

# Ensuring Network Reliability and Quality for IP Surveillance

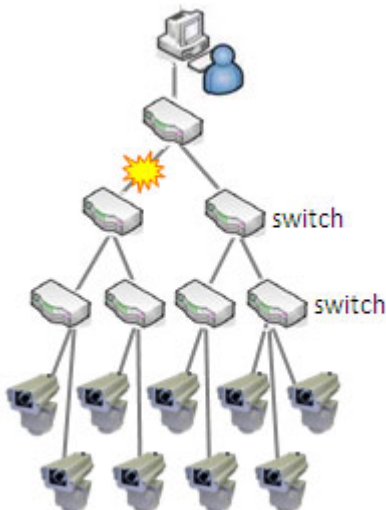
*Korenix MSR: The Most Reliable and High Quality IP Surveillance Network*



Along with the emerging market of IP surveillance, network plays increasingly important role in a video surveillance system. The network in its turn, determines the reliability and quality of video delivery. This paper describes the importance of network redundancy for IP surveillance network. It gives a clear idea of how Korenix patented MSR redundancy technology outstands from other protocols and describes all the exceptional benefits that it can give to the IP surveillance system.

## Network Redundancy is Critical for IP Surveillance

Legacy IP surveillance network is connected into a star topology where video streams are transmitted from cameras to the monitoring room. Closer is the link to the monitoring room, more video streams are carried through a single Ethernet cable. A single link failure will result in serious loss of images which is not acceptable for a surveillance system. As a result, network redundancy is critical for IP surveillance.



**Figure 1.** A link failure occurred in an IP surveillance network results serious loss of images.

## The Best Choice of Network Redundancy Technology

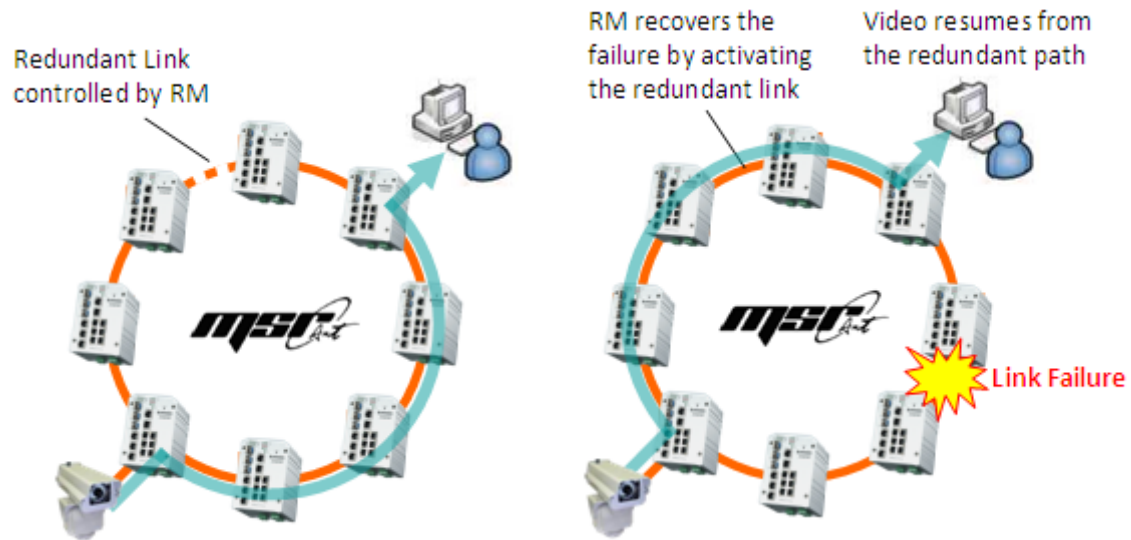
To protect a surveillance network from failure, a redundancy technology is required. RSTP (Rapid Spanning Tree Protocol, IEEE 802.1w) is commonly chosen for network redundancy. While RSTP can provide redundancy, its original design is for interconnectivity: to connect network devices from different vendors in any topology without problem. Since RSTP requires a complex algorithm to handle this, it cannot guarantee the failure recovery time which can take up to few seconds. Lots of images can be lost while RSTP recovers the failure.

Furthermore, the scalability of an RSTP network is limited. According to the standard, the maximum level of switches connected from the central room to the cameras is limited to 20. This constrains RSTP from constructing a large scale surveillance system.

|  | RSTP                           | Korenix MSR   |
|--|--------------------------------|---|
| <b>Standard</b>  | IEEE 802.1w                    | Korenix Patented  |
| <b>Purpose</b>   | Interconnectivity              | Redundancy  |
| <b>Topology</b>  | Any                            | Ring  |
| <b>Algorithm</b>   | Complex                        | Simple  |
| <b>Failure Recovery</b>                                    | Not Deterministic, <5s         | Deterministic, < 5ms  |
| <b>Failure Restoration<br/>(Upon the failure is fixed)</b> | Packet loss<br>Topology change | Seamless Restoration<br>No packet loss<br>No loop<br>No topology change |
| <b>Scalability</b>   | 20 in depth                    | 250 in a ring   |

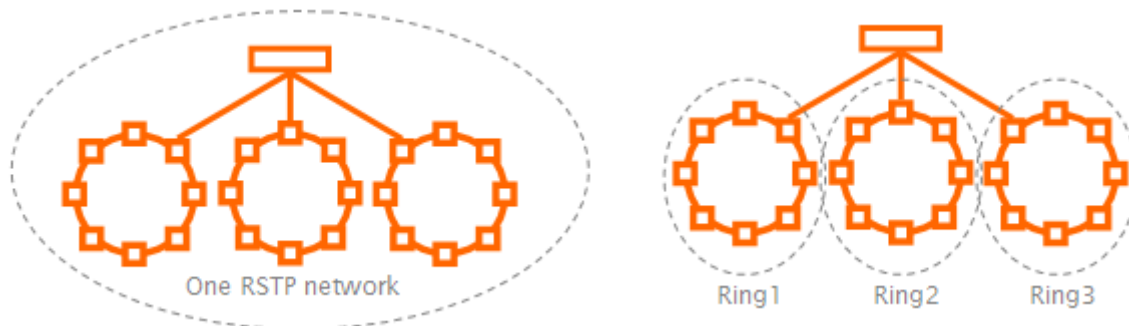
**Table 1.** Comparison of RSTP and Korenix MSR redundant ring

To solve these problems, Korenix introduces **MSR (Multiple Super Ring)**, the surveillance redundant ring technology, which is specifically designed for building the most reliable, high quality and scalable IP surveillance networks. With the simplest network architecture, Korenix MSR guarantees the failure recovery time within 5ms. Video streams are protected from any network failure and can be resumed even without being noticed.





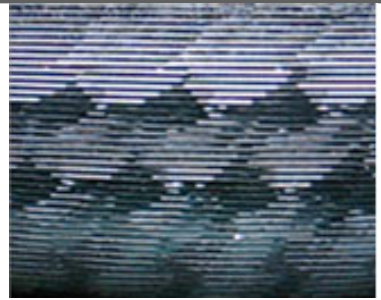


**Figure 2:** Korenix MSR protects an IP surveillance network from link failure. Video resumes from a failure with in 5ms.

The maximum number of switches in a single Korenix surveillance redundant ring is 250. Several rings can be connected together for larger surveillance network. Unlike RSTP, which treats all LAN devices as a single system, each of Korenix surveillance redundant rings operates independently. The influence of any network failure is limited within the ring itself and will not spread to the other parts. As a result, MSR provides the most scalable IP surveillance network and high quality video transmission.



**Figure 3:** Even with the same topology, RSTP treats all rings as a single network. Any link failure affects the whole network and the recovery time is longer because of its complexity. On the contrary, Korenix redundant ring works independently and guarantees the failure recovery time within 5ms.

In addition, RSTP results in packet loss and topology change when a network failure is restored. A topology change leads to image loss and packet flooding to everywhere. This prolongs system downtime, consumes bandwidth and downgrades the video quality. Korenix MSR introduces an error-free restoration procedure, **Seamless Restoration**. There will be no any packet loss, no loop and no topology change when restoring a broken ring to its original redundant-guarantee state. The patented mechanism eliminates any unstable status and guarantees the best quality and smooth video delivery.

| RSTP and Other Ring Protocols  |  |   |
|--|--|---|
|   |                           |  |
| Failure recovery < 50ms  | Failure recovery > 1s  | Broadcast Storm   |
| <p>Other protocols require longer recovery time. The longer it recovers the more images are loss. During restoration, some ring protocols result in broadcast storm which overwhelms the network. No images can be seen.</p> |  |   |
| Korenix MSR Technology   |  |   |
|    |                         |   |
| Rapid failure recovery < 5ms   | Seamless Restoration   |   |
| Video streams resume even without being noticed.   | Restoration time = 0, no packet loss, no broadcast storm and no topology change. Video continues smoothly. |   |

**Figure 4.** Compared to other protocols, Korenix MSR guarantees the most reliable and quality video delivery

### How Korenix Surveillance Redundant Ring Works

There are 5 stages in the ring operation: Setup, Normal, Failure Recovery, Abnormal, and Restoration.

- 1. Setup State:** The switches are linked into a ring topology. One of the switches is selected as RM (Ring Master) to manage the ring. RM blocks one of its ring paths for redundancy.
- 2. Normal State:** RM starts to monitor the live status of ring in case of any network failure.
- 3. Failure Recovery:** Following the failure, either caused by a link break, device down, or system maintenance, RM notices the failure and recovers the network connectivity by activating its redundant path immediately. The video resumes through the redundant path. IT staff can be notified of the failure event through alarm, email, or SNMP trap.
- 4. Abnormal State:** The ring is broken and has no redundancy capability. IT staff starts trouble shooting and requires restoring the failure in the shortest period.

5. **Restoration:** IT staff fixes the failure and the ring regains its redundant capability.

## The Most Reliable, High Quality and Scalable IP Surveillance Network

Compared to other protocols, Korenix patented redundant ring is superior in all stages to provide the most reliable and high quality IP surveillance network.

1. **Easy Setup:** Korenix MSR provides a simple and time-saving setup mechanism with auto selection of the RM and of the best redundant route. The deployment of a ring is easy and does not require professional network knowledge.
2. **Efficient Control:** Korenix MSR monitors the ring status with minimum bandwidth consumption, less than 1kbps. The efficient design reserves the network resources for video surveillance demands.

|                            |                       | Korenix MSR  | Other Rings                        | RSTP                           |
|----------------------------|-----------------------|--|------------------------------------|--------------------------------|
| <b>Setup</b>               |                       | RM auto selection<br>Redundant path auto selection                                 | Manual configuration               | Complex parameter setting      |
| <b>Failure Recovery</b>    | <b>Link Failure</b>   | 5 ms recovery<br>Multiple redundancy   | < 300ms                            | Not deterministic              |
|                            | <b>Device Failure</b> | 5 ms recovery<br>RM redundancy   | < 300ms<br>No RM redundancy        | Not deterministic              |
| <b>Failure Detection</b>   |                       | Failure notification<br>Failure Positioning  | Failure notification               | Topology change notification   |
| <b>Failure Restoration</b> |                       | Seamless Restoration<br>No packet loss<br>No broadcast storm<br>No topology change | Topology change<br>Broadcast storm | Topology change<br>Packet loss |

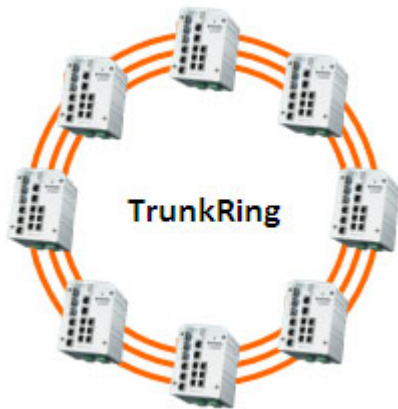
**Table 2.** Comparison of redundancy technologies in all stages of ring operation

3. **Rapid Failure Recovery and RM Redundancy:** Korenix MSR guarantees the recovery of a network failure, either link or device failure, within 5ms; video streams continue smoothly. The exclusive RM redundancy mechanism ensures the ring's reliability even when the RM fails.
4. **Failure Notification and Positioning:** In addition to the event warnings, such as alarm, email, or SNMP trap, Korenix MSR points out the failure location by the LED indicator. The Korenix network management software, JetView Pro, also helps IT staff to do fast trouble-shooting by the visualized network topology layout. All these management features help to detect and react to the failure promptly.
5. **Seamless Restoration:** The patented mechanism has 0 ms restoration time and eliminates the packet loss, loop, and topology change problems of other protocols when restoring a failed network to its original state. It guarantees the highest quality video transmission for an IP surveillance system.

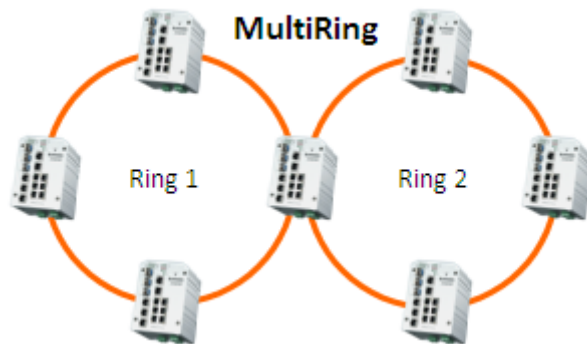
6. **Truly Scalable:** Korenix MSR includes **TrunkRing** and **MultiRing** mechanism to fit the needs for the increasing bandwidth and the expansion of a surveillance system.

**TrunkRing** increases the bandwidth on the ring by link aggregation mechanism. Multiple gigabit links trunked together are capable of delivering hundreds of megapixel images in a large surveillance system. TrunkRing also enhances network reliability; the trunked ring fails only when all the aggregated links are broken.

**MultiRing** provides easier connectivity between two ring networks. MultiRing technology simply extends the network coverage of an IP surveillance network.

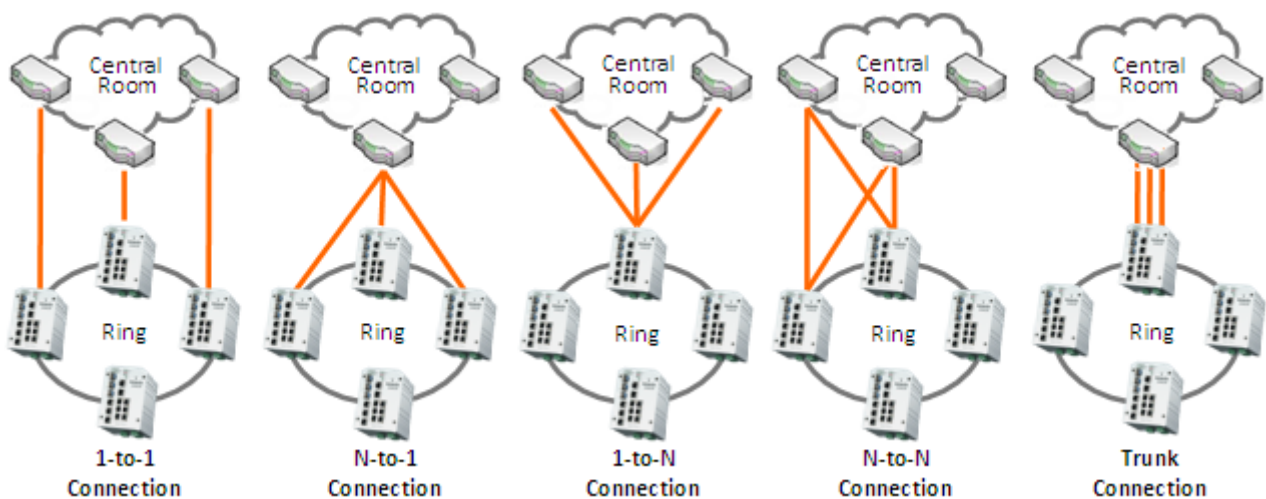


**Figure 5.** TrunkRing mechanism increases the bandwidth and the reliability as well.



**Figure 6.** MultiRing can easily expand the network to form a larger IP surveillance system.

7. **Fully Cisco Compatible:** Korenix MSR is fully compatible with Cisco switches. It can connect to Cisco switches easily and flexibly. Multiple redundancies are achieved by connecting more than one single link. Link aggregation is also integrated for greater network capacity.



**Figure 7.** Korenix ring connects to the switches in the central room easily and flexibly with multiple redundant capabilities.

## Summary

MSR, the Korenix surveillance redundant ring technology, is easy to use and assures the most reliable, scalable and high quality IP surveillance network. It is applied to Korenix PoE switches, Ethernet switches, Surveillance and security networking computers to deliver quality videos in a reliable surveillance network from the IP cameras to the central room. It is the most suitable for airport surveillance, transportation surveillance, city surveillance, highway surveillance, casino surveillance, harbor surveillance, bank surveillance, campus surveillance, retail surveillance, etc.

## Appendix: Korenix Patents for Surveillance Ring Technology

- Rapid Super Ring
- Dual Homing
- Dual Homing II
- Multiple Super Ring with MultiRing, TrunkRing, AnyRing
- Seamless Ring Restoration with ZERO Restoration Time
- Rapid Dual Homing II
- Fast Recovery Mechanism for Trunk Ring
- A Fast Redundant Path Moving Mechanism for Network Coupling

## About Korenix

Korenix, the network leader, is dedicated in providing the most reliable and high quality PoE switch, Ethernet switch, weatherproof Ethernet switch, wireless outdoor AP and embedded computer for IP video surveillance anytime, anywhere and for any purpose.

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