



## SWEDISH TRANSPORT ADMINISTRATION (TRAFIKVERKET)

# A MAJOR CCTV SYSTEM FOR TRAFFIC MONITORING AROUND THE STOCKHOLM AREA AND NATIONWIDE

### CASE IN BRIEF

The project involved implementing a fully-integrated, IP-based video system to monitor traffic flow on highways and in tunnels in and around the greater Stockholm area. Since 2013, the system has been nationwide and includes four monitoring centers. The two main centers are in Stockholm and Gothenburg. The monitoring centers provide actual traffic information round the clock, all year round.

The traffic center in Stockholm is maintained in co-operation with the STA and the City of Stockholm. The system also provides video to other authorities, such as the police and fire departments. In addition to the main monitoring centers, the system includes hundreds of cameras and a local monitoring center in each tunnel.

The system has continued to develop throughout the years, from its start in 1999 until present, and it is still constantly evolving. As of today, the STA system contains approximately 1400 cameras. The latest development was in 2013 when the Gothenburg area was connected to the system (~200 cameras), and in 2014 the North Link tunnel in Stockholm was connected (~350 cameras). Service, support, and extensions have been implemented since 2006.

**TELESTE**

**Swedish Transport Administration – Trafikverket**  
STA – Swedish Transport Administration (Trafikverket) is responsible for the overall long-term infrastructure planning of road traffic, rail traffic, seafaring, and aviation.

Their mission also includes constructing, operating, and maintaining state-owned roads and railways. They are helping all of society develop, planning for the entire transport system. In order for society to develop, transportation systems must work. Increased availability is of the essence.

**“ We selected Teleste as they could deliver a video system completely in accordance with our specification in terms of scalability, distribution and an efficient utilization of IP network.”**

– Lars Jonsson,  
Project manager, National Maintenance,  
Swedish Transport Administration.

### OBJECTIVES

- Ability to quickly deliver public traffic information via radio, the Internet, or road signs.
- To monitor incidents and forward video to rescue service organizations.
- To improve traffic safety, prevent accidents, and use CCTV cameras as an effective decision-supporting tool.
- To achieve better co-ordination between different authorities and guarantee an easy and efficient workflow for system operators.

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### SOLUTION

- **Scalability:** In 1999, the project started with approximately 100 cameras, and over the years the system has grown to include more than 1400 cameras (and expanding). New features and modifications have been added over the years. The system is now nationwide. All roads and road tunnels will soon be equipped with cameras.
- **Equipment and network:** 1400 cameras, distributed recording and decoding channels under four main monitoring centers. There are local monitoring centers in each tunnel. A network consisting of a Gigabit Ethernet backbone, 155 Mbit radio links, QoS via RSVP, and 4G/3G/EDGE from roadside assistance vehicles. Also, the fixed cameras use 4G for places not reached by fibre cables.
- **Umbrella system:** The Teleste VMX system is the video function for the total operator's view. The operator's environment is an umbrella system handling many subsystems; the video is one of these subsystems
- **Bandwidth manager:** Resource Preserving Protocol (RSVP) checks if there is enough bandwidth all the way from the encoder to the decoder. If no bandwidth is available, the video stream will not be connected and the user will be alerted that there is no free bandwidth for the required video stream. Seventy percent of the maximum bandwidth capacity can be utilized in video transmission.
  - Roadside assistance vehicles work 24/7 in co-operation with the police, the STA, and the City of Stockholm. The purpose of these cars is to help maintain high traffic flow and assist and protect vehicles that have suffered from, for example, mechanical failure. It is possible to transmit MPEG-4 video over 3G from the roadside assistance vehicles using the system.
- **Continuous operation:** The operational system works 24/7. System upgrades are carried out without interfering with operations and there is the possibility for a quick roll-back if the upgrade does not work as it should. Several separate systems have also been integrated since the start of the project. The City of Stockholm's own stand-alone CCTV system was fully integrated with the system in 2007. A tunnel north of Stockholm has been integrated via ASN.1 protocol (~150 cameras). The latest development involved connecting the North Link tunnel in 2014 (~350 cameras) to the system.
- **Public traffic information:** Every minute, STA publishes pictures about traffic conditions on its website: [www.trafikenu](http://www.trafikenu). Every morning, live video from the Teleste VMX system is distributed to a local TV station, which airs the video during its traffic reports.