 2819662. NUMA memory enhancement.
FIX: Out-of-memory errors related to a memory clerk in SQL Server 2012	SP1 CU4	3368	2013 Mar	
An update is available for SQL Server 2012 Memory Management	SP1 CU4			KB 2845380 - "We recommend that you install this hotfix as soon as possible".
FIX: Scheduler deadlock on AlwaysOn Availability Group primary replica in SQL Server 2012	SP1 CU5	3373	2013 Aug	KB 2869734.
FIX: Error 14420 when you enable Log Shipping on databases that are in an AlwaysOn availability group in SQL Server 2012	SP1 CU6	3381	2013 Sep	KB 2872854.
FIX: A memory leak occurs when you enable AlwaysOn Availability Groups or SQL Server failover cluster in Microsoft SQL Server 2012				KB 2877100.
FIX: "RESTORE DATABASE is terminating abnormally" error when you restore the secondary database in SQL Server 2012				KB 2884126.

- Related SQL Server, Operating System (OS) and additional fixes.

Fix / KB article	Eligibility	Release date	Remarks / KB
A hotfix is available to let you configure a cluster node that does not have quorum votes in Windows Server 2008 and in Windows Server 2008 R2	OS 2008/R2 RTM/SP1+		KB 2494036, OS fix
SQL Server 2012 service crashes when a replica SQL Server 2012 instance goes offline on a Windows Server 2008 R2-based failover cluster	OS 2008 R2 SP1+		OS fix
An update introduces support for the AlwaysOn features from SQL Server 2012 to the .NET Framework 3.5 SP1	.NET 3.5 SP1	2012 Jan	2654347
A hotfix that improves the performance of the "AlwaysOn Availability Group" feature in SQL Server 2012 is available for Windows Server 2008 R2	OS 2008 R2 SP1+	2012 Mar	KB 2687741, OS fix
A transient communication failure	OS 2008 R2 RTM/SP1+		KB 2550886

causes a Windows Server 2008 R2 failover cluster to stop working			
Cluster node cannot rejoin the cluster after the node is restarted or removed from the cluster in Windows Server 2008 R2	OS 2008 R2 RTM/SP1+		KB 2549472
Cluster service still uses the default time-out value after you configure the regroup time-out setting in Windows Server 2008 R2	OS 2008 R2 RTM/SP1+		KB 2549448
A Windows Server 2008 R2 failover cluster loses quorum when an asymmetric communication failure occurs	OS 2008 R2 SP1+		KB 2552040
Time-out error and you cannot connect to a SQL Server 2012 AlwaysOn availability group listener in a multi-subnet environment (also has link to Sharepoint 2010 fix to add support for MultiSubnetFailover)	SQL 2012		KB 2792139, workaround
Connection times out when you use AlwaysOn availability group listener with MultiSubnetFailover parameter	SQL 2012		KB 2855417, workaround
Cluster service leaks memory when the service handles state change notifications in Windows Server 2008 R2 or Windows Server 2008	OS 2008 SP2, 2008 R2 RTM/SP1		KB 2550894
Hotfix to add support for asymmetric storages to the Failover Cluster Management MMC snap-in for a failover cluster that is running Windows Server 2008 or Windows Server 2008 R2	OS 2008/2008R2 RTM		KB 976097
Windows Installer starts repeatedly after you install SQL Server 2012 SP1	SQL2012 SP1		KB 2793634, CU2
Can't access VNN FILESTREAM share when you use the FILESTREAM and FileTable features on a Windows Server 2012-based failover cluster	OS 2012		KB 2835620
SQL Server 2012 service shuts down unexpectedly upon availability group replica role transition on a Windows Server 2008 R2-based failover cluster	OS 2008 R2 SP1		KB 2777201

- Pre-requisite fixes.

Pre-required fixes are indicated in <http://technet.microsoft.com/en-us/library/ff878487.aspx> (Prerequisites, Restrictions, and Recommendations for AlwaysOn Availability Groups (SQL Server)). All fixes should be installed on all cluster nodes (or at least on nodes that will have Availability Group failover).

## Section f - Reference documents for working of AlwaysOn

- Applications and AlwaysOn

Prerequisites, Restrictions, and Recommendations for AlwaysOn Client **Connectivity** (SQL Server)

<http://technet.microsoft.com/en-us/library/hh510238.aspx>

Configure a Server to Listen on a Specific TCP Port (SQL Server Configuration Manager)

<http://msdn.microsoft.com/en-us/library/ms177440.aspx>

The Database Mirroring (and AlwaysOn Availability Group) Endpoint

<http://msdn.microsoft.com/en-us/library/ms179511.aspx>

sqljdbc DriverManager.getConnection Hangs after mirror failover (infinite timeout scenario)

<http://social.msdn.microsoft.com/Forums/sqlserver/en-US/5137ab7b-ced5-4365-8020-5cb821b5a3bc/sqljdbc-drivermanagergetconnection-hangs-after-mirror-failover>

DB Failover causes application hang using JDBC

<http://social.msdn.microsoft.com/Forums/sqlserver/en-US/03be11ee-653e-48f3-aa78-a312a8b5335f/db-failover-causes-application-hang-using-jdbc>

SqlClient Support for High Availability, Disaster Recovery

<http://msdn.microsoft.com/en-us/library/hh205662.aspx>

SQL Server Native Client Support

[http://msdn.microsoft.com/en-us/library/gg471494\(v=sql.110\).aspx](http://msdn.microsoft.com/en-us/library/gg471494(v=sql.110).aspx)

An update introduces support for the AlwaysOn features from SQL Server 2012 to the .NET Framework 3.5 SP1 (needs to be installed on each Reporting Services report server)

<http://support.microsoft.com/kb/2654347>

Network port (and firewall) requirements for **Windows**

<http://support.microsoft.com/kb/832017/en-us>

Configure a Windows Firewall for Database Engine Access

<http://msdn.microsoft.com/en-us/library/ms175043.aspx>

Configure and manage SQL Server availability groups for SharePoint Server (Support for SQL 2012 AlwaysOn with SharePoint Foundation 2010 ) (Readable secondaries not supported)

[http://technet.microsoft.com/en-us/library/hh913923\(v=office.14\).aspx](http://technet.microsoft.com/en-us/library/hh913923(v=office.14).aspx)

- Availability Group listener in SQL 2012

Limitations, using SQL Server Management Studio for listener, CNO permissions/maximum, prestaging

<http://msdn.microsoft.com/en-us/library/hh213080.aspx>

Troubleshooting listener creation

<http://support.microsoft.com/kb/2829783>

- Availability Groups in SQL 2012

Script for SQL Agent job alert.

Script basically throws exceptions in case of errors so does not check for "Not Synchronizing" state etc. Scripts monitors single Availability Group and should be run on primary replica.

<http://blogs.msdn.com/b/sqlalwayson/archive/2012/02/15/monitoring-alwayson-health-with-powershell-part-3.aspx>

<http://blogs.msdn.com/b/sqlalwayson/archive/2012/02/15/the-always-on-health-model-part-4.aspx>

<http://gallery.technet.microsoft.com/scriptcenter/AlwaysOn-Availability-23bc88b5> (monitorag.ps1)

Includes steps after creation (sections 'Creating and Configuring a New Availability Group', 'Managing Availability Groups, Replicas, and Databases', '**Monitoring** Availability Groups').

<http://technet.microsoft.com/en-us/library/gg509118.aspx>

GUI steps for custom dashboard conditions

<http://blogs.msdn.com/b/sqlalwayson/archive/2012/02/13/extending-the-alwayson-health-model.aspx>

<http://technet.microsoft.com/en-us/library/hh510235.aspx> (includes predefined policies, policies in Server facet).

Monitoring of Availability Groups (SQL Server)

<http://msdn.microsoft.com/en-us/library/ff877954>

**Overview**, planning

<http://download.microsoft.com/download/D/2/0/D20E1C5F-72EA-4505-9F26->

[FF9550EFD44/Microsoft%20SQL%20Server%20AlwaysOn%20Solutions%20Guide%20for%20High%20Availability%20and%20Disaster%20Recovery.docx](http://download.microsoft.com/download/D/2/0/D20E1C5F-72EA-4505-9F26-FF9550EFD44/Microsoft%20SQL%20Server%20AlwaysOn%20Solutions%20Guide%20for%20High%20Availability%20and%20Disaster%20Recovery.docx)

Who is using AlwaysOn

<http://blogs.msdn.com/b/sqlalwayson/archive/2012/01/10/who-is-using-alwayson.aspx>

AlwaysOn FAQ, capabilities for SQL Server 2012

<http://msdn.microsoft.com/en-us/sqlserver/gg508768>

Prerequisites, Restrictions, and Recommendations for AlwaysOn Availability Groups (SQL Server)

Includes hardware, NIC (network adapter) recommendations, HostRecordTTL, same/different network link, client connectivity

, maximum limits, FCI/database requirements, file path, TDE protected databases

, thread usage.

<http://technet.microsoft.com/en-us/library/edbab896-42bb-4d17-8d75-e92ca11f7abb>

<http://blogs.msdn.com/b/saponsqlserver/archive/2012/02/07/sql-server-2012-alwayson-what-is-it.aspx>

<http://blogs.msdn.com/b/saponsqlserver/archive/2012/02/19/sql-server-2012-alwayson-part-2-quorum-detection.aspx>

<http://blogs.msdn.com/b/saponsqlserver/archive/2012/02/20/sql-server-2012-alwayson-part-3-sap-configuration-with-two-secondary-replicas.aspx>

<http://blogs.msdn.com/b/saponsqlserver/archive/2012/02/29/sql-server-2012-alwayson-part-4-sap-configuration-in-geo-cluster-configuration.aspx>

<http://blogs.msdn.com/b/saponsqlserver/archive/2012/03/29/sql-server-2012-alwayson-part-5-preparing-to-build-an-alwayson-availability-group.aspx>

<http://blogs.msdn.com/b/saponsqlserver/archive/2012/03/29/sql-server-2012-alwayson-part-6-building-an-alwayson-availability-group.aspx>

**behind the scenes and into the details of what does happen** when creating an Availability Group

<http://blogs.msdn.com/b/saponsqlserver/archive/2012/04/24/sql-server-2012-alwayson-part-7-details-behind-an-alwayson-availability-group.aspx>

<http://blogs.msdn.com/b/saponsqlserver/archive/2012/07/10/sql-server-2012-alwayson-part-8-failover-mechanism-with-sap-netweaver.aspx>

<http://blogs.msdn.com/b/saponsqlserver/archive/2013/01/24/alwayson-part10-alwayson-and-logshipping.aspx>

(part 9)

<http://blogs.msdn.com/b/saponsqlserver/archive/2013/01/25/alwayson-part-10-switching-scheduled-tasks-automatically.aspx>

<http://blogs.msdn.com/b/saponsqlserver/archive/2013/04/21/sql-server-2012-alwayson-part-11-performance-aspects-and-performance-monitoring-i.aspx>

<http://blogs.msdn.com/b/saponsqlserver/archive/2013/04/24/sql-server-2012-alwayson-part-12-performance-aspects-and-performance-monitoring-ii.aspx>

AlwaysOn: Minimizing blocking of REDO thread when running reporting workload on Secondary Replica

<http://blogs.msdn.com/b/sqlserverstorageengine/archive/2011/12/22/alwayson-minimizing-blocking-of-redo-thread-when-running-reporting-workload-on-secondary-replica.aspx>

AlwaysOn: Impact of mapping reporting workload on Readable Secondary to Snapshot Isolation

<http://blogs.msdn.com/b/sqlserverstorageengine/archive/2011/12/22/alwayson-impact-of-mapping-reporting-workload-to-snapshot-isolation-on-readable-secondary.aspx>

AlwaysOn: Readable Secondary and data latency

<http://blogs.msdn.com/b/sqlserverstorageengine/archive/2011/12/22/alwayson.aspx>

AlwaysOn: I just enabled Readable Secondary but my query is blocked?

<http://blogs.msdn.com/b/sqlserverstorageengine/archive/2011/12/22/alwayson-i-just-enabled-readable-secondary-but-my-query-is-blocked.aspx>

Active Secondaries: Backup on Secondary Replicas (supported and not supported options)

<http://msdn.microsoft.com/en-us/library/hh245119>

Configure Read-Only Routing

<http://msdn.microsoft.com/en-us/library/hh710054.aspx>

Select Initial Data Synchronization Page

<http://technet.microsoft.com/en-us/library/hh231021>

Enable and Disable AlwaysOn Availability Groups

<http://msdn.microsoft.com/en-us/library/ff878259.aspx>

ALTER AVAILABILITY GROUP

<http://msdn.microsoft.com/en-us/library/ff878601.aspx>

**Features** Supported by the Editions of SQL Server 2012

[http://msdn.microsoft.com/en-us/library/cc645993.aspx#High\\_availability](http://msdn.microsoft.com/en-us/library/cc645993.aspx#High_availability)

DNS settings in a **multi-site** failover cluster

[http://technet.microsoft.com/en-us/library/dd197562\(W.S.10\).aspx](http://technet.microsoft.com/en-us/library/dd197562(W.S.10).aspx)

Includes multi-site/subnet FCI for AlwaysOn

[http://download.microsoft.com/download/D/2/0/D20E1C5F-72EA-4505-9F26-FEF9550EFD44/SQLServer2012\\_MultisiteFailoverCluster%20\(2\).docx](http://download.microsoft.com/download/D/2/0/D20E1C5F-72EA-4505-9F26-FEF9550EFD44/SQLServer2012_MultisiteFailoverCluster%20(2).docx)

Requirements and Recommendations for a Multi-Site (multi-subnet) Failover Cluster

[http://technet.microsoft.com/en-us/library/dd197575\(W.S.10\).aspx](http://technet.microsoft.com/en-us/library/dd197575(W.S.10).aspx)

Failover Clustering and AlwaysOn Availability Groups (SQL Server)

<http://msdn.microsoft.com/en-us/library/ff929171.aspx>

Failover Clustering in Windows Server 2008 R2

<http://download.microsoft.com/download/5/B/D/5BD5C253-4259-428B-A3E4-1F9C3D803074/WS08%20R2%20Failover%20Clustering%20White%20PaperTDM.docx>

Requirements and Recommendations for a Multi-Site Failover Cluster (Windows 2008)

[http://technet.microsoft.com/en-us/library/dd197575\(v=ws.10\).aspx](http://technet.microsoft.com/en-us/library/dd197575(v=ws.10).aspx)

Configuring IP Addresses and Dependencies for Multi-Subnet Clusters

<http://blogs.msdn.com/b/clustering/archive/2011/01/05/10112055.aspx>

<http://blogs.msdn.com/b/clustering/archive/2011/01/19/10117423.aspx>

<http://blogs.msdn.com/b/clustering/archive/2011/08/31/10204142.aspx>

sqlcmd Utility (-M multisubnet\_failover)

<http://msdn.microsoft.com/en-us/library/ms162773.aspx>

SQL Server Multi-Subnet Clustering (SQL Server)

<http://msdn.microsoft.com/en-us/library/ff878716.aspx>

Time-out error and you cannot connect to a SQL Server 2012 AlwaysOn availability group listener in a multi-subnet environment (also mentions Sharepoint 2010 CU)

<http://support.microsoft.com/kb/2792139>

Worker pool usage

<http://blogs.msdn.com/b/psssql/archive/2012/05/17/alwayson-hadron-learning-series-worker-pool-usage-for-hadron-enabled-databases.aspx>

HADR\_SYNC\_COMMIT

<http://support.microsoft.com/kb/2723814>

"When the session queries the sys.dm\_exec\_requests dynamic management view, the session performs DML against the availability databases. In this state, the prevalent reported waittype is HADR\_SYNC\_COMMIT."

Use the AlwaysOn Dashboard

<http://msdn.microsoft.com/en-us/library/hh213474.aspx>

Availability group is offline

<http://msdn.microsoft.com/en-us/library/hh230829.aspx>

sys.dm\_os\_wait\_stats (Transact-SQL) (HADR waits)

<http://msdn.microsoft.com/en-us/library/ms179984.aspx>

**Windows** Server Catalog (for checking certified configuration especially with respect to virtualization or virtual machines)

<http://www.windowsservercatalog.com/>

Recommended Windows Hotfix for Database Availability Groups running Windows Server 2008 R2

<http://blogs.technet.com/b/exchange/archive/2011/11/20/recommended-windows-hotfix-for-database-availability-groups-running-windows-server-2008-r2.aspx>

Concurrent ADD NODE operation yields unexpected results in a SQL Server Failover **Cluster** Instance

<http://blogs.msdn.com/b/sqlalwayson/archive/2012/03/30/concurrent-add-node-operation-yields-unexpected-results-in-a-sql-server-failover-cluster-instance.aspx>

DO NOT use Windows Failover Cluster Manager to perform Availability Group Failover

<http://blogs.msdn.com/b/sqlalwayson/archive/2012/03/30/do-not-use-windows-failover-cluster-manager-to-perform-availability-group-failover.aspx>

Asymmetric storage, Quorum voting, changing quorum model, Read-Write and Read-only workloads, 'Recovering from a Disaster'

[http://download.microsoft.com/download/D/2/0/D20E1C5F-72EA-4505-9F26-FEF9550EFD44/Building\\_a\\_HA\\_and\\_DR\\_Solution\\_using\\_AlwaysON\\_SQL\\_FCIs\\_and\\_AGs%20v1.docx](http://download.microsoft.com/download/D/2/0/D20E1C5F-72EA-4505-9F26-FEF9550EFD44/Building_a_HA_and_DR_Solution_using_AlwaysON_SQL_FCIs_and_AGs%20v1.docx)

How DNS registration happens with network name resource.

<http://blogs.msdn.com/b/clustering/archive/2009/07/17/9836756.aspx>

Understanding Requirements for Failover Clusters

<http://technet.microsoft.com/en-us/library/cc771404.aspx>

Steps for prestaging the cluster name account

[http://technet.microsoft.com/en-us/library/cc731002\(v=ws.10\).aspx#BKMK\\_steps\\_prestaging](http://technet.microsoft.com/en-us/library/cc731002(v=ws.10).aspx#BKMK_steps_prestaging)

Failover Cluster Step-by-Step Guide: Configuring the Quorum in a Failover Cluster (Windows 2008/2008R2)

[http://technet.microsoft.com/en-us/library/cc770620\(v=ws.10\).aspx](http://technet.microsoft.com/en-us/library/cc770620(v=ws.10).aspx)

Windows Server Failover Clustering (WSFC) with SQL Server

<http://msdn.microsoft.com/en-us/library/hh270278.aspx>

Understanding Quorum Configurations in a Failover Cluster

<http://technet.microsoft.com/en-us/library/cc731739.aspx>

Configure Heartbeat and DNS Settings in a Multi-Site Failover Cluster

<http://technet.microsoft.com/en-us/library/dd197562%28WS.10%29.aspx>

Modifying the Settings for a Clustered Service or Application (The default value for the maximum number of failures is n-1, where n is the number of nodes)

<http://technet.microsoft.com/en-us/library/cc755151.aspx>

Windows cluster

<http://blogs.msdn.com/b/psssql/archive/2011/04/26/alwayson-hadron-learning-series-maximum-failovers-within-specified-period.aspx>

Steps for troubleshooting problems caused by changes in cluster-related Active Directory accounts

[http://technet.microsoft.com/en-us/library/cc731002\(v=WS.10\).aspx](http://technet.microsoft.com/en-us/library/cc731002(v=WS.10).aspx)

<http://blogs.msdn.com/b/psssql/archive/2013/09/30/error-during-installation-of-an-sql-server-failover-cluster-instance.aspx>

**Automatic Failover** of an Availability Group

<http://msdn.microsoft.com/en-us/library/hh710061.aspx>

AlwaysON - HADRON Learning Series: Automated Failover Behaviors (Denali - Logging History Information, FCI and Default Health Capture, sp\_server\_diagnostics)

<http://blogs.msdn.com/b/psssql/archive/2012/03/22/alwayson-hadron-learning-series-automated-failover-behaviors-denali-logging-history-information-fci-and-default-health-capture-sp-server-diagnostics.aspx>

Availability Modes

<http://msdn.microsoft.com/en-us/library/ff877931.aspx>

Replication, Change Tracking, Change Data Capture, and AlwaysOn Availability Groups (SQL Server)

<http://msdn.microsoft.com/en-us/library/hh403414.aspx>

Troubleshooting automatic failover problems in SQL Server 2012 AlwaysOn environments

<http://support.microsoft.com/kb/2833707>

- AlwaysOn in SQL 2014

What's New (Database Engine) (section 'AlwaysOn enhancements')

[http://msdn.microsoft.com/en-us/library/bb510411\(v=sql.120\).aspx](http://msdn.microsoft.com/en-us/library/bb510411(v=sql.120).aspx)

- Powershell and AlwaysOn

Powershell optimization "-NoRefresh"

SMO optimizations with SetDefaultInitFields.

<http://blogs.msdn.com/b/sqlalwayson/archive/2012/02/13/monitoring-alwayson-health-with-powershell-part-2.aspx>

<http://blogs.msdn.com/b/mwories/archive/2005/04/22/smoperf1.aspx>

<http://blogs.msdn.com/b/mwories/archive/2005/04/22/smoperf2.aspx>

View health policy (similar to dashboard information) through Powershell.

<http://blogs.msdn.com/b/sqlalwayson/archive/2012/02/13/monitoring-alwayson-health-with-powershell-part-1.aspx>

<http://blogs.msdn.com/b/sqlalwayson/archive/2012/02/13/monitoring-alwayson-health-with-powershell-part-2.aspx>

AvailabilityGroup Class

<http://msdn.microsoft.com/en-us/library/microsoft.sqlserver.management.smo.availabilitygroup>

- Windows Azure (IaaS) and AlwaysOn

GUI steps for AlwaysOn on Windows Azure (IaaS)

Powershell steps at MSDN links.

Blog has details about OS 2012 fix (KB 2854082) to enable Azure listeners, about listener mapped to public VIP of cloud service, about load balancing options in Windows Azure.

<http://blogs.msdn.com/b/sqlalwayson/archive/2013/01/23/test-lab-create-an-alwayson-availability-group-in-windows-azure-end-to-end.aspx>

<http://msdn.microsoft.com/en-us/library/jj870963.aspx>

<http://msdn.microsoft.com/en-us/library/dn376546.aspx>

<http://blogs.msdn.com/b/igorpag/archive/2013/09/02/sql-server-2012-alwayson-availability-group-and-listener-in-azure-vm-notes-details-and-recommendations.aspx>

<http://gallery.technet.microsoft.com/scriptcenter/Create-Availability-Group-fff94cd5> (not tested).

<http://blogs.msdn.com/b/sqlalwayson/archive/2013/08/06/availability-group-listener-in-windows-azure-now-supported-and-scripts-for-cloud-only-configuration.aspx> (similar to the MSDN link steps).

Tutorial: AlwaysOn Availability Groups in Windows Azure

<http://msdn.microsoft.com/en-us/library/jj870963.aspx>

<http://blogs.msdn.com/b/sqlalwayson/archive/2013/01/23/test-lab-create-an-alwayson-availability-group-in-windows-azure-end-to-end.aspx>

<http://social.technet.microsoft.com/wiki/contents/articles/14776-how-to-configure-windows-failover-cluster-in-windows-azure-for-alwayson-availability-groups.aspx>

<http://blogs.msdn.com/b/sqlalwayson/archive/2012/12/03/wsfc-cluster-configuration-on-windows-azure-virtual-machines.aspx>

<http://sqlcat.com/sqlcat/b/whitepapers/archive/2013/05/31/performance-guidance-for-sql-server-in-windows-azure-virtual-machines.aspx>

Data Series: SQL Server in Windows Azure Virtual Machine vs. SQL Database

<http://blogs.msdn.com/b/windowsazure/archive/2012/06/26/data-series-sql-server-in-windows-azure-virtual-machine-vs-sql-database.aspx>

<http://msdn.microsoft.com/library/windowsazure/dn133151.aspx>

<http://www.windowsazure.com/en-us/manage/windows/common-tasks/install-sql-server/>

- Related links

Although a SQL database mirroring article, it has downtime scenarios including Recovery point objectives (RPOs) and recovery time objectives (RTOs).

Sections include "Database Storage Protection: SAN and RAID", "Web Server Protection: NLB Clustering", "Data Center Selection", "Data Center Infrastructure" etc.

[http://technet.microsoft.com/en-us/library/ee355221\(v=SQL.100\).aspx](http://technet.microsoft.com/en-us/library/ee355221(v=SQL.100).aspx)

Some 'High Availability' topics include 'SAN data replication', 'GEO cluster'.

<http://blogs.msdn.com/b/sqlcat/archive/2013/09/05/sqlcat-com-consolidated-index-of-whitepapers.aspx>

SQL on Windows 8/2012

<http://support.microsoft.com/kb/2681562>

SQL 2005/2008/2008R2/2012 checklist

<http://www.brentozar.com/archive/2008/03/sql-server-2005-setup-checklist-part-1-before-the-install/>

- Useful blogs

saponsqlserver

<http://social.msdn.microsoft.com/Search/en-US?query=alwayson&beta=0&rn=Running+SAP+Applications+on+SQL+Server&rq=site:blogs.msdn.com/b/saponsqlserver/&ac=4>

psssql

<http://social.msdn.microsoft.com/Search/en-US?query=alwayson&beta=0&rn=CSS+SQL+Server+Engineers&rq=site:blogs.msdn.com/b/psssql/&ac=4>

Technet Wiki for AlwaysOn

<http://social.technet.microsoft.com/wiki/contents/articles/tags/Always+On/default.aspx>

CNO Blog Series: Increasing Awareness around the Cluster Name Object (CNO)

<http://blogs.technet.com/b/askcore/archive/2012/09/25/cno-blog-series-increasing-awareness-around-the-cluster-name-object-cno.aspx>

Forum topics

<http://social.msdn.microsoft.com/Forums/sqlserver/en-US/home?forum=sqldisasterrecovery>

SQL Server AlwaysOn team blog

<http://blogs.msdn.com/b/sqlalwayson/>

SQL Server Storage Engine blog

<http://blogs.msdn.com/b/sqlserverstorageengine/archive/tags/high+availability/>

SQL Server AlwaysOn

<http://msdn.microsoft.com/en-us/sqlserver/gg490638>

SQL Server support lifecycle

<http://support.microsoft.com/lifecycle/?c2=1044>

AlwaysOn Availability Groups Troubleshooting and Monitoring Guide

<http://msdn.microsoft.com/en-us/library/dn135328.aspx>

AlwaysOn Availability Groups (SQL Server)

<http://technet.microsoft.com/en-us/library/hh510230.aspx>

File bugs for SQL Server 2012

<https://connect.microsoft.com/SQLServer/SearchResults.aspx?SearchQuery=SQL+Server+2012>

## Section g - Similar technologies from other organizations

Please note these are third party links. These links are mentioned only as a reference, and do not indicate support for the respective author's or organization's opinions.

<http://joedantoni.wordpress.com/2012/03/29/always-on-versus-active-data-guard-a-value-proposition/>

<http://dba.stackexchange.com/questions/20867/sql-server-equivalent-to-functionality-of-oracle-rac>

<http://blogs.technet.com/b/sqlman/archive/2012/04/12/what-you-still-think-rac-is-the-answer-for-your-high-end-database-platform-requirements-even-with-sql-server-2012-amp-sql-azure-now-released-time-to-think-again.aspx>

[http://sqlblog.com/blogs/linchi\\_shea/archive/2008/01/22/sql-server-always-on-and-oracle-hard.aspx](http://sqlblog.com/blogs/linchi_shea/archive/2008/01/22/sql-server-always-on-and-oracle-hard.aspx)

## Section h – Data collection

Ideally troubleshooting information is available through below logs:

- Executing TSQL etc. commands through SQL Management Studio.
- SQL ERRORLOG files
- Cluster logs, cluster validation report.
- SQL default traces, system\_health\_\* files (or Output of "EXEC sp\_server\_diagnostics;"), AlwaysOn\_health\_\*.xel (AlwaysOn) files in LOG folder
- Event logs.

## Section i – Errors in SQL Server

Note: There are multiple messages that mention “This is an **informational** message only”. These are just informational messages and generally no user action is required, hence most of these are not mentioned in the following section. If there is a problem during occurrence of these messages, then look for additional messages in logs.

error	severity	Error message
1480	10	The %S_MSG database "%.*ls" is changing roles from "%ls" to "%ls" because the mirroring session or availability group failed over due to %S_MSG. This is an <b>informational</b> message only. No user action is required.

Examples of informational messages: Error numbers 1480, 35202, 35262, 35265, 35266, 35267, 35299, 41048, 41049, 41051, 41053, 41054, 41055, 41058, 41059, 41061, 41075, 41076, 41089, 41092, 41093, 41094, 41097, 41098, 41099, 41110, 41111, 41137, 41139, 41141, 41145, 41147, 41149.

Error, Severity: Error message
<p>Troubleshooting information</p> <ul style="list-style-type: none"> <li>• Error 976, Severity 14: The target database, '%.*ls', is participating in an availability group and is currently not accessible for queries. Either data movement is suspended or the availability replica is not enabled for read access. To allow read-only access to this and other.</li> </ul> <p>If <code>dm_hadr_availability_replica_states.role_desc=3(INVALID)</code>, then check service broker. Because Availability group is using Service Broker to communicate between SQL Server then need to check Service Broker first. Open SSMS&gt;“Server Objects” &gt; “Endpoints”, there are two “Service Broker” folder&gt;Expand both, and if the state is Stopped or Disabled, then can change the state to Started.</p> <p>Similar steps as in error 35250.</p>
<ul style="list-style-type: none"> <li>• Error 983, Severity 14: Unable to access database '%.*ls' because its replica role is RESOLVING which does not allow connections. Try the operation again later.</li> </ul> <p>Check SQL ERRORLOGs, event logs, etc. for network, storage related messages etc.</p> <p>Check for issues as in error 19406. Search for “RESOLVING_NORMAL” in this document.</p>
<ul style="list-style-type: none"> <li>• Error 3402, Severity 10: The database '%ls' is marked %ls and is in a state that does not allow recovery to be run.</li> </ul> <p>If the second %ls is RESTORING, then one option is below.</p> <ol style="list-style-type: none"> <li>1) Asked the customer to stop the SQL Server Service.</li> <li>2) Had the customer rename the actual files on disk with a "_old" suffix so that the sql server would not find them and have the db come up suspect.</li> <li>3) Asked the customer to start the SQL Server Service.</li> </ol> <p>Once the server came back up we were able to delete the database.</p> <ol style="list-style-type: none"> <li>4) Had the customer create a new database with the same name and location as the</li> </ol>

original database. Used the output from sysaltfiles to verify this.

5) Had the customer stop the SQL Server Service.

6) Had the customer rename these new database files by appending a "\_new" on the end of the file.

7) Had the customer take the old database files with the "\_old" suffix and changed them back to the original name.

8) Had the customer start the SQL Server Service.

- Error 3633, Severity 16: The operating system returned the error '%ls' while attempting '%ls' on '%ls' at '%hs'(%d).

Verify error in %ls at DOS prompt with "net helpmsg". Then proceed depending on this error.

- Error 3752, Severity 16: The database '%. \*ls' is currently joined to an availability group. Before you can drop the database, you need to remove it from the availability group.

Before you can drop the database, you need to remove it from the availability group. If AG exists, try ALTER AVAILABILITY GROUP [AGname] REMOVE DATABASE [DbName]. If AG does not exist, try removing with ALTER DATABASE [DbName] SET HADR OFF.

If replica\_id and group\_database\_id in sys.databases show as null, then this may be due to earlier meta-data when database was part of an AG so stop SQL Server, rename the database files and start SQL Server. Then you should be able to remove the database.

- Error 19405, Severity 16: Failed to create, join or add replica to availability group '%.\*ls', because node '%.\*ls' is a possible owner for both replica '%.\*ls' and '%.\*ls'. If one replica is failover cluster instance, remove the overlapped node from its possible owners and try ag

May occur if AG involves two or more SQL failover instances. Check possible owners of SQL resource on both/more so as to verify no node name overlap. There should not be node-overlap.

TSQL: SELECT \* FROM sys.dm\_os\_cluster\_nodes;

Powershell: get-clusterownernode -resource "XXXBSQL"

Powershell: set -clusterownernode -resource "XXXASQL" -owners NODE1,NODE2

- Error 19406, Severity 10: The state of the local availability replica in availability group '%.\*ls' has changed from '%ls' to '%ls'. The replica state changed because of either a startup, a failover, a communication issue, or a cluster error. For more information, see the availabi

If the "changed to" state is PRIMARY\_PENDING, then check sys.dm\_hadr\_database\_replica\_states. If database\_state\_desc = RECOVERY\_PENDING (synchronization\_health\_desc will be NOT\_HEALTHY), then try "ALTER DATABASE db SET HADR RESUME;". Else if this is the only replica (no secondary replica), then (consider first taking a database snapshot as a backup if required) try "ALTER DATABASE db SET HADR OFF;" to remove AlwaysOn so as to then manually recover database with SQL service or database restart (ALTER DATABASE ONLINE).

TSQL: ALTER DATABASE DbName SET HADR RESUME;

TSQL: ALTER DATABASE DbName SET ONLINE;

TSQL: RESTORE DATABASE DbName WITH RECOVERY;

If the "changed to" state is RESOLVING\_NORMAL, check for additional messages. Also check for issues as in <http://support.microsoft.com/kb/2833707> (Troubleshooting

automatic failover problems in SQL Server 2012 AlwaysOn environments).

If "change to" state is PRIMARY\_NORMAL / SECONDARY\_NORMAL, then this may indicate successful failover. Check for additional messages if failover was not expected.

- Error 19456, Severity 16: None of the IP addresses configured for the availability group listener can be hosted by the server '%s'. Either configure a public cluster network on which one of the specified IP addresses can be hosted, or add another listener IP address which can be

Add a new IP address (with different subnet) manually to the existing Listener.

- Error 19471, Severity 16: The WSFC cluster could not bring the Network Name resource with DNS name '%s' online. The DNS name may have been taken or have a conflict with existing name services, or the WSFC cluster service may not be running or may be inaccessible. Use a different

Verify cluster name has "Create Computer objects" permission in AD. Steps in error 1193.

Check for associated errors like error 19476.

Below steps may be an option.

1. Temporarily move the CNO account into the Computers container [optional].
2. Log into one of the cluster nodes with a domain account that had the Reset Password right in the domain
3. Take the cluster Network Name offline. If this does not work to solve the problem, simulate failures for the cluster Network Name resource until it is in a permanent failed state
4. Once the resource was in an offline state, right-click on the resource, choose More Actions and then click Repair
5. The previous action caused the password for the CNO to be reset in the domain
6. Restart the cluster service on all nodes.

- Error 19476, Severity 16: The attempt to create the network name and IP address for the listener failed. The WSFC service may not be running or may be inaccessible in its current state, or the values provided for the network name and IP address may be incorrect. Check the state of the WSFC cluster and validate the network name and IP address with the network administrator.

Check for associated errors like error 41009.

- Error 35206, Severity 10: A connection timeout has occurred on a previously established connection to availability replica '%s' with id [%s]. Either a networking or a firewall issue exists or the availability replica has transitioned to the resolving role.

If there is a login failed for domain\node\$ account around same time, then it may be because NT AUTHORITY\SYSTEM account lacked the required permissions to failover the availability group. To failover the group to the other node, NT AUTHORITY\SYSTEM must have permission to connect to SQL (CONNECT SQL), failover the availability group (ALTER ANY AVAILABILITY GROUP) and execute sp\_server\_diagnostics (VIEW SERVER STATE). The NT AUTHORITY\SYSTEM account is used to automatically execute sp\_server\_diagnostics. Another option is to add the account to sysadmin role in SQL Server.

```
CREATE LOGIN [NT AUTHORITY\SYSTEM] FROM WINDOWS WITH DEFAULT_DATABASE=[master],  
DEFAULT_LANGUAGE=[us_english];
```

```
ALTER SERVER ROLE [sysadmin] ADD MEMBER [NT AUTHORITY\system];
```

- Error 35240, Severity 16: Database '%.\*ls' cannot be joined to or unjoined from availability group '%.\*ls'. This operation is not supported on the primary replica of the availability group.

TSQL to unjoin is "ALTER DATABASE db SET HADR OFF". Note that failing over thus making it a secondary, and then retrying ALTER DATABASE HADR is not an option, because the alter database will then give error 921 that database has not been recovered yet.

If this replica can be made a secondary, then fail over thus making it a secondary, and then drop replica when in this secondary role. TSQL is "ALTER AVAILABILITY GROUP AgName REMOVE REPLICA ON 'ReplicaName'";".

If no secondary replica for failover and getting this error on primary, then "DROP AVAILABILITY GROUP AgName". This will automatically drop listener. If do not want listener dropped, then create a temporary AG adding same name, then try the "DROP AVAILABILITY GROUP".

- Error 35250, Severity 16: The connection to the primary replica is not active. The command cannot be processed.

Check SQL ERRORLOG to verify SQL is listening on the ports. If SQL is listening on port, check if SQL is listening on all IPs (e.g. not "Server is listening on [ 192.192.192.192 <ipv4> 5022]") (should ideally be "Server is listening on [ 'any' <ipv4> 1433]"). If not listening on any/all IPs for port, then two options. One option is to recreate hadr\_endpoint to listen on ALL ip. Second option is to enter the replication adapter IP in DNS for the configured endpoint).

Check ping, telnet, nslookup to replica(s). If firewall exception is required, then create new inbound rule for TCP port 5022.

- Error 35264, Severity 10: AlwaysOn Availability Groups data movement for database '%.\*ls' has been suspended for the following reason: "%S\_MSG" (Source ID %d; Source string: '%.\*ls'). To resume data movement on the database, you will need to resume the database manually. For infor

Link redirects to <http://msdn.microsoft.com/en-us/library/ff877956.aspx> and the mention steps should be followed to resume data movement.

SSMS: AlwaysOn High Availability node>Availability Groups node>expand availability group>Availability Databases node>right-click database>Resume Data Movement>OK.  
TSQL on secondary: ALTER DATABASE database\_name SET HADR RESUME;

- Error 41009, Severity 16: The Windows Server Failover Clustering (WSFC) resource control API returned error code %d. The WSFC service may not be running or may not be accessible in its current state, or the specified arguments are invalid. For information about this error code,

Net helpmsg on the %d value, and proceed accordingly. May also be accompanied by Microsoft-Windows-FailoverClustering messages in event log. Check cluster log.

If the error is in cluster in Windows Azure, then it may be because Windows Azure currently does not support more than one IP address per VM, which is required by the

availability group listener to resolve to the availability group owner node. This is documented in <http://msdn.microsoft.com/en-us/library/jj870962.aspx> (High Availability and Disaster Recovery for SQL Server in Windows Azure Virtual Machines).

- Error 41015, Severity 16: Failed to obtain the Windows Server Failover Clustering (WSFC) node handle (Error code %d). The WSFC service may not be running or may not be accessible in its current state, or the specified cluster node name is invalid. For information about this error

Check if Windows cluster service is running.

Net helpmsg on the %d value, and proceed accordingly.

- Error 41042, Severity 16: The availability group '%.\*ls' already exists. This error **could be caused by a previous failed CREATE AVAILABILITY GROUP or DROP AVAILABILITY GROUP operation**. If the availability group name you specified is correct, try dropping the availability group a

If AG still exists, DROP AVAILABILITY GROUP.

Open regedit, backup the entry from the old Availability Group that starts with HADR\_Ag\_???? key, then delete this key [to be tested].

Try with new name for Availability Group.

- Error 41050, Severity 10: AlwaysOn Availability Groups: Waiting for local Windows Server Failover Clustering **service** to start. This is an **informational** message only. No user action is required.

Notice this error says cluster "service" not node.

Check services.msc if cluster service is started on that node. If not started, then start the service.

This is an informational message only. If there is a problem, then look for additional messages.

- Error 41052, Severity 10: AlwaysOn Availability Groups: Waiting for local Windows Server Failover Clustering **node** to start. This is an **informational** message only. No user action is required.

Notice this error says cluster "node" not service.

If node is paused in Failover Cluster Manager, resume it.

This is an informational message only. If there is a problem, then look for additional messages.

- Error 41066, Severity 16: Cannot bring the Windows Server Failover Clustering (WSFC) resource (ID '%.\*ls') online (Error code %d). The WSFC service may not be running or may not be accessible in its current state, or the WSFC resource may not be in a state that could accept the r

In DOS prompt, run "Net helpmsg" on the %d value, and proceed accordingly.

- Error 41074, Severity 10: AlwaysOn: The local replica of availability group '%.\*ls' is preparing to transition to the primary role **in response to a request from the Windows Server Failover Clustering (WSFC) cluster**. This is an **informational** message only. No user action is required

This is an informational message only. If there is a problem, then look for additional messages.

- Error 41091, Severity 10: AlwaysOn: The local replica of availability group '%.\*ls' is going offline because either the lease expired or lease renewal failed. This is an **informational** message only. No user action is required.

Lease expired event from the cluster. Lease cannot be renewed maybe because the SQL Server was busy. Will need to check default traces etc. General suggestions include updating statistics, index rebuild, set max memory if not set.

Possible causes include loss of lease, possible network issues and sp\_server\_diagnostic query timeout.

This is an informational message only. If there is a problem, then look for additional messages.

- Error 41095, Severity 10: AlwaysOn: Explicitly transitioning the state of the Windows Server Failover Clustering (WSFC) resource that corresponds to availability group '%.\*ls' to Failed. The resource state is not consistent with the availability group state in the instance of SQL

Verify pre-requisite (for AlwaysOn) Windows fixes are installed.

- Error 41131, Severity 10: Failed to bring availability group '%.\*ls' online. The operation timed out. Verify that the local Windows Server Failover Clustering (WSFC) node is online. Then verify that the availability group resource exists in the WSFC cluster. If the problem persists

Check logs for additional errors.

- Error 41142, Severity 16: The availability replica for availability group '%.\*ls' on this instance of SQL Server cannot become the primary replica. One or more databases are not synchronized or have not joined the availability group, or the WSFC cluster was started in Force Quorum

Select availability group databases and select option to resume data movement. This will work if cluster was not started in forced\_quorum mode.

Check if \*\_FailoverCluster\_health\_XeLogs confirm that the cluster was started in forced\_quorum mode (forced\_quorum True in availability\_replica\_automatic\_failover\_validation event).

- o When a cluster is started in forced\_quorum mode (net.exe start clussvc /forcequorum, OR Failover Cluster Manager>left pane>right-click Windows cluster>choose Force Cluster Start>Confirm by clicking Yes.) on primary replica, the availability group is required to be started by issuing command ALTER AVAILABILITY GROUP <AGNAME> FORCE\_FAILOVER\_ALLOW\_DATA\_LOSS;. Because this is the original primary, despite issuing force allow data loss, NO data loss occurs
- o When a cluster is started in forced\_quorum mode on secondary replica, first check sys.dm\_hadr\_database\_replica\_cluster\_states.is\_failover\_ready on secondary. If this value is 1, and be assured no data loss will occur. If this

value is not 1 (for example because it's asynchronous commit), then can check `sys.dm_hadr_database_replica_states.last_commit_time`, so as to know estimate start time of data loss. The `sys.dm_hadr_database_replica_states.last_hardened_lsn` value may be used to consider other secondaries for failover. Then can initiate failover with `ALTER AVAILABILITY GROUP <AGNAME> FORCE_FAILOVER_ALLOW_DATA_LOSS;` on secondary.

- o TSQL: 

```
SELECT database_name, is_failover_ready
FROM sys.dm_hadr_database_replica_cluster_states
WHERE replica_id = (SELECT replica_id
                    FROM sys.availability_replicas
                    WHERE replica_server_name = '<Replica server name>')
```

Otherwise, once all local secondary databases are joined /synchronized, a planned manual failover can be performed to this secondary replica (without data loss).

- Error 41152, Severity 16: Failed to create availability group '%.\*s'. The operation encountered SQL Server error %d and has been rolled back. Check the SQL Server error log for more details. When the cause of the error has been resolved, retry `CREATE AVAILABILITY GROUP` command

Check this document for error number mentioned in %d and proceed accordingly.

Check `sys.messages` for error number mentioned in %d and proceed accordingly

- Error 41158, Severity 16: Failed to join local availability replica to availability group '%.\*s'. The operation encountered SQL Server error %d and has been rolled back. Check the SQL Server error log for more details. When the cause of the error has been resolved, retry the A

Check for SQL/Windows messages around same time.

- Error 41160, Severity 16: Failed to designate the local availability replica of availability group '%.\*s' as the primary replica. The operation encountered SQL Server error %d and has been terminated. Check the preceding error and the SQL Server error log for more details about

Checks logs for additional messages.

- Error 41172, Severity 16: An error occurred while dropping availability group '%.\*s' from Windows Server Failover Clustering (WSFC) cluster and from the local metadata. The operation encountered SQL OS error %d, and has been terminated. Verify that the specified availability gr

In DOS prompt, run "Net helpmsg" on the %d value, and proceed accordingly.

- Error 41195, Severity 16: Availability group '%.\*s' failed to process the WSFC lease-renewal command. The local availability replica lease is no longer valid to process the lease renewal command. Availability replica lease expired. This is an **informational** message only. No user a

This is an informational message only. If there is a problem, then look for additional messages.

- Error 41406, Severity 16: The availability group is not ready for automatic failover. The primary replica and a secondary replica are configured for automatic failover, however, the secondary replica is not ready for an automatic failover. Possibly the secondary replica is unavail

Check for additional messages on secondary replica(s).

- Error 41414, Severity 16: In this availability group, at least one secondary replica is not connected to the primary replica. The connected state is DISCONNECTED.

Check connectivity as in error 35250.

## Section j - Errors in user interface (SSCM, wizard, SSMS)

### Errors in SQL Server Configuration Manager (SSCM)

Error message
Troubleshooting information
<ul style="list-style-type: none"><li>An error occurred while loading the AlwaysOn High Availability properties [return code: 0x80070005].</li></ul> <p>May get this error if don't have the appropriate permission. Try right click 'SQL Server Configuration Manager' and select 'Run as Administrator'.</p>
<ul style="list-style-type: none"><li>Unable to save the AlwaysOn High Availability settings [return code: 0x80041033].</li></ul> <p>Proceed depending on error code. This is generally a WMI code e.g. 0x80041033.</p>
<ul style="list-style-type: none"><li>The AlwaysOn Availability Groups feature requires the x86(non-WOW) or x64 Enterprise Edition of SQL Server 2012 (or later version) running on Windows Server 2008 (or later version) with WSFC hotfix KB 2494036 installed. This SQL Server edition and/or Windows Server System does not meet one or more of the requirements</li></ul> <p>Verify OS is Windows 2008 or later version.</p> <p>If OS is Windows 2008 or Windows 2008 R2, install Windows hotfix KB 2494036, if not already installed.</p>
<ul style="list-style-type: none"><li>Unable to retrieve cluster name [return code: (0x800706d9)].</li></ul> <p>Verify cluster service is started.</p> <p>One option may be to EVICT and ADD again that node.</p> <p>Steps: Right click node in failover cluster manager &gt; More Actions... &gt; Evict.</p>

## Errors in New Availability Group wizard in SSMS

### Error message

### Troubleshooting information

- The current WSFC cluster quorum vote configuration is not recommended for this availability group. For more information, see the following topic in SQL Server Books Online:  
<http://go.microsoft.com/fwlink/?LinkId=224159>.

When validating WSFC quorum vote configuration, the AlwaysOn Availability Group Wizard shows a warning if any of the following conditions are true:

- The cluster node that hosts the primary replica does not have a vote. If this vote is not required for that environment, then this message may be ignored. Powershell command to check vote is "Get-ClusterNode | fl Name, Nodeweight".
- A secondary replica is configured for automatic failover and its cluster node does not have a vote. If this vote is not required for that environment, then this message may be ignored.
- KB2494036 is not installed on all cluster nodes that host availability replicas. This patch is required to add or remove votes for cluster nodes in multi-site deployments. However, in single-site deployments, it is usually not required and you may safely ignore the warning.
- While setting up the availability group in the wizard, you configured a replica to asynchronous availability mode. This warning is only reported in SQL 2012 RTM, not in SP1 of SQL 2012 RTM.
- While setting up the availability group in the wizard, you configured a replica for manual failover mode. This warning is only reported in SQL 2012 RTM, not in SP1 of SQL 2012 RTM.

Check the link. Redirects to <http://msdn.microsoft.com/en-us/library/hh270280.aspx>

- Checking for the **database files on the secondary replica** resulted in an error.  
(Microsoft.SqlServer.Management.HadrTasks)

-----  
Program Location:

at Microsoft.SqlServer.Management.Hadr.TestDatabaseFileExisting.DoWork()  
at Microsoft.SqlServer.Management.TaskForms.SimpleWorkItem.Run()

=====

The following database files already exist on the server instance that hosts secondary replica HA-VM3\TEST1:

\\path\file.mdf

\\path\file\_log.ldf

(Microsoft.SqlServer.Management.HadrTasks)

-----

Program Location:

at Microsoft.SqlServer.Management.Hadr.TestDatabaseFileExisting.DoWork()

Check if database-file paths are identical on source and on destination servers. If different, manual (rather than using AG wizard) restore may be required with WITH MOVE syntax.

- An error was encountered while modifying the quorum settings.  
Your cluster quorum settings have not been changed.  
There was an error configuring the file share witness '\\XXX\ABC'.  
Unable to save property changes for 'File Share Witness'.  
File share associated with file share witness resource cannot be hosted by this cluster or any of its nodes

Run cluster validation report and ensure there are no errors.

- The Endpoints tab lists at least one endpoint that uses only Windows Authentication. However, the server instance might be running under a nondomain account. To use the listed endpoint, change the corresponding SQL Server service account to a domain account. To continue using the nondomain account, alter the endpoint to use a certificate. Do you want to use the listed endpoints?

Check SQL Server Configuration Manager to see if SQL startup account is domain user.

- -----  
TITLE: Microsoft SQL Server Management Studio  
-----  
The primary server 'XXX' cannot write to '\\XXX\e\$\mssql\data'.  
(Microsoft.SqlServer.Management.HadrTasks)  
-----  
ADDITIONAL INFORMATION:  
Backup failed for Server 'XXX'. (Microsoft.SqlServer.SmoExtended)  
For help, click:  
[http://go.microsoft.com/fwlink?ProdName=Microsoft+SQL+Server&ProdVer=11.0.3000.0+\(\(SQL11\\_PC\\_U\\_Main\).121019-1325+\)&EvtSrc=Microsoft.SqlServer.Management.Smo.ExceptionTemplates.FailedOperationExceptionText&EvtID=Backup+Server&LinkId=20476](http://go.microsoft.com/fwlink?ProdName=Microsoft+SQL+Server&ProdVer=11.0.3000.0+((SQL11_PC_U_Main).121019-1325+)&EvtSrc=Microsoft.SqlServer.Management.Smo.ExceptionTemplates.FailedOperationExceptionText&EvtID=Backup+Server&LinkId=20476)  
-----  
An exception occurred while executing a Transact-SQL statement or batch.  
(Microsoft.SqlServer.ConnectionInfo)  
-----  
Cannot open backup device '\\XXX\e\$\mssql\data\HADR Test.bak'. Operating system error 5(Access is denied.).  
BACKUP DATABASE is terminating abnormally. (Microsoft SQL Server, Error: 3201)  
For help, click:  
<http://go.microsoft.com/fwlink?ProdName=Microsoft%20SQL%20Server&ProdVer=11.00.3000&EvtSrc=MSSQLServer&EvtID=3201&LinkId=20476>  
-----  
BUTTONS:  
OK  
-----

Check SQL startup account to see if its domain account.

## Errors in SQL Management Studio (SSMS)

### Error message

### Troubleshooting information

- SSMS shows Availability Group state as Resolving.

Check that cluster service is started on that node. Also check for issues as in error 19406.

- Back up database task backs up the database availability groups contained in the set, you receive a warning message like the one below.  
This backup type is not supported in the secondary this task will fail if executed on the secondary.

GoTo SQL Server Management Studio, in Object Explorer, expand the availability of high-availability - availability - AlwaysOn group - group - properties. Note the Backup preferences section.

Consider using the maintenance plan Wizard to create a backup job since it checks the `sys.fn_hadr_backup_is_preferred_replica` function call and automatically includes the following script logic. This logic is if the default backup the current replica replica (the return value to 1) grants the `COPY_ONLY` option in your backup and not backup default backup replicas. The maintenance plan Wizard when you create a database backup using the scripts are automatically added.

```
IF (NOT sys.fn_hadr_backup_is_preferred_replica(@DBNAME))
BEGIN
Select 'This is not the preferred replica, exiting with success';
RETURN 0 - This is a normal, expected condition, so the script returns success
END
BACKUP DATABASE @DBNAME TO DISK=<disk>
WITH COPY_ONLY;
```

- AlwaysOn. 'ApplcationIntent=ReadOnly' doesn't work for registered server.

This is a known issue. Consider specifying "ApplicationIntent=ReadOnly" everytime you make connection to SQL server 2012.

- The local node is not part of quorum and is therefore unable to process this operation. This may be due to one of the following reasons:
  - The local node is not able to communicate with the WSFC cluster.
  - No quorum set across the WSFC cluster.For more information on recovering from quorum loss, refer to SQL Server Books Online. (Microsoft.SqlServer.Management.HadrTasks)

Start cluster service. If it's not started due to quorum, last option may be start without a quorum. After cluster is running, check cluster nodes/votes are appropriate.

## Section k - Additional Windows related errors

### Errors in Windows cluster log

#### Error message

#### Troubleshooting information

- [RES] Network Name <SPEPD\_Tier2>: **Unable to update password for computer account** DCR-SPEPD on DC \\ DC-04.xxxx.org, status **5**.  
[RHS] Online for resource SPEPD\_Tier2 failed.

Status 5 is Access Denied

In Windows AD, check for CNO (cluster network object) permissions.

For example, below to grant the "create computer objects" to the cluster virtual host (virtual cluster name) for the OU in Active Directory on "Computers" and "DomainServer" OU that was created. [To be tested, steps in event 1193]

Instructions:

- 1) Log into the Domain Controller machine.
- 2) Select Start - Administrative Tools - Active Directory users and computer.  
--> Active Directory users and computer screen displays.
- 3) Display-select advanced features.
- 4) Select the appropriate domain - Computers.
- 5) Verify that the cluster virtual hosts.
- 6) Select the appropriate domain - Computers - right click - Properties.  
--> Computers Properties screen appears.
- 7) Security tab-click the Advanced button.  
--> Advanced Security for Computers "screen appears.
- 8) If you have access permissions tab - cluster virtual host registration registration no "Edit" button if you choose the "add" button.  
+ Case "add": conducted a check in the "computer", click the "object type" button, search for cluster virtual hosts.  
--> [Permission entries on Computers] screen is displayed.
- 9) Target: Select this object and all child objects check the permission "create computer objects" and click the "OK" button.  
--> Returns to the advanced security for Computers "screen.
- 10) Click "OK" button after clicking "the apply" button.  
--> Returns to the Computers Properties screen.
- 11) And click the "OK" button and exit the Active Directory users and computer screen.

- INFO [RES] Network Name: [NNLIB] **NetUserAdd** object aglisten11 on DC: \\DC.contoso.com, result: **8557**  
ERR [RES] Network Name: [NNLIB] **Failed to create Computer Object** aglisten11 in the Active Directory, error **8557**

net helpmsg 8557 says "Your computer could not be joined to the domain. You have exceeded the maximum number of computer accounts you are allowed to create in this domain. Contact your system administrator to have this limit reset or increased."

- Cluster log has "[RES] SQL Server Availability Group: [hadrag] Run 'EXEC sp\_server\_diagnostics 10' returns following information" "ERR [RES] SQL Server Availability Group: [hadrag] ODBC Error: [42000] [Microsoft][SQL Server Native Client 11.0][SQL Server]The user does not have permission to perform this action. (297)"

NT AUTHORITY\SYSTEM account lacked the required permissions to failover the availability group. To failover the group to the other node, NT AUTHORITY\SYSTEM must have permission to connect to SQL (CONNECT SQL), failover the availability group (ALTER ANY AVAILABILITY GROUP) and execute sp\_server\_diagnostics (VIEW SERVER STATE).

Please view error 35206 for additional details.

- Lease renewal failed with timeout error

Check this document for "lease" related errors/troubleshooting. This may be a performance issue.

- ERR [RES] SQL Server Availability Group <WSDBMEMAVG>: [hadrag] Availability Group is not healthy with given HealthCheckTimeout and FailureConditionLevel  
ERR [RES] SQL Server Availability Group <WSDBMEMAVG>: [hadrag] Resource Alive result 0.  
ERR [RES] SQL Server Availability Group: [hadrag] Failure detected, diagnostics heartbeat is lost

This may be a performance issue.

## Errors in Windows event log

Event ID, Source: Error message  
Troubleshooting information

- Event ID 1193, Microsoft-Windows-FailoverClustering: Cluster network name resource '%1' failed to create its associated computer object in domain '%2' for the following reason: %3.  
The associated error code is: %5  
Please work with your domain administrator to ensure that:
  - The cluster identity '%4' can create computer objects. By default all computer objects are created in the 'Computers' container; consult the domain administrator if this location has been changed.
  - The quota for computer objects has not been reached.
  - If there is an existing computer object, verify the Cluster Identity '%4' has 'Full Control' permission to that computer object using the Active Directory Users and Computers tool.

If %5 says "Access is denied", then verify "Create Computer objects permission" for cluster network name resource (CNO).

Steps:

- On a domain controller, click Start, click Administrative Tools, and then click Active Directory Users and Computers. If the User Account Control dialog box appears, confirm that the action it displays is what you want, and then click Continue.
- Expand the default Computers container or the folder in which the cluster name

account (the computer account for the cluster) is located. Computers is located in Active Directory Users and Computers/domain node/Computers.

3. Examine the icon for the cluster name account. It must not have a downward-pointing arrow on it, that is, the account must not be disabled. If it appears to be disabled, right-click it and look for the command Enable Account. If you see the command, click it.

4. On the View menu, make sure that Advanced Features is selected.

When Advanced Features is selected, you can see the Security tab in the properties of accounts (objects) in Active Directory Users and Computers.

5. Right-click the default Computers container or the folder in which the cluster name account is located.

6. Click Properties.

7. On the Security tab, click Advanced.

8. In the list of accounts with permissions, click the cluster name account, and then click Edit.

Note If the cluster name account is not listed, click Add and add it to the list.

9. For the cluster name account, ensure that Allow is selected for the "Create Computer objects permission."

10. Click OK until you have returned to the Active Directory Users and Computers snap-in.

- Event ID 1194, Microsoft-Windows-FailoverClustering: Cluster network name resource '%1' failed to create its associated computer object in domain '%2' for the following reason: %3.  
The text for the associated error code is: %4  
Please work with your domain administrator to ensure that:
  - The cluster identity '%5' can create computer objects. By default all computer objects are created in the 'Computers' container; consult the domain administrator if this location has been changed.
  - The quota for computer objects has not been reached.
  - If there is an existing computer object, verify the Cluster Identity '%5' has 'Full Control' permission to that computer object using the Active Directory Users and Computers tool.

Like in event 1193, verify "Create Computer objects permission" for cluster network name resource (CNO).

Try creating Client Access Point (CAP) with same name and IP to try to reproduce the issue outside SQL.

Try pre-staging the name in AD (also add node name \$ to the ACL with full control). Now re-try creating CAP. More details in

[http://technet.microsoft.com/en-us/library/cc731002\(Ws.10\).aspx#BKMK\\_steps\\_precreating](http://technet.microsoft.com/en-us/library/cc731002(Ws.10).aspx#BKMK_steps_precreating) .

Run Cluster validation.

## Windows messages through "net helpmsg"

Error (Error message obtained through "net helpmsg" at command prompt)

Troubleshooting information

- Error 665 (The requested operation could not be completed due to a file system limitation)

If database has FILESTREAM/FileTable, then check if 8dot3 name creation is enabled for applicable drive(s). If it is enabled, disable it.

DOS command1: fsutil 8dot3name query C:

DOS command2: fsutil 8dot3name set C: 1

- Error 5057 (The cluster IP address is already in use.)

Checked if IP is already in use. May require a new/unused IP depending on what is being done.

Check permission for cluster network object CNO.

- Error 5942 (The resource failed to come online due to the failure of one or more provider resources.)

Check for additional messages in logs.

Depending on the resource type, this generally requires involvement of Windows team.

For multi-subnet cluster, check the HostRecordTTL property for network name. If it's set to 1200 (20 minutes), suggested value is 300 (5 minutes).

Try to remove SQL from this issue. For example, if this is a network name or an IP address resource, then try creating a Client Access Point with same name and IP if possible, and see it comes online. If it does not come online, then this requires investigation by Windows team.

- Error 8557 (Your computer could not be joined to the domain. You have exceeded the maximum number of computer accounts you are allowed to create in this domain. Contact your system administrator to have this limit reset or increased.)

For example, when a listener is created, a Computer Object is automatically created in Active Directory. Even after Listener is dropped, that Computer Object may remain in Active Directory. The other thing to know is that by default, authenticated (domain) users are limited to create 10 Computer Objects in the domain. Once they hit the limit, attempting to create the 11th will fail with this error. User needs permission to create more than 10 Computer Objects or, more likely, user needs to engage the Windows network team to clean up these Computer Objects.

## Errors in Windows Management Instrumentation (WMI)

Error: Error message

Troubleshooting information

- Error 0x80070005

May get this error if don't have the appropriate permission. Try right click 'SQL Server Configuration Manager' and select 'Run as Administrator'.

Verify wbemtest queries are working against root/default, cimv2 and SQL namespaces.

- Error 0x80041033

WBEM\_E\_SHUTTING\_DOWN 2147749939 (0x80041033) --> User has requested an operation while WMI is in the process of shutting down.

At the same time of error, check if application event log has message "Windows Management Instrumentation has stopped WMIPRVSE.EXE because a quota reached a warning value." (Microsoft-Windows-WMI, event id 5612). If this message is present, then this issue may be because WMIPrvse process is not able to create the required number of handles, it may be shutting down before completing the entire process. Increase the maximum number of handles per host in WMI. Steps to increase max number of handles per host:

- o Go to Start--> Run and type wbemtest.exe.
- o Click Connect.
- o In the namespace text box type "root" (without quotes).
- o Click Connect.
- o Click Enum Instances...
- o In the Class Info dialog box enter Superclass Name as "\_\_ProviderHostQuotaConfiguration" (without quotes) and press OK. Note: the Superclass name includes a double underscore at the front.
- o In the Query Result window, double-click "\_\_ProviderHostQuotaConfiguration=@"
- o In the Object Editor window, double-click HandlesPerHost.
- o In the Value dialog, type in 8192
- o Click Save Property.
- o Click Save Object.
- o Close Wbemtest.
- o Restart the Windows Management Instrumentation service.

Note: This change means: the WMIPrvse which was eligible to create 4096 handles at the max will be able to make 8196 handles at the max only if required. Even if something makes the WMIPrvse host to leak handles it will not cross 8192 handles. Handles consumed are proportional to amount of resources consumed; especially Pool resources. But I don't see that being a problem unless, we have a large number of WMIPrvse leaking handles all at the same time and the system does not have much RAM/Processor. Hence there should not be any impact as such, since this is a 64 bit server and we have ample resources on the server. However, I would not recommend changing the default values unless there is a similar demand or any other reason to increase the default value.