

Open Transport Network (OTN)

The OTN Triangle: empowering your physical security network



HIGHLIGHTS

OTN communication network

Large dynamic visualization displays

Network video recording & video analytics

Introduction

Nokia Siemens Networks' security network vision as adopted in the Safety & Security markets today brings together industrial grade video products and solutions built around a core OTN fiber optic communication system.

A hybrid model, called the OTN Triangle, offers our customers in various segments - Metro, Rail, Mining, Motorways, Oil&Gas, Pipelines, Electricity, Industrial Plants - technological advantages as well as investment protection and a risk-free integrated security network system.

Although peripheral security equipment such as cameras, access control panels and video recorders are moving to network or IP-based devices, many customers have heavily invested in traditional equipment over the years. Despite the many advantages that IP-based end-to-end solutions offer, many of the pure IP-based solutions suffer from inconsistent video quality as well as poor manageability due to the complexity of IP Multicast or IGMP. Nokia Siemens Networks' experience with voice and video over IP has been that "Critical Infrastructure" markets are opting for a Hybrid model.



This model allows our customers to take advantage of some of the features that IP has to offer, benefit from real-time TDM based technologies, deploy a future proof, secure, industry-grade reliable and integrated communication system, and at the same time maximize the investment done in legacy equipment.

Although investment protection is the key driver for the Hybrid model, this model also offers major technological advantages.

The core product for the Hybrid model is OTN or Open Transport Network. Together with key partners for the visualization, recording and video analytics, we are able to offer a risk-free, low maintenance, fully operational and integrated Security System. This Hybrid solution will be referred to as the OTN Triangle.

Physical security network vision

Technology is a major tool in the hands of Critical Infrastructure Entities that are confronted with today's issue number one: Security. In order to counter various threats such as terrorism, disaster and fire, these entities use a wide array of surveillance and warning systems, ranging from sophisticated security and building management systems, access control systems

and emergency phones to video surveillance. These Security applications can only work properly if they are supported by the right infrastructure.

As the Security Department has very specific requirements, a majority of people in the industry are convinced that Security applications need to run on a dedicated network that provides guarantees in terms of bandwidth and propagation delay. Virtual LANs or VLANs will not do the job in many cases.

Typical physical security network customer requirements

The Security Network must have specific features in order to meet the specific needs of the Security department. Several interviews with customers allowed us to highlight 5 basic requirements:

- **Security above all - no compromise**
Sharing bandwidth with other applications is not an option: traditional VLANs are not a valid solution.
- **Redundancy and resiliency**
The network nodes must offer redundancy options for vital parts such as power supplies, control cards, optics and transmission paths.

- **High-quality, full motion and real-time video**

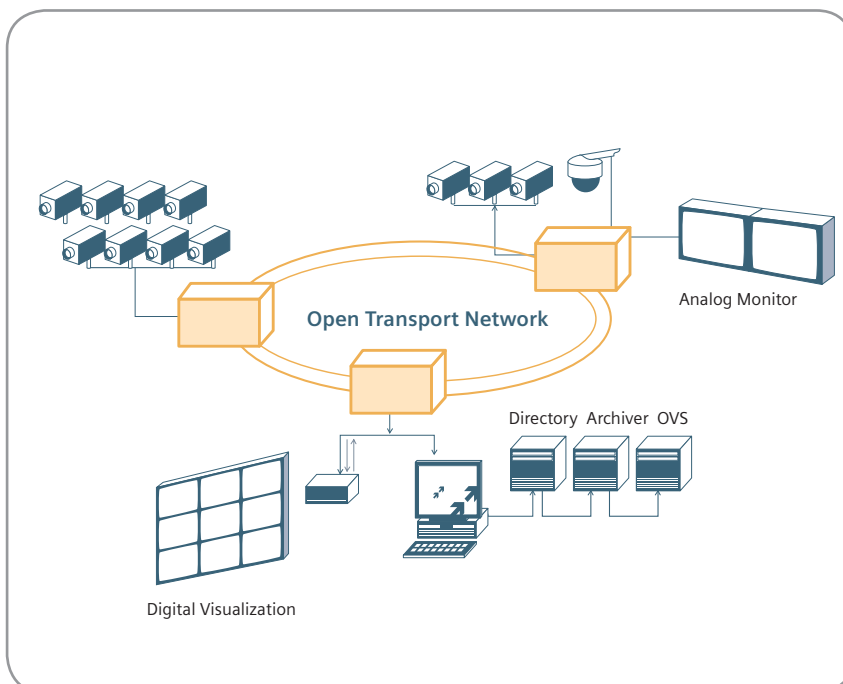
- The end-to-end delay must be predictable and must be reduced to a minimum.
- Stable video compression and stable frame rate are a must, even in the worst conditions.

- **Access and Integration**

- The network should provide different electrical interfaces so that our customers are able to connect IP-based systems as well as legacy systems.
- The network must offer an integration platform allowing interaction between surveillance systems of different vendors, all sorts of alarms, access control systems, video intelligence and video recording systems.

- **Low lifetime costs**

The network must optimize operational expenses by offering easy and integrated management. It must be possible to train a security administrator in 3 to 5 days. Management Software Updates should be free!



Critical infrastructure markets

The Triangle solution will mainly target Critical Infrastructure Markets with following characteristics:

- We look at stretched markets where there is a distance factor.
- Markets that need to connect IP-based systems as well as legacy equipment.
- Markets that need 100% uptime and that run critical applications.

Markets that meet these requirements are: Metro & Rail, Tunnels, Bridges, Highways, Defense, Airports, Utilities, Mines, Petrochemical Plants, Government, Municipalities, Prisons, Pipelines, Universities, Ports,

The OTN Triangle

OTN (Open Transport Network) is a private communication network, based on the latest fiber technology. OTN uses a single fiber pair and is used to transport various types of information such as video images, audio and data over a large distance and without any loss of quality. One link is able to bridge 70 miles / 110 km without repeating the signal.

OTN uses Time Division Multiplexing (TDM) and makes sure that applications do not share bandwidth and that delays are kept to a minimum. Although OTN is a TDM network, it offers support for packet based protocols such as Ethernet/IP.

OTN uses a SONET/SDH frame offering the resiliency of SONET/SDH networks in case of a fiber cut. In case of a fiber cut the network will recover within 50 ms.

Today's OTN family includes four bandwidth variants: OTN-155 (OC3c-STM1c), OTN-X3M 622 (OC12c-STM4c), OTN-X3M 2500 (OC48c-STM16c) and the OTN 10Gbps (OC192c-STM64c).

The OC48c/STM16c and OC192c/STM64c systems are the high-end/high bandwidth versions of the product line and were designed for complex, real-time video networks that need to be combined with redundant Ethernet traffic.

OTN network nodes are capable of providing Gigabit Ethernet ports that can serve as resilient transport for the administrative applications of the security department. In other words, the IT network can run over the Security network instead of the other way around.



OTN and video

OTN is able to transport video signals in a unique way. OTN nodes offer several connection possibilities on the access side: NTSC, PAL and Ethernet for IP cameras. In the case of NTSC and PAL, the signal is converted by an integrated encoder into an MJPEG or MPEG 2/4 stream. That stream is given a secure and dedicated path to the egress side of the network where it can be decoded or where it can be kept digital. The egress side can be 70 miles / 110 km away from the camera location. OTN also provides embedded "matrix" functionality eliminating the need of a video matrix.

What makes OTN so unique is that it provides an easy manageable single box solution to transport video together with other signal types such as access control - area rescue systems and for example



radio. While being transported over a single pair of fibers these signals do not share bandwidth. Operating expenses are kept to a minimum as one management system is used to manage, configure and troubleshoot the system. In addition, Nokia Siemens Networks provides a 10-year product commitment to all its customers guaranteeing that the system will be supported for a minimum of 10 years after the purchase.

Other Triangle components

Other components of the OTN Triangle are NVR (Network Video Recording) solutions, Digital Visualization products and Video Analytics algorithms from major leading brands.

We work together with pioneers in IP video surveillance solutions and with leaders within the physical security industry. Typically their systems provide a software platform from where "video systems" can be managed and include a Network Video Recorder (NVR) function that can handle thousands of video streams. We select Open solutions to assure that video analytics developers can communicate with the video management system.

World leaders in display and visualization solutions make sure they are interoperable with OTN. Streams as well as general data managed by the video management system and the network video recorder are transported via OTN and can be displayed on high-quality digital display walls, offering the simultaneous display of multiple sources on walls of various sizes: for example video data can be displayed on top of traffic data - more than one source can be viewed at the same time - etc...

What does the OTN Triangle bring to the table?

Analog images are captured by the cameras at the remote location



and encoded by OTN into an MPEG2/4 format. These streams are transported to the egress side where they are kept digital. In other words the streams come out of a special Ethernet board called MVIDIP. One board can handle 60 streams. The integration lies in the fact that these streams can be read by major video management and NVR providers as well as video controllers from leading digital display manufacturers.

Many potential customers think that it is easy to integrate systems that communicate over Ethernet but this is so untrue. Video over IP protocols are proprietary due to the lack of standards and whenever two vendors want to integrate their systems developers have the write code to make things work. By integrating all pieces of the OTN Triangle we spared our customer and partner integrators a lot of issues. OTN guarantees an end-to-end integrated solution that provides the highest image quality possible with no significant delay. OTN also makes sure that all features of each individual component of the OTN Triangle are kept untouched and remain operational.

In terms of manageability, OTN Triangle customers will not have to worry about IGMP or multicasting protocols as OTN uses video

switching to distribute video across the network. Many customers have witnessed the complexity of provisioning a pure IP-based system. Dealing with IGMP has given them sleepless nights especially when the camera count is high.

If we revisit the video analytics subject customers can easily understand that these algorithms work best when they are fed with a reliable constant bit rate or predictable bit stream and that is exactly what OTN will provide. Furthermore, in our strive to protect our customers investments, we make sure the solutions we offer and the companies we partner with, are open and flexible to allow usage of the latest developments in this complex and fast moving field.

OTN's proven track record of supplying reliable products, which are open and fit for future technological developments, focused on matching our customer requirements, are a blueprint of what you can expect from this OTN Triangle. Take advantage of the Power of a Group, the attention of one team, from design to supply, our expertise is at your service.