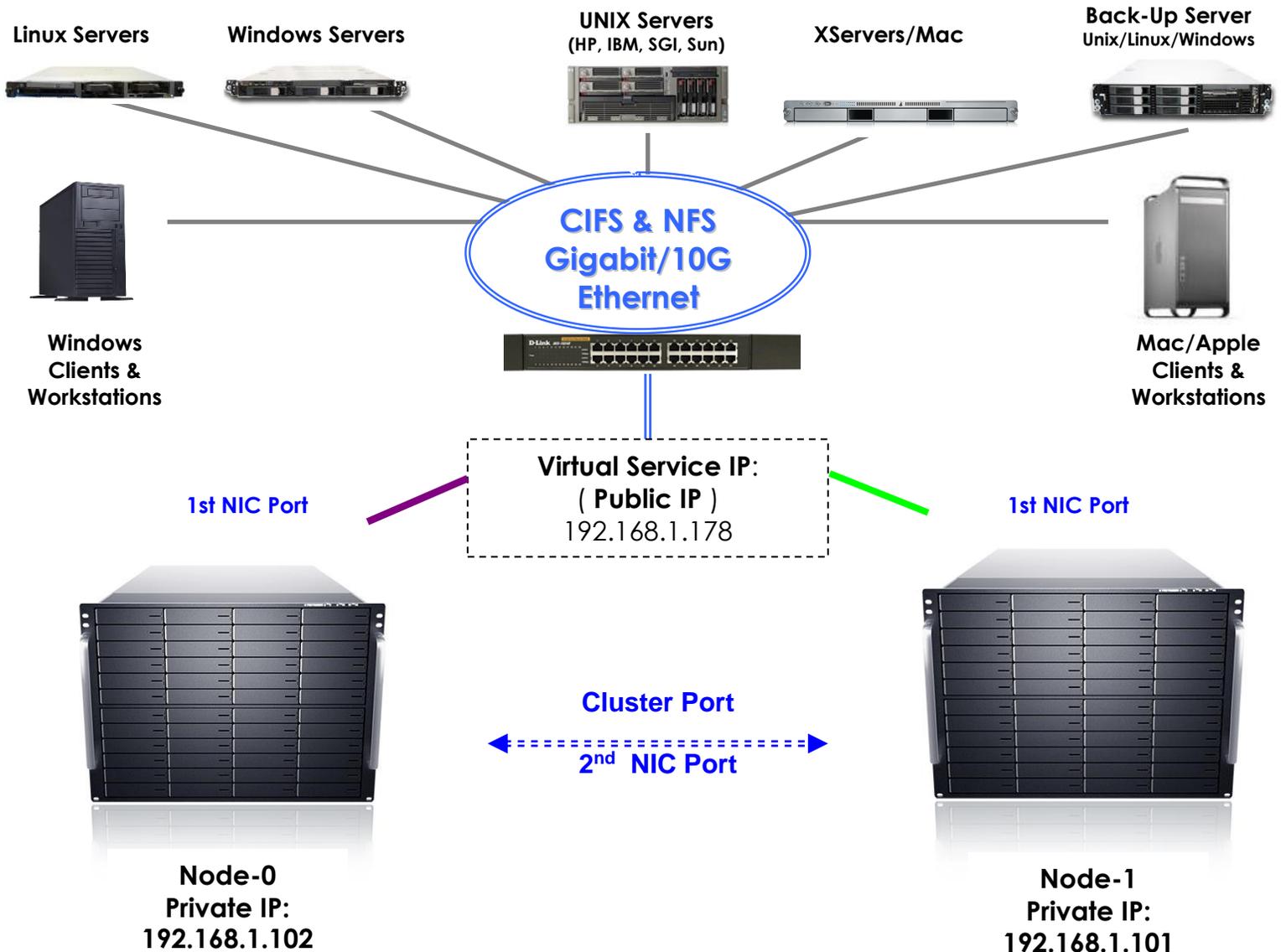


# EliteNAS Cluster Mirroring Option - Introduction

## Real Time NAS-to-NAS Mirroring & Auto-Failover

### Cluster Mirroring – High-Availability & Data Redundancy Option for Business Continuity

#### Typical Cluster Mirroring Setup



It is **Real Time, Synchronized, Block level, Volume base** data replication with automatic **Fail-Over** from one node to another node. It can be viewed as if a RAID-1 across 2 NAS units over LAN.

**Cluster Mirroring** is for **network share/volume only**. (iSCSI and FC target is under development.)

Even though the cluster now is the **Mirroring** mode, but there are many configuration variations:

- Configuration-1: **Active/Standby**
- Configuration-2: **Active/Active with Static Load-Balancing**
- Configuration-3: **Active/Active with Dynamic Load-Balancing**

Multiple **Public IPs** (virtual service IPs) are supported either to cover multiple network segments or to increase network performance.

The **Cluster Port** is the NIC port for data synchronization between the clustered Nodes. It can be a dedicated NIC port or shared with the data port that uses for the client access. From time to time, it is also referred to as: "**Sync Port**" or "**Clustered Port**".

The NIC port that is behind the **Public IP** serving data to clients are some time also referred to as "**Data Port**" or "**Public Port**".

### **Cluster Mirroring – Basic Requirements**

- Needs two (2) NAS nodes.
- Each NAS node needs at least two NIC ports. One NIC port for providing data access to the network and the other NIC port for data mirroring between nodes (the Cluster Port / Sync Port).
- Each Node must have different names in the "Server Name" field.
- Clustering is an optional feature/function, and will require a license for each node in the cluster. It can be enabled by purchasing the clustering license or when purchasing with the unit. To activate, enter the license key from the Web Admin page "**System**" → "**Updates**" → "**New License**".
- Note - each Node must be in the same LAN, not over WAN.

### **Cluster Performance Consideration.**

- A matching **RAID storage system**. A fast network interface (such as 10Gb Ethernet or Infiniband) does not guarantee a fast network throughput, unless the RAID storage system can provide the same or more bandwidth. For the desired network throughput, please make sure the **RAID controller**, **the type of disks**, and **number of disks** together can provide enough bandwidth.
- **A dedicated network link** between two nodes for the **Sync-Port/Cluster-Port**. The connection can be a direct cable link between the NIC Ports without a switch in between, either 1Gigabit Ethernet or **10Gb Ethernet**. Consider using a 10GbE NIC for the Sync Port, even though the Data Ports are only Gigabit NICs, are recommended. The performance of fast Sync-Port will improve significantly in the event of the Node **Fail-Back**.
- **Caching mode** for network volume/share. Clustered volume/share has options for the **Cache Mode: Write-Back** or **Write-Through**. Write-Back gives fast better Write performance while taking the risk of losing data in cache in case of sudden power outage or system locked up. On the other hand, Write-through mode will minimize that risk, but giving far less Write performance. For detail, please refer to document: "**Steps for Cluster Configuration – detail**".
- **CPU & Memory**. The NAS system will always use any available memory for caching and buffering. Therefore, the larger the sizes of memory are better. In normal operation, even in cluster mirroring mode, the CPU utilization is very low. However, when it is in the node **Fail-Back mode**, the **Surviving Node** will use full CPU power and maximum memory to calculate the data that needed to be re-synced to the **Failing-Back Node** and pushes those data across the Sync-Port link to the Failing-Back Node. The **faster CPU**, the **larger the memory**

and the **higher-bandwidth the Sync-Port link** is, the sooner both Nodes will be **in-sync** again, and the **Fail-Back Node** can be sooner put back into clustering service.

### **Cluster Implementation Planning**

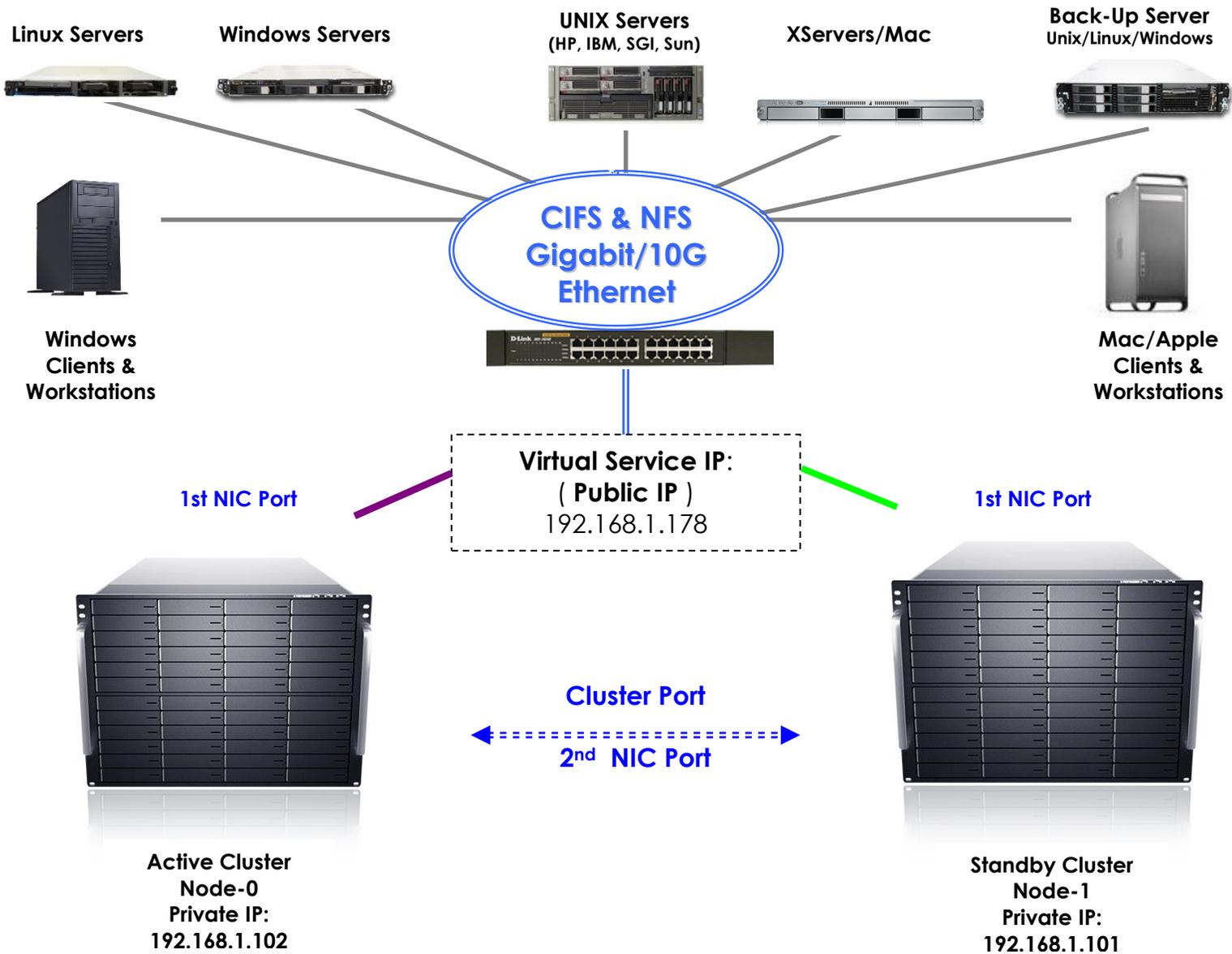
- System hardware – 2 NAS node servers.
- Network –gigabit NIC or 10Gb NIC, dedicated Sync-Port or share the NIC ports for both Data-Port and Sync-Port.
- NAS - General setting – Server Names, DNS Server in place or not, DNS Server working properly or not.
- NAS – Cluster setting – share/volume to be Write-Back mode or Write-Through mode. Which NIC will be the Cluster Port, give it a host name and IP, and which NIC will be the Data Port, give it a host name and IP as well. These host name – IP association will be registered under “**network → host**” page.

### **Cluster – Be Aware & Limitation**

- **Cluster Mirroring and Failover** is for LAN only, and not for WAN.
- The default network share/volume is using EXT4 as the file system. With EXT4, it takes time to create the file system depending on the size of the share/volume. If you get a Blank Black screen during the file system creation, do not panic, and it is normal.
- When adding Node to the Cluster, it will also give a momentary Blank Black screen, it is also normal.
- When assigning the **ethX** port to Public IP, it will also give a momentary Blank Black screen, it is also normal.
- Refer to “**Cluster – Valid Public IP Config**” for what Network configuration is valid and what is not.
- Clustered volumes must have the exact same size from both nodes
- Data-Port/Public-Port from both Nodes must be using the same port number / 'ethX' port, for example, both nodes are using 'eth0' data port, or 'eth1' for public port.

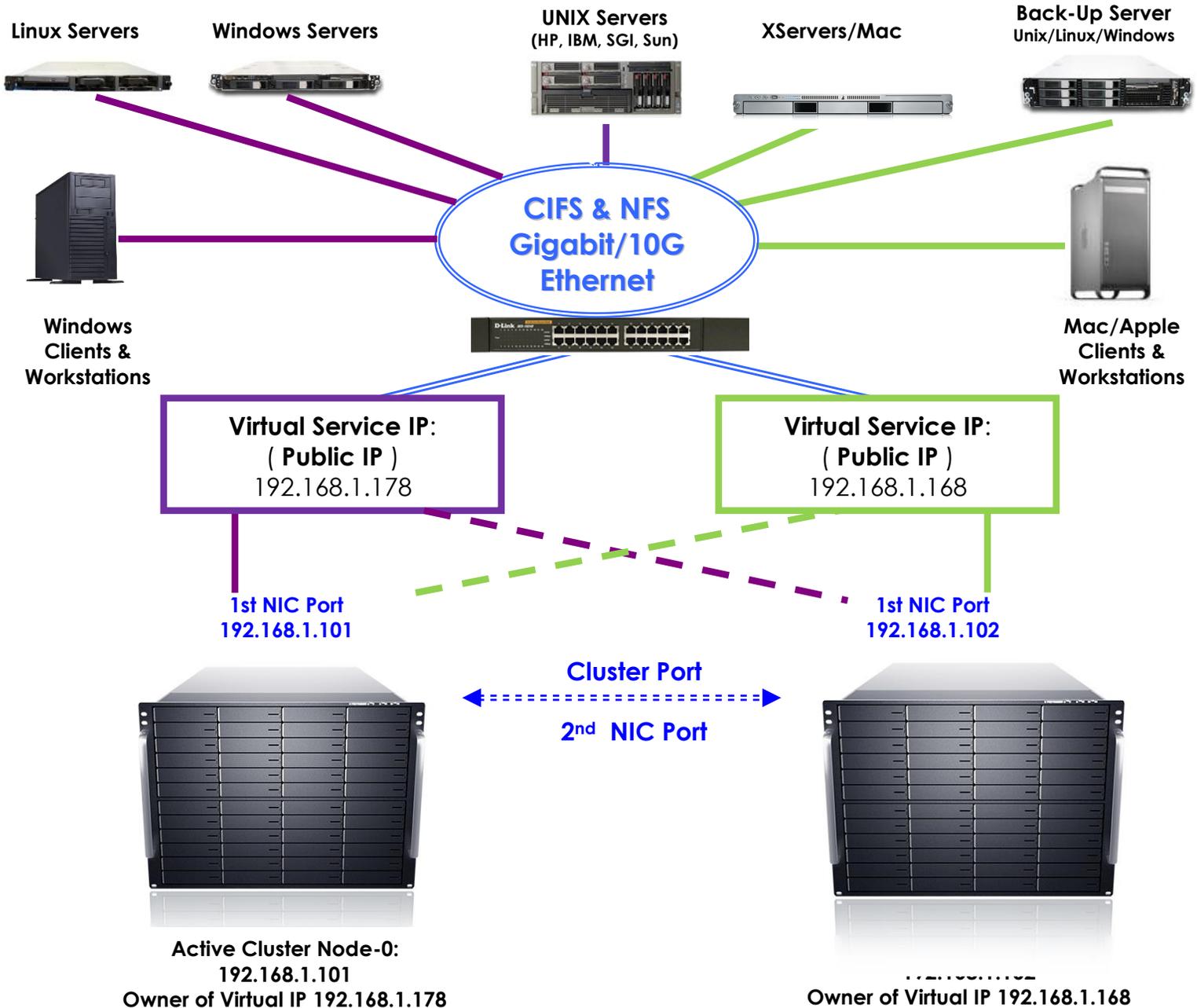
**Active-Standby Configuration.**

- All clients map to the share(s) on the Public IP (virtual service IP): 192.168.1.178
- All network activities is accessing Node-0 via 1<sup>st</sup> NIC Port at IP: 192.168.1.101 during normal operation.
- Any writes from clients to Public IP will get synchronized from Node-0 to Node-1 via the 2<sup>nd</sup> NIC Ports, the Clustered Ports.
- Any Reads to clients are from Node-0 only.
- In the event Node-0 goes down, all accessing from clients will automatically and transparently failover to Node-1.
- The Failover process will take just seconds.



**Active-Active with Static Load-Balancing Configuration.**

- Separate clients into two group:
  - Clients from Group #1 map the share(s) on the Public IP (virtual service IP): 192.168.1.178 which is owned by Node-0 (Green lines)
  - Clients from Group #2 map the same share(s) on the Public IP (virtual service IP): 192.168.1.168 which is owned by Node-1. (Purple Lines)
- Node-0 serves its own clients while being standby for Node-1, and Node-1 serves its own clients while being standby for Node-0.
- Data updates on Node-0 will get synchronized to Node-1 at real time, and data updates on Node-1 will also get synchronized to Node-0 at real time.
- Write performance to the cluster (both nodes) in this Active-Active configuration is better than the Active-Standby configuration.



## Active-Active with Dynamic Load-Balancing Configuration

This setup will require an external device. You will need either a DNS server configured with **Round-Robin**, or some 3<sup>rd</sup> party network load-balancing device configured with load-balancing policy. Please consult with the specific Round-Robin DNS or 3<sup>rd</sup> party load-balancing network device for configurations for the load balancing virtual IP.

