



Intelligent Automatic Failover Technology – Automatic Switch Over (ASO)

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Introduction

Reliability and availability of requesting content are significant and challenging problems in the modern Internet. The increasing population of Internet users makes these problems be more critical to be solved. Infrastructure providers and network operators may choose to solve this problem by increasing bandwidth or installing more servers. However, this method will burden the network loading because the network and server scalability has not been solved.

Problems in traditional CDN solution

A content-oriented approach network called Content Delivery Network (CDN) has been deployed recently to increase the reliability and availability of content. Users are connected to the closest servers or caches for accessing the content, thus reducing the chance of failure and increasing the quality of service. However, most of the recent CDN solutions do not have the automatic failover solution. It means that when a node on the content delivery path is failed, the connection is lost. A client has to make a request again for resuming the connection. This greatly discourages the client from accessing the content and thus leading to user lost.

In order to prevent the content providers from losing clients, an automatic failover solution must be provided to solve the connection lost problem mentioned above. This functionality must be transparent to the end-users so that they can still access the content continuously even an intermediate node is down. It is especially suitable for long-running connections like streaming media, Internet telephony and FTP transfers etc. SinoCDN's content networking solution enables this mid-stream failover functionality for streaming media.





Automatic Switch Over (ASO)

SinoCDN's ISG-based CDN solution provides the ability of Automatic Switch Over (ASO) between ISGs for live streaming media. This industry leading advance technology is called ASO. This feature can efficiently solve the problem of content unavailability or node failure. When there is an ISG node fail or the streaming content is suddenly unavailable during delivery, the CDN can intelligently migrate the connection from the failure node to another healthy ISG, transparent to the end users. The connection is resumed and users can enjoy the content continuously without interruption. The details of the switch over mechanism will be described below.

Benefits and Features

- Enable automatic failure recovery for live streaming media
- Eliminate single point of failure
- Automatic failure detection and failover
- Transparent to end-users
- Increase quality of service
- Intelligent path selection by working with *ActiveRoute™* technology
- Enable equipment upgrade without interrupting service

Components of ASO

There are several components in ASO to make it function:

1. ActiveRoute™ system

The intelligent content routing of *ActiveRoute™* of the ISG is an important component for ASO. The *ActiveRoute™* system provides the information of the original stream delivery path for ASO. Moreover, it selects the best healthy node for the system to perform intelligent switch over when there is a node failure.

2. Monitoring system

There is a monitoring system in the ISG for monitoring the incoming stream connections. When the monitoring system realizes that there is suddenly no data delivery for an incoming stream from a neighbor ISG, it will treat that ISG as failure and initiate *ActiveRoute™* system to find a healthy one for switch over.



3. Supporting candidate nodes

In order to maintain the original stream connection, the ISG performing switch over must know which ISGs are healthy and contain the requesting content. Then, the ISG can immediately migrate the connection to an available one. However, we cannot take all ISGs on the network as candidates since it is not scalable. In our algorithm, the candidates for switch over are the neighbors of the ISG node that needs to perform switch over.

How ASO works?

The mechanism of ASO is described in details below.

At the beginning of a connection, the path of a streaming content passing through ISGs has been established by the *ActiveRoute™* technology. The delivery path is also recorded in the routing tables of *ActiveRoute™* system.

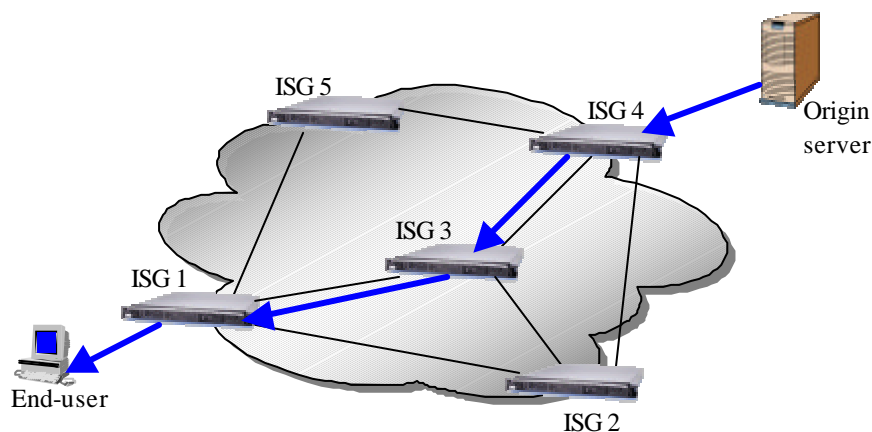


Fig.1 Original streaming connection

When the intermediate ISG (ISG 3) fails, ASO will be initiated by the downstream node (ISG 1). The monitoring system in ISG 1 continuously monitors the connection from ISG 3. When it realizes that there is no data coming from ISG 3, ISG 3 is treated as failure and ISG 1 performs switch over.

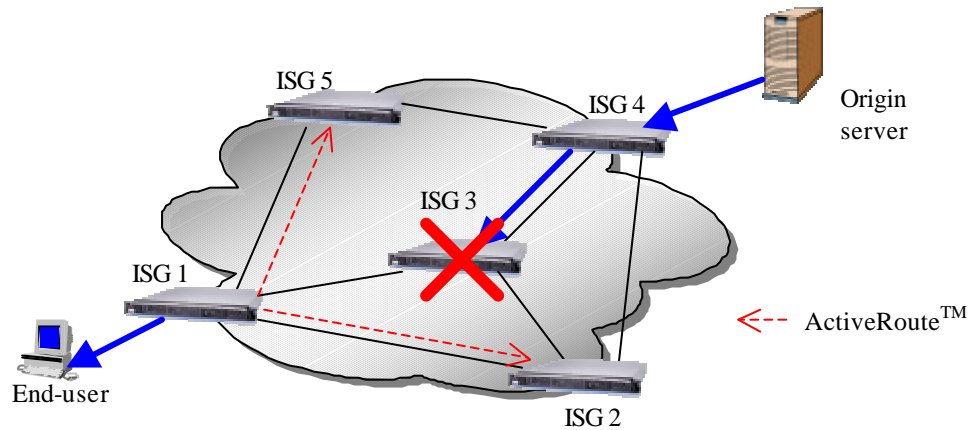


Fig.2 Search another node for switch over

After ISG 1 realized the failure of ISG 3, it uses *ActiveRoute™* technology to search a path for switch over from its neighbors (supporting candidates). *ActiveRoute™* technology finds out the best healthy node and delivery path based on the content availability, latency, loading and bandwidth. Once the new path is found, ISG 1 follows this path to obtain the content. If no new path is found until timeout, ISG 1 will connect to the original server or in-charge ISG to obtain the content.

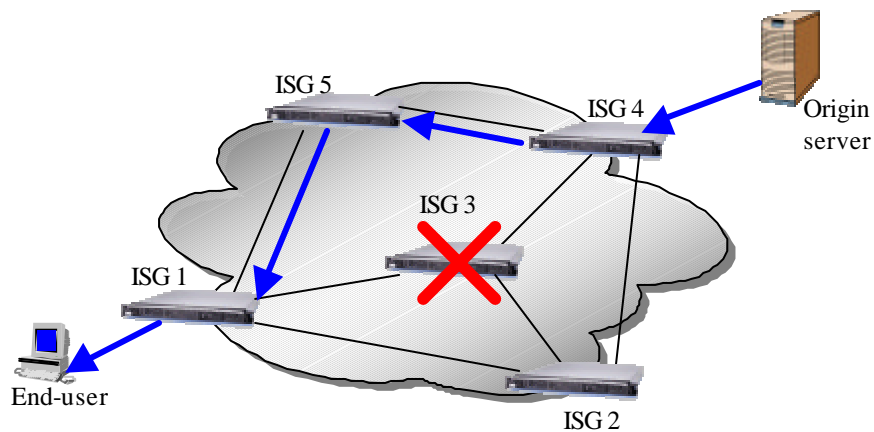


Fig.3 Automatic switch over complete

As shown in the above figures, the connection between the end-user and ISG 1 is still maintained during switch over. Our algorithm guarantees that a new path can be established before the end-user teardown the connection (timeout). This switch over technology ensures that users can enjoy the service without any interruption even there is intermediate failure point.



Summary

ASO is the industry leading technology that allows transparent automatic switch over on ISG-based Content Delivery Network for live streaming. This technology eliminates the problem of single point of failure in the core of the network. When there is a failure node in the network core, the ISGs can intelligently migrate the streaming connection from the failure node to a healthy one based on *ActiveRoute™* intelligent content routing technology. As a result, end-users can continuously enjoy the content without the awareness of failure. The quality of service and user loss rate can be greatly improved.

About SinoCDN

SinoCDN is the leading broadband infrastructure technology developer in Asia. It offers content networking and management technology, which enables high-quality live and on-demand content delivery over the Internet from long haul to edge networks. Their products are based on their innovative Intelligent Streaming Gateway architecture that can create reliable, intelligent, scalable and easy-to-manage Content Delivery Network infrastructure for millions of users with best viewing experience. The company is headquartered in Hong Kong, with offices in Boston US. Additional information is available at <http://www.sinocdn.com>

