Indigenous Switch-Routers for Dependable Video Surveillance Networks

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Video-surveillance represents a security sensitive application and usually consists of number of geographically distributed cameras (fixed and PTZ type) connected to a farm of high performance servers (for display, recording, storage) through computer network. Currently all network devices are of foreign origin leading to cyber security concerns in critical applications. Now, we have an indigenous solution for dependable and secure surveillance network.

Carrier Ethernet based switch-routers designed by IIT-Bombay are being manufactured under license by ECIL as ECR series products. E&I Group, BARC is involved in adding value to this path-breaking new technology through enhancements and evaluation studies so as to increase its penetration in security sensitive and strategic applications. ECR routers with their proprietary routing protocols are well-suited for closed group communication where cyber-security is a concern. This, along with low latency and low power make them especially attractive option for integrating video-surveillance networks spanning 10’s of Kms and thousands of cameras.

Currently, three models (Fig.1: ECR-100/1000/1010) are available. Together, they provide both copper and optical Ethernet ports and support 10/100/1000 Mbps speeds as well as 10Gbps Ethernet or OTN. A light-weight Network Management System (NMS) helps in configuration, operation, monitoring and maintenance of the network. The network is “completely managed” - all communication parameters are a-priori configured from NMS. Only the configured nodes are allowed to communicate with other configured nodes and the traffic is limited to the provisioned bandwidth. This feature greatly enhances security since access to network is restricted to configured, authorized users/devices.

Salient features of ECR based networks are given below.

- Provides a high level of protection against DoS (Denial of Service) attacks.
- Inherent topology security provides data-origin authentication.
- Configuration change and download is authorized and authenticated before being accepted and is maintained on power-on/off.
- Replay of control plane traffic for configuration is protected through timeout of authentication and session tokens
- Any fault in the network is detected and switchover to pre-defined redundant path occurs within 50msec and is annunciated on NMS.

E&I Group, BARC has successfully integrated a prototype Video Surveillance system around these ECR switch-routers. Specific functions were added to the devices to optimize their performance in a video-surveillance application. These include Internet Group Management Protocol (IGMP) for dynamic join and leave for multicast group and provision to handle burst of traffic from cameras without incurring delays and freeze-frames. Fig.2 shows the screenshot of display workstation for 3 camera network.

ECR routers are well-suited for demanding video-surveillance applications; it offers an indigenous, dependable, secure and economical alternative for security sensitive installations while planning their video-surveillance systems.