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Siemens leads the way to spectacular Saadiyat Island Cultural District

Reliable RUGGEDCOM products from Siemens are at the heart of automated tunnel to connect all three museums: Louvre Abu Dhabi, the Guggenheim Abu Dhabi and the National Zayed Museum on Saadiyat.

Saadiyat is quickly becoming home to world's highest concentration of important cultural institutions at a single location. These include the Zayed National Museum, Guggenheim Abu Dhabi, Louvre Abu Dhabi, a performing arts center, and a maritime museum. A car tunnel linking Saadiyat Island to the city is a vital infrastructure component that will bring in an anticipated 1.5 million visitors a year. Twelve meters wide, six meters deep and 1.2 kilometers long, the underground tunnel will also provide connectivity between the institutions that will be at the heart of the Saadiyat Island Cultural District.

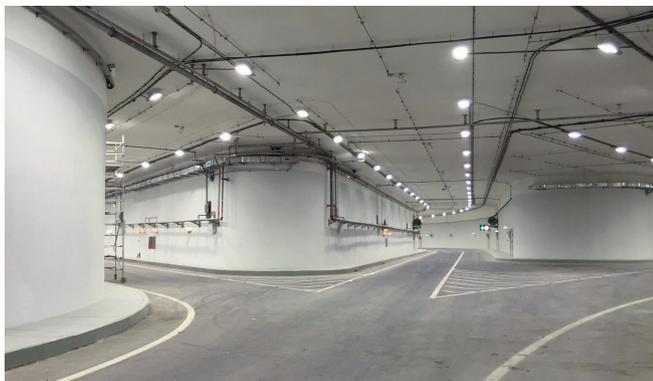
With overall responsibility for the project, the Tourism Development & Investment Company (TDIC) of Abu Dhabi has prioritized that the tunnel should also maximize convenience for museum staff and visitors, while ensuring their safety and security. A sophisticated communications infrastructure is essential to making this happen, so planning began for a three-ring network topography.

The first provides Supervisory Control and Data Acquisition (SCADA), the second delivers closed-circuit television (CCTV), and the third is an Intelligent Transportation System (ITS). All three rings are linked to two control rooms. Electro Mechanical Co. LLC (Elmec), founded in 1971 and based in Abu Dhabi, was assigned responsibility for the SCADA/ITS/CCTV network. Elmec is an exclusive agent of Siemens, and its permanent staff of more than 300 people focus on designing, engineering, supplying, installing and commissioning electrical products, services and systems based on Siemens products.

The challenge

To enable sophisticated, reliable communications in a confined space and under extreme environmental conditions. The tunnel's state-of-the-art communications network was designed to maximize commuter convenience, while ensuring safety and security for all museum visitors. Network reliability was paramount, but some tough conditions had to be overcome to ensure success.

As space in the tunnel is so limited, all the field switches needed to be ultra-compact, yet still maintain sophisticated functionality. They also needed to withstand difficult environmental factors such as extreme heat and humidity, a lot of dirt, constant vibration, and a heavy dose of electromagnetic interference. In addition, the creation of the network needed to keep pace with an overall timeline for the construction of both the museum and tunnel which was highly ambitious. So product delivery, installation, and testing all had to be managed within a matter of months.



The 1.2-kilometre car tunnel linking Saadiyat Island to the city is equipped with the latest network equipment from Siemens.

The solution

RUGGEDCOM products from Siemens meet all these challenging requirements. They can be delivered quickly and are fully supported with an extended warranty.

Venu Gopal is a Senior Automation Engineer at Elmec, responsible for the design and commissioning of the tunnel's entire control system. He knew from past experience that he could count on the RUGGEDCOM products to meet their network architecture requirements.

"We know RUGGEDCOM products work in a harsh environment, including at very high temperatures," he says. "And we know how reliable RUGGEDCOM and other Siemens products are. From our many years and many installations, such as substations and water pumping stations, we have found these products to be 100 percent reliable and don't need replacing for many years."

For this particular project, the network architecture required a number of elements from Siemens, with key protocols being used to ensure redundancy protection. The CCTV cameras work with compact and durable

RUGGEDCOM products in the tunnel communication architecture

RUGGEDCOM RX1510 – A compact, cost-efficient, utility-grade layer 2 and layer 3 switch and router, this device is ideal for traffic control systems, with a modular and field-replaceable platform that allows for selection among WAN and serial and Ethernet options.

RUGGEDCOM RX5000 – This device is an integrated switch and router supporting 10 Gigabit uplink speeds and features, able to serve as the critical backbone of any network in the most challenging climatic environments.

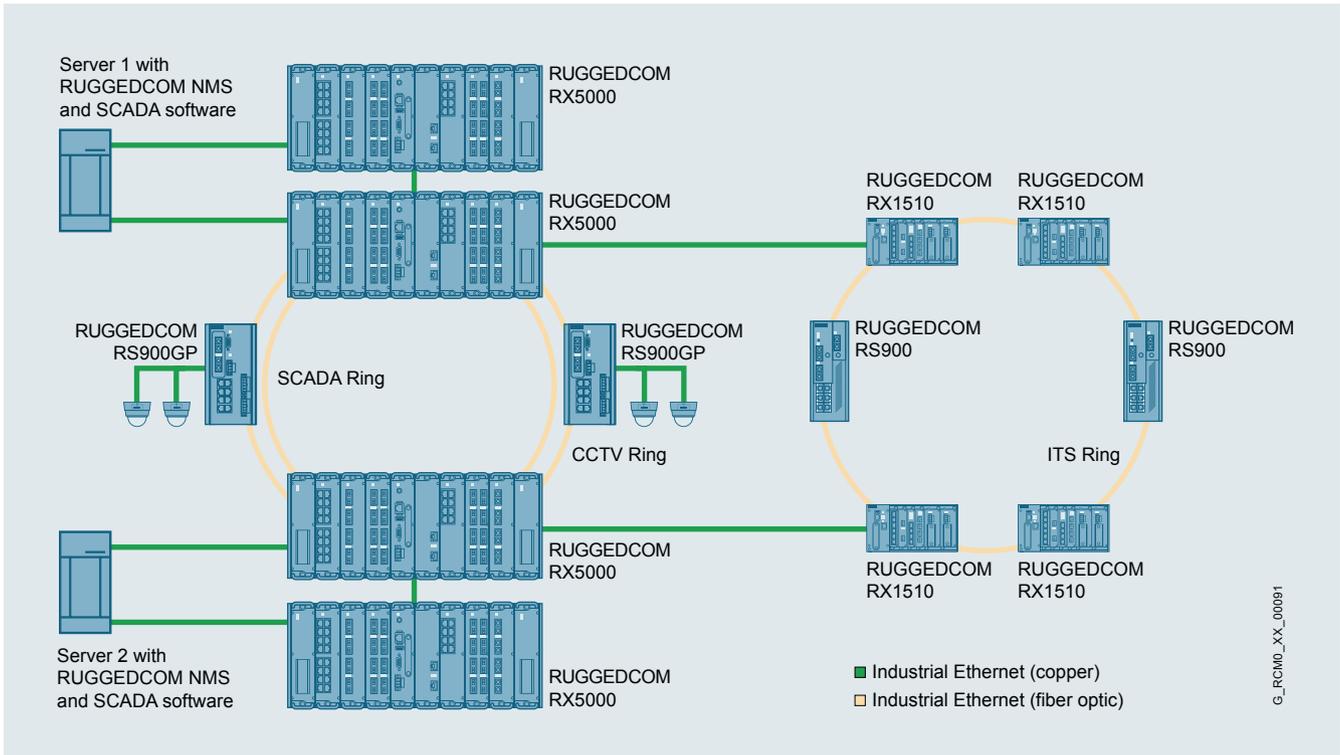
RUGGEDCOM RS900G – Designed to operate reliably in harsh environments and placed in almost any location, users of this utility-grade, fully managed Ethernet switch benefit from its dual-fibre-optic gigabit Ethernet ports and eight fast Ethernet copper ports.

RUGGEDCOM RS900GP – A fully-managed switch, with eight Power over Ethernet (PoE) ports, and designed to provide power to end devices in extreme environments, it is capable of providing up to 30W per port (up to 240W total) in -40°C to +85°C temperatures.

RUGGEDCOM NMS – A fully-featured enterprise-grade network management software based on the OpenNMS platform, this solution is specifically designed for the rugged communications industry, providing a comprehensive platform for monitoring, configuring and maintaining mission-critical IP-based communications networks.



The RUGGEDCOM RX5000 integrated switch and router is a high-port-density Ethernet routing and switching platform designed to operate in harsh environments – like that of the tunnel to Saadiyat Island.



Saadiyat tunnel network connectivity layout.

RUGGEDCOM RS900GP switches to transmit video to the control rooms, where a collection of reliable RUGGEDCOM RX1510 and RX5000 core switches are housed to direct the gathering and storage of video on servers.

Similarly, RUGGEDCOM RS900G switches transmit SCADA information – including key communications on the functioning of lighting, pumps, mist, low voltage, jet fans, fire alarms, and various sensors in the tunnel. The reliable RS900G devices are also used for sending and receiving automotive traffic information related to all the ITS equipment. RUGGEDCOM NMS network management software ties it all together, integrating all three network rings in a user-friendly way. Finally, all products were provided with a five-year warranty to ensure long-term peace of mind.

The results

A fully-automated tunnel anchored by RUGGEDCOM products that have been designed for long-term reliability.

With all the RUGGEDCOM devices installed, configured, tested and working well, and the tunnel already in operation, Mr. Gopal can look back on the role Siemens played with satisfaction. In dealing with a market leader, he knew he could count on excellence with both the products and people behind them. He notes that with such a tight timeline it was a relief to be working with Siemens.

He was confident based on his past experience with the company that it would be able to come through.

“This is a complete solution with a cost-effective design and everything was delivered quickly. That was important because we had a fast timeline,” he explains. “The project was awarded to Elmec in May 2015. The completion date was set for the following October. So the delivery, configuration and installation were very tight and Siemens delivered on that for us.”



The automated tunnel provides 24/7 monitoring and control over all functions with full reliability, thanks to a strong communications network in a ring-based architecture.

The future

More projects throughout the region in transportation and other sectors. The suite of Siemens products used by Elmec in the tunnel demonstrate the potential for the two teams to come together on future projects in the region, especially for leading-edge transportation initiatives that involve ITS.

It's all underpinned by a great long-term relationship between Siemens and Elmec in serving organizations like TDIC, and based on a Siemens' strong reputation across the region. "I strongly recommend Siemens products and people," concludes Mr. Gopal. "We have lots of experience with projects such as substations and pumping stations. I expect we will have many more opportunities like this one with TDIC."

Case study at-a-glance

Customer: Established in 1971, Elmec is an exclusive agent & solution partner of Siemens in Abu Dhabi, with a team of more than 300 people focused on delivering cost-effective solutions and systems.

Challenge: A sophisticated fibre-optic communications infrastructure was needed to monitor and manage an automated tunnel for service vehicles; switches and other hardware and software must reliably handle extremely difficult climatic and environmental conditions.

Solution: RUGGEDCOM RX5000 for control rooms; RUGGEDCOM RS900G for SCADA and ITS; RUGGEDCOM RS900GP and RX1510 for CCTV; RUGGEDCOM NMS for the management of the entire network.

Results: An automated tunnel that provides monitoring and control over all functions with full reliability, thanks to a strong communications network in a ring-based architecture.

Future: Based on extensive experience working together on projects spanning multiple sectors, the strong relationship between Elmec and Siemens points to many more successful collaborations in the coming years.

Security information

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions only form one element of such a concept. For more information about industrial security, please visit www.siemens.com/industrialsecurity

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