Troubleshooting HP StorageWorks All-in-One Storage System Networking Problems

Introduction

The HP StorageWorks All-in-One Storage Systems are designed to help manage storage complexity end-to-end, meaning from the application all the way to the disk spindles. While this paradigm provides a powerful solution in environments where storage expertise is limited, the solution does come with a few caveats regarding its use.

When managing storage end-to-end, the All-in-One Storage System depends on the network infrastructure to communicate with the application and provide storage over the iSCSI protocol. The All-in-One Storage Systems are easily configured to function seamlessly in almost any networking environment.

However, when networking changes are made to an existing configuration, then network connections between application servers and the All-in-One could be impacted. The customer should be aware of the potential repercussions of making networking changes on application servers that use storage from the All-in-One.

Note: A storage networking best practice is to isolate iSCSI traffic from all other networking traffic by using dedicated subnets and NIC ports. This will provide dedicated bandwidth to the storage traffic as well as physical security.

Names and addresses on the network

One of the challenges of managing devices on a network is providing a common and scalable mechanism for naming all of the devices. The types of names and addresses applied to devices on a network typically are as follows:

MAC address	This is the hardware address physically loaded into the device by the manufacturer.
IP address	This is the routable address assigned to the device. Subnets provide services to translate IP addresses to MAC addresses (ARP).
Computer (host) name	This is the human friendly name for the device. Services such as NETBIOS and WINS commonly translate computer names to IP addresses.
Fully Qualified Domain Name	This is the scalable, human friendly naming convention used in most networks to identify devices anywhere in the world. The Domain Name Service (DNS) is used to translate FQDNs to IP addresses.

As long as the necessary hierarchy of names and addresses is maintained, a network may implement and use any combination of these naming services.

Considerations for the HP StorageWorks All-in-One Storage System in a network

The HP StorageWorks All-in-One Storage System is designed to work in any networking naming scheme. Connections may be established to other devices on the network using almost any combination of IP addresses or names (if the associated name services are in place).

However, problems can arise when connections are made between devices, and then the name or address of one of the devices is changed. Following are some examples of how names or addresses can be changed on a device:

- Manually changing the static IP address of a device; for example, if the device needs to be moved to a different subnet.
- Manually changing the name of the device.
- Adding a device to the Active Directory. Often the Active Directory is tied in with DNS services. Bringing a device into the Active Directory causes it to be added to the DNS tables.
- Removing a device from the Active Directory.
- Obtaining a different dynamic IP address from the DHCP server. In most cases, DHCP provides a consistent, long-term lease of IP addresses to each device, but it is possible that a new one may be assigned when the system is re-booted.

Changing networking parameters on computers in a network is not a common task. The network administrator should be aware that if changes are made, then all service connections established on the affected device are terminated. Some connections may get re-established automatically, and some may require some manual intervention. In the case of the HP StorageWorks All-in-One Storage System, there are a few special cases to consider:

iSCSI connections

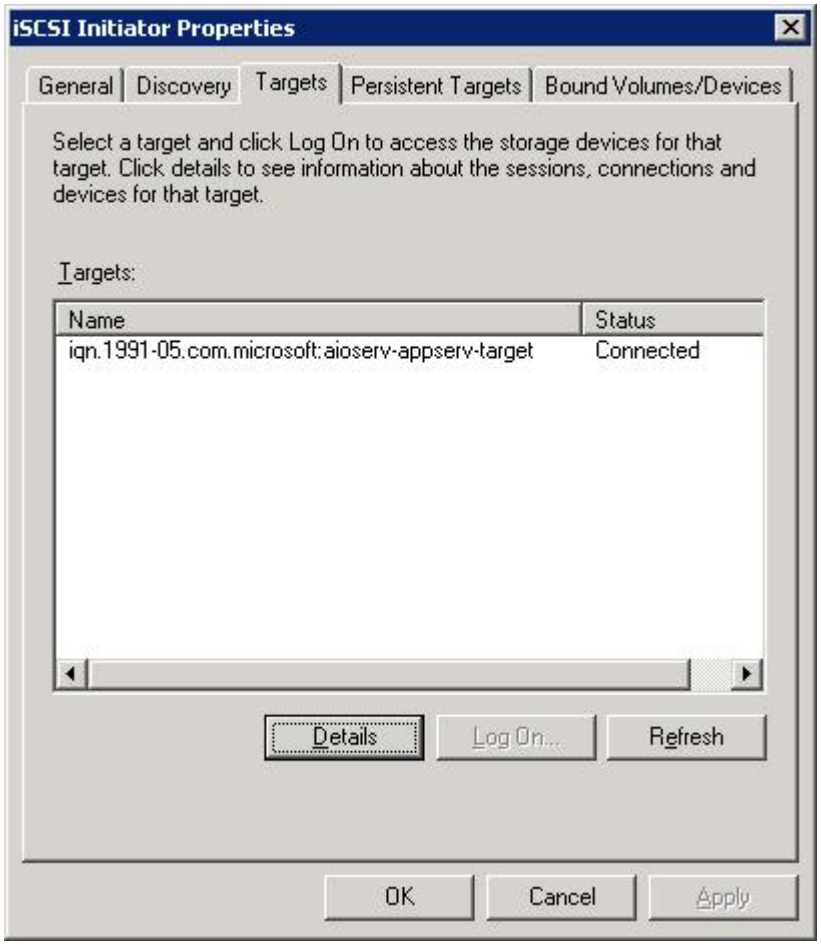
The iSCSI protocol uses a special naming convention to establish and maintain connections between initiators and targets. This naming convention is referred to as the iSCSI Qualified Name (IQN). The IQN is normally constructed automatically and will typically consist of elements such as the vendor name, the host name of the initiator, and/or the host name of the target.

Given this approach, iSCSI connections are usually impervious to changes of the network names. However, since all names are ultimately resolved to IP addresses, the connection will likely falter if an IP address is changed. In such cases, the connection can be easily re-established by manually logging off the iSCSI connection and then logging back on. This task is performed by the initiator. In the case of the Microsoft initiator, use the Targets tab in the iSCSI Initiator Properties tool (Figure 1).

When the IP address has been changed, the status of the connection may report as “Re-connecting.” If this occurs, log off and then log on to restore the connection. To log off, highlight the target in the list, and click the **Details** button. The dialog that comes up has a button that allows the user to log off (be sure to check the initiator in the list first). After you are logged off, the above dialog allows you to log on by clicking the **Log On...** button.

Note: Logging off an iSCSI connection terminates any existing iSCSI session between the target and the initiator. This action may have an adverse impact on healthy connections where data is being processed by database applications, such as SQL Server or Exchange. The customer is advised to ensure that associated applications are taken offline before logging off a healthy connection.

Figure 1. iSCSI connections



All-in-One Storage Manager

The All-in-One Storage Manager (ASM) is the tool that helps the user manage storage "end-to-end." When ASM is used to provision storage for applications on other servers, then the location of the server is preserved for future use. The location may be the IP address, the computer (host) name, or the FQDN, depending on which information is input by the user, and which information is available on the network (an IP address might get mapped to a FQDN).

Once established, changing the names or addresses of the application server or the All-in-One server may cause problems. Following are some of the scenarios to consider:

- Joining the application server to the Active Directory or registering with DNS. As long as the original Computer (host) Name is not changed, then these actions should only have a minor impact. The "All-in-One Storage Manager Server" service on the All-in-One server may need to be restarted to recognize the change to the Application Server. Alternatively, you can simply re-boot the All-in-One server. In addition, when more storage is provisioned to the Application Server, a new iSCSI connection may be generated using a new IQN (thus creating multiple iSCSI connections to the application server).
- Changing the IP address of the application server or the All-in-One server. As mentioned in the section discussing iSCSI connections, this change may impact iSCSI as well as ASM. In this case, rebooting both servers when any IP address is changed should clear up any connection issues.
- Changing the computer (host) name of the application server. Since ASM keeps track of the computer names that it manages, changing the name will cause the ASM management connection to be lost. The guidance here is to avoid changing the computer name of application servers.

NOTE: The guidance in this paper regarding the re-booting of the All-in-One Storage System assumes that the server is not actively serving storage when it is re-booted. Re-booting the server will impact all of the active storage-related services, especially iSCSI storage used for databases, such as SQL Server or Exchange. The customer is advised to ensure that storage services and associated applications are taken offline before doing a re-boot.

Troubleshooting iSCSI connections

The All-in-One Storage Manager automates the process of setting up connections between the iSCSI Target on the All-in-One Storage System, and the Microsoft iSCSI Initiator on the application server. When existing iSCSI connections fail to work, or when new connections cannot be established, there are a few troubleshooting techniques available to help isolate the problem.

- Verify basic networking. This is usually done with the `ping` command on the command line. It is important to verify that pinging servers from each end with IP Addresses and names (computer name and/or FQDN) works as expected.
- Verify the status of the connection from the initiator side. You should be able to launch the Microsoft iSCSI Initiator configuration tool (iSCSI Initiator Properties) from the desktop or the Start menu. Check the following information:
    - Discovery tab—The IP address or the host name of the target should appear in the list of Target Portals.
    - Targets tab—A target should be defined in the list detailing a connection between the All-in-One and the application server. The status should be Connected. If the connection is Inactive, then selecting the **Log On...** button should establish an active connection.

    - Persistent Targets tab—The connection listed in the Targets page should also appear in the Persistent Targets list.
- Verify that a proper iSCSI Target connection is established on the target. On the All-in-One Storage Server console, right click **My Computer** and select **Manage**. In the MMC interface that comes up, select **Storage** > **Microsoft iSCSI Software Target** > **iSCSI Targets**. This lists the connections that have been defined. Verify that a connection matching the initiator is in the list. Also, verify that one or more virtual disks are assigned to the connection (when you select the connection, the associated virtual disks appear in the window pane to the right).

Although it is beyond the scope of this paper, these tools may also be used to create and manage iSCSI connections between the initiator and the target. Refer to the associated documentation from Microsoft regarding the use of the Microsoft iSCSI Initiator and the Microsoft iSCSI Software Target.

For more information

For more information about HP StorageWorks All-in-One Storage Systems, see http://www.hp.com/go/AiOStorage.

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