Iasi

T13.1 Video Surveillance System in Iasi

Iasi

May 2012

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Contents

1. Introduction

1.1 Background CIVITAS

CIVITAS - cleaner and better transport in cities - stands for CIty-VITAlity-Sustainability. With the CIVITAS Initiative, the EC aims to generate a decisive breakthrough by supporting and evaluating the implementation of ambitious integrated sustainable urban transport strategies that should make a real difference for the welfare of the European citizen.

CIVITAS I started in early 2002 (within the 5th Framework Research Programme);
CIVITAS II started in early 2005 (within the 6th Framework Research Programme) and
CIVITAS PLUS started in late 2008 (within the 7th Framework Research Programme).

The objective of CIVITAS-Plus is to test and increase the understanding of the frameworks, processes and packaging required to successfully introduce bold, integrated and innovative strategies for clean and sustainable urban transport that address concerns related to energy-efficiency, transport policy and road safety, alternative fuels and the environment.

Within CIVITAS I (2002-2006) there were 19 cities clustered in 4 demonstration projects, within CIVITAS II (2005-2009) 17 cities in 4 demonstration projects, whilst within CIVITAS PLUS (2008-2012) 25 cities in 5 demonstration projects are taking part. These demonstration cities all over Europe are funded by the European Commission.

Objectives:

- to promote and implement sustainable, clean and (energy) efficient urban transport measures
- to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
- to build up critical mass and markets for innovation

Horizontal projects support the CIVITAS demonstration projects & cities by :

- Cross-site evaluation and Europe wide dissemination in co-operation with the demonstration projects
- The organisation of the annual meeting of CIVITAS Forum members
- Providing the Secretariat for the Political Advisory Committee (PAC)
- Development of policy recommendations for a long-term multiplier effect of CIVITAS

Key elements of CIVITAS

- CIVITAS is co-ordinated by cities: it is a programme "of cities for cities"
- Cities are in the heart of local public private partnerships
- Political commitment is a basic requirement
- Cities are living 'Laboratories' for learning and evaluating

1.2 Background ARCHIMEDES

ARCHIMEDES is an integrating project, bringing together 6 European cities to address problems and opportunities for creating environmentally sustainable, safe and energy efficient transport systems in medium sized urban areas.

The objective of ARCHIMEDES is to introduce innovative, integrated and ambitious strategies for clean, energy-efficient, sustainable urban transport to achieve significant impacts in the policy fields of energy, transport, and environmental sustainability. An ambitious blend of policy tools and measures will increase energy-efficiency in transport, provide safer and more convenient travel for all, using a higher share of clean engine technology and fuels, resulting in an enhanced urban environment (including reduced noise and air pollution). Visible and measurable impacts will result from significantly sized measures in specific innovation areas. Demonstrations of innovative transport technologies, policy measures and partnership working, combined with targeted research, will verify the best frameworks, processes and packaging required to successfully transfer the strategies to other cities.

1.3 Participant Cities

The ARCHIMEDES project focuses on activities in specific innovation areas of each city, known as the ARCHIMEDES corridor or zone (depending on shape and geography). These innovation areas extend to the peri-urban fringe and the administrative boundaries of regional authorities and neighbouring administrations.

The two Learning cities, to which experience and best-practice will be transferred, are Monza (Italy) and Ústí nad Labem (Czech Republic). The strategy for the project is to ensure that the tools and measures developed have the widest application throughout Europe, tested via the Learning Cities' activities and interaction with the Lead City partners.

1.3.1 Leading City Innovation Areas

The four Leading cities in the ARCHIMEDES project are:
- Aalborg (Denmark);
- Brighton & Hove (UK);
- Donostia-San Sebastián (Spain); and
- Iasi (Romania).

Together the Lead Cities in ARCHIMEDES cover different geographic parts of Europe. They have the full support of the relevant political representatives for the project, and are well able to implement the innovative range of demonstration activities.

The Lead Cities are joined in their local projects by a small number of key partners that show a high level of commitment to the project objectives of energy-efficient urban transportation. In all cases the public transport company features as a partner in the proposed project.

2. Iasi

The City of Iasi is located in north-eastern Romania and is the second largest Romanian city, after Bucharest, with a population of 366,000 inhabitants. It is also the centre of a metropolitan area, which occupies a surface of 787.87 square kilometres, encompassing a total population of 398,000 inhabitants.

The city seeks to develop possibilities for habitation, recreation and relaxation for all citizens in the region, business opportunities and provide opportunities for more consistent investments.

The city has five universities with approximately 50,000 students, the second largest in Romania. The universities and their campuses are located in the central and semi-central area of the city. In the same area, there are also a large number of kindergartens, schools and high schools with approximately 10,000 pupils. This creates a large number of routes along the main corridor, served by the public transport service number "8" (Complex Tudor Vladimirescu - Copou) with an approximate length of 10 km. The City of Iasi will implement its integrated measures in this area to be known as the "CIVITAS+ Corridor".

The city's objectives in CIVITAS - ARCHIMEDES are based on the existing plans related to transport, Local Agenda 21, approved in 2002, and the Sustainable Social-Economic Development Strategy for City of Iasi. The CIVITAS Plus objectives were integrated in the Integrated Urban Development Plan development which was finalized in October 2009.

3. Background to the Deliverable

In Iasi, before the ARCHIMEDES project, there were no video surveillance systems inside public transport vehicles. In this context, not only drivers' security was affected, but also that of passengers.

Therefore, Iasi planned to introduce a video surveillance system inside vehicles, a system that also integrates IT equipments.

Specifically, this system was introduced to identify travel fraud and crime inside public transport vehicles, thus contributing to reducing these problems and increasing passengers' safety.

3.1 Summary Description of the Tasks

The measure comprises one task: T2.7 – Video Surveillance System.
Within this task, Iasi purchased 400 video cameras and 100 video management and storage systems. They were installed on 100 public transport vehicles. The video cameras capture images from inside and front of the vehicle, these are then sent to the video recorder equipped with a storage hard-disk. Video recorders are connected to an on-board wireless communication system, planned to make possible the WLAN data connectivity with Maintenance Facility Centres network (connection with measure 76).

4. Video Surveillance System in Iasi

4.1 Description of the work done

By organising a public procurement tender, Iasi bought and installed a video surveillance system on 100 public transport vehicles (64 buses and 36 trams), in order to improve the quality and safety of the public transport service.

The video surveillance system is based on a digital recorder NVR (Network Video Recorder, model AXIS Q8108-R) which receives and stores digital images from **four** IP cameras (model AXIS M3113-R) mounted onboard (cockpit, front, middle, rear) (See Figure 1).
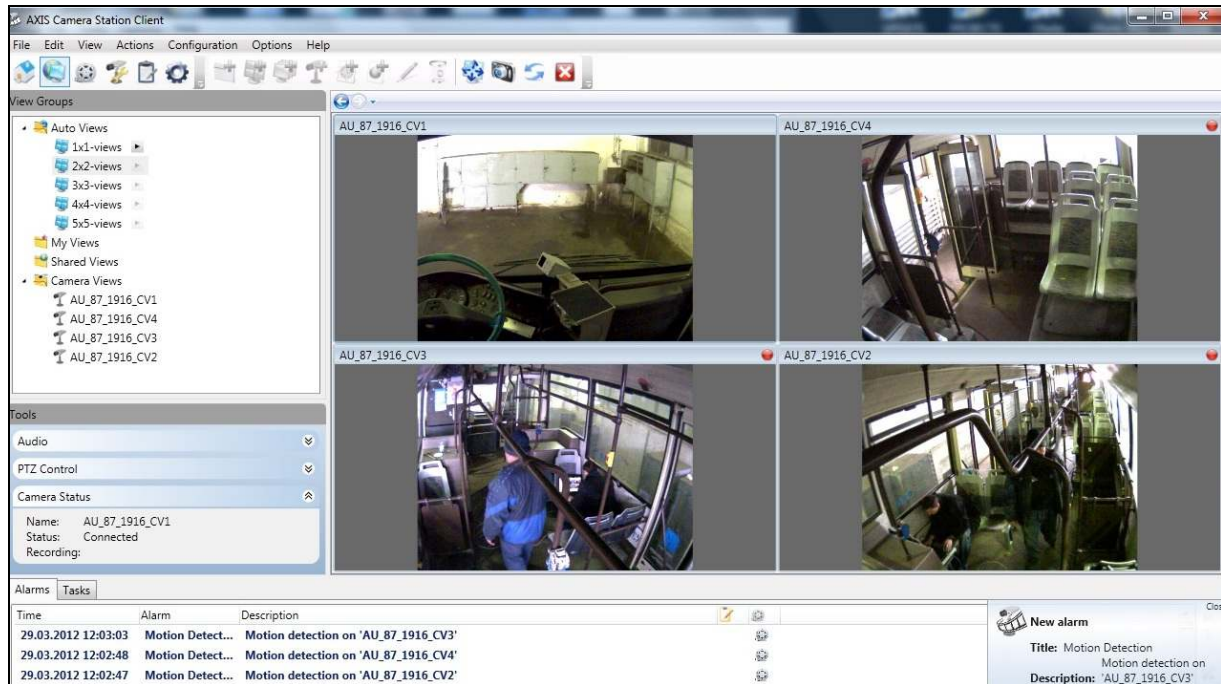

Figure 1: Axis Camera Station Client – live view – all cameras

Network video surveillance solutions are based on open IP standards. This enables the use of standard IP network infrastructure, instead of proprietary systems and devices, similar to analogue CCTV solutions.

The images can also be seen on the 19'' LCD bus display installed inside the vehicle.
The same screens are equipped with SD-card players for alternately transmitting commercials, presentation spots, pictures, at time intervals.

Video recorders are equipped with wireless and 3G adapters making possible the WLAN data connectivity with Maintenance Facility Centres network (See Figure 2 and Figure 3) and the instant remote access to images and records, using the GSM network.
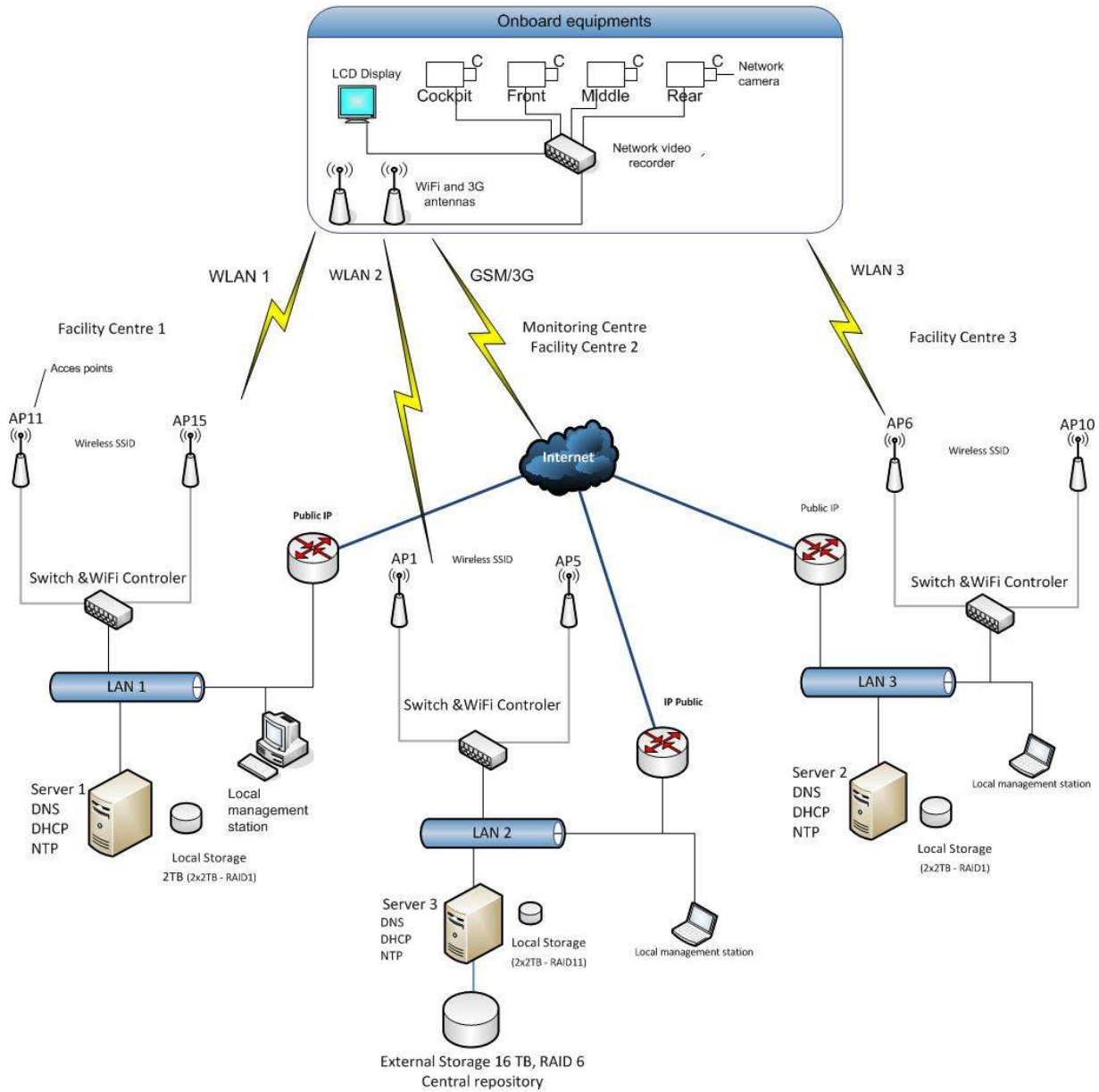
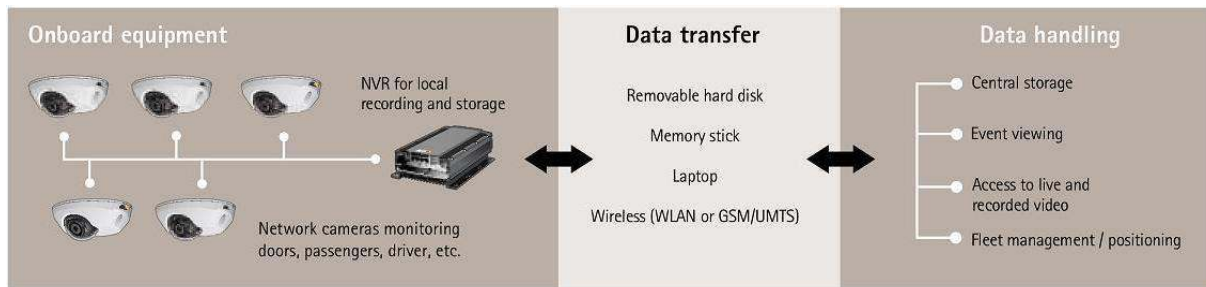**Figure 2 : Maintenance Facility Centres Network Architecture**

Figure 3: Data transfer and handling

The video images from cameras are locally recorded on board, then transferred wirelessly to a local storage when the buses are in depot and then, using the VPN infrastructure, it will be forwarded and stored on Central Maintenance Facility Centre's storage.

The video images from the buses can also be viewed from the Monitoring Centre, in real-time, accessing the GSM interface mounted on the NVR.

Each Facility Centre is equipped with storage and local management and recording systems (management server + local storage) (See Figure 4) running **Axis NVR Manager** application used to access, diagnose and manage all the Axis NVR's located in the wireless network coverage area provided by the WLAN devices (access points, controllers, routers) installed on each depot.
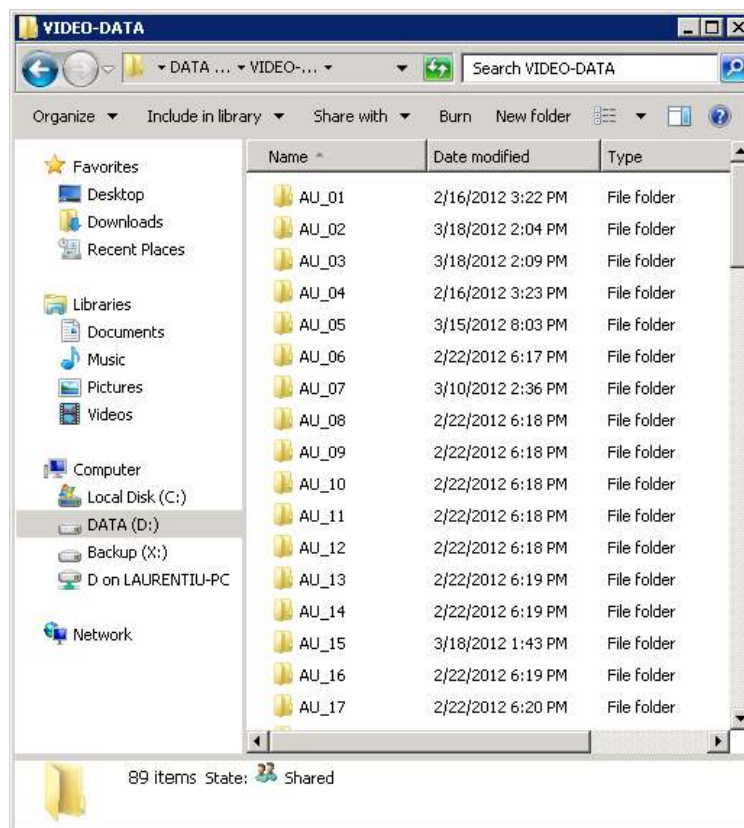

Figure 4 : Storage folder on local management systems

Also, each of these three locations has one local management station installed, allowing access, via the **Axis Camera Station Client** application, images stored in NVR's.

Local management stations are accessed through Remote Desktop RDP connections from the Monitoring Centre management station, thus ensuring a single point management solution.

4.2 Main Outcomes

The new surveillance system contributes to decrease in costs, taking into account the amounts spent responding to incidents (through decreases in the number of acts of vandalism leading to lower repair costs and decreases in the number of incidents involving drivers, again leading to lower costs related to the management of these situations - for example claims and the related expenses). It is also an efficient tool in preventing abuse, crime, as it sustains the onboard investigation in case of incidents, identifying those people involved.

At the same time, the video camera installed in the cockpit allows recording of events that took place both in the cabin and in traffic, in front of the vehicle. This allows identification of triggers that caused produced an incident, allowing the driver's behaviour at work to be checked. By keeping the buses safe and secure, PTI will also attract more passengers.

The onboard cameras help solve vandalism and crime situations, provide valuable information for investigations, and also protect the operator from dishonest liability claims. Access to high-quality video is essential for investigations, in order to find out what really happened during an on board incident. In addition, the images can be easily shared and accessed numerous times without losing any quality. The secret lies within the high resolution capability and progressive scan technology of network cameras. All recorded video has a resolution of at least 800x600 pixels, which is more than the 2CIF typically offered by analogue systems.

Progressive scan technology provides clearer images of moving persons and objects, making it easier to identify individuals and, in turn, shortening investigation times. The stored video also provides a clear view of what happened before, during and after an incident.

4.3 Communication Activities

During the implementation of this measure, the public were informed by written press, radio and TV about the role and utility of these systems.

Written press reactions ,e.g.:

http://www.ziare.com/ziare-iasi/stiri-actualitate/100-de-mijloace-de-transport-public-ale-ratp-au-fost-dotate-cu-camere-video-2864008

http://www.newsiasi.ro/eveniment/actualitate/1494-videoreportaj-primarul-nichita-a-inaugurat-sistemul-de-supraveghere-video-din-tramvaie-si-autobuze.html

http://www.administratie.ro/articol.php?id=39278

http://www.ziaruldeiasi.ro/local/400-de-camere-video-au-fost-montate-in-tramvaie-si-autobuze~ni8b19

4.4 Problems Identified

No problem has been detected in the implementation of the video surveillance systems.

4.5 Future Plans

The video surveillance system, contributing to passenger's increase in safety will be extended to the entire public transport fleet. It will be integrated to the Traffic Management System, which will be implemented at the whole city level within the next two years.

The measure will be evaluated based on the questionnaires by face to face interviews which will be addressed to PT users on CIVITAS+ corridor. They will be asked about awareness, acceptance and quality of service levels.

ANNEXES

Technical specifications

IP video camera - AXIS M3113R SVGA Network Camera (DATA SHEET)

The AXIS M3113-R Network Camera is specifically designed for use on buses and trains. It is developed to withstand the harsh onboard environment, resisting vibrations, dust and moisture. Other highlighted features include:
• Compact, discreet form factor
• High image quality with SVGA capabilities at full frame rate
• Smooth edges for passenger safety
• Power over Ethernet (PoE) for easy and cost-efficient installation
• Active Tampering Alarm that automatically alerts if the camera manipulated or tampered with.

Environmental sustainability
ISO 14000.
2002/95/EG RoHS and 2002/96/EG WEEE.
Certifications and standards:
EMC approvals: EN55022, EN55024, FCC Part 15 - Subpart B, VCCI, C-tick AS/NZS CISPR22, ICES-003
MPEG-4, ISO/IEC 14496-10 AVC (H.264)
Networking:
IEEE 802.3af (Power over Ethernet),   IPv4 (RFC 791), IPv6 (RFC 2460),   QoS   – DiffServ (RFC 2475)
Mechanical Environment:
IEC 60721-3-4 Class 4K3 (Climate range), IEC 62262 Class IK08 (Impact resistance)
IEC 60529 IP66 & IP67 (Ingress protection)
NEMA 250 Type 4X (Enclosure protection)
Automotive and railway use:
EN 50155 Class T3 (Vibration, shock, bump & temperature)

ISO 16750-3 (Vibration & shock)
ECE R10 rev.03 (EMC)

Maximum resolution : SVGA maximum
Rugged, female RJ-45 connector
Image sensor 1/4" progressive scan RGB CMOS
Lens AXIS M3113-R: 2.9 mm: 66° view*, F2.0, M12 mou nt
Light sensitivity 1 - 100000 lux, F2.0
Shutter time 1/24 500 s to 1/6 s
Camera angle adjustment : Pan ± 30°, tilt 0-90°, ro tation ± 180°
Video compression
H.264 (MPEG-4 Part 10/AVC)
Motion JPEG
Resolutions 800x600 to 160x90
Frame rate 30 fps in all resolutions
Video streaming Multiple, individually configurable streams in H.264 and Motion JPEG
Controllable frame rate and bandwidth
VBR/CBR H.264
Pan/Tilt/Zoom : Digital PTZ, preset positions, guard tour
Image settings :
Compression, color, brightness, sharpness, contrast, white balance, exposure control, exposure zones, backlight compensation, wide dynamic range - dynamic contrast, fine tuning of behavior at low light, mirroring of images
Rotation: 0°, 90°, 180°, 270°, including Corridor F ormat™
Text and image overlay, privacy mask
<u>**Network**</u>
Security : Password protection, IP address filtering, HTTPS** encryption, digest authentication, user access log
Supported protocols: IPv4/v6, HTTP, HTTPS**, QoS Layer 3 DiffServ, FTP, SMTP,
Bonjour, UPnP, SNMPv1/v2c/v3 (MIB-II), DNS, DynDNS, NTP, RTSP, RTP, TCP, UDP, IGMP, RTCP, ICMP, DHCP, ARP, SOCKS
System integration
Application Programming Interface
Open API for software integration, including VAPIX® and
AXIS Camera Application Platform from Axis Communications;
Support for AXIS Video Hosting System (AVHS) with One-Click Camera connection
Intelligent video :
Video motion detection, active tampering alarm
Support for AXIS Camera Application Platform enabling installation of additional applications
Alarm triggers: Intelligent video
Alarm events : File upload via FTP, HTTP and email , Notification via email, HTTP and TCP
Video buffer : 25 MB pre- and post-alarm
Installation aids in software : Pixel counter
Casing:
IP66-, IP67- and NEMA 4X-rated, IK08 impact-resistant aluminum/plastic casing with integrated dehumidifying membrane and captive screws
Processors and memory: ARTPEC-3, 128 MB RAM, 128 MB Flash
Power : Power over Ethernet IEEE 802.3af Class 1, max. 3.2 W
Connectors : RJ-45 variants: rugged, female RJ-45 10BASE-T/100BASE-TX M12 variants: rugged, female, D-coded M12 connector with rotatable coupling nut
All connectors support Power over Ethernet
Operating conditions : -25 ℃ to 50 ℃ (-13 ℉ to 122 ℉)

Cleaner and better transport in cities

CiViTAS
Cleaner and better transport in cities
ARCHIMEDES

THE CIVITAS INITIATIVE
IS CO-FINANCED BY THE
EUROPEAN UNION

Approvals : EN 55022 Class B, EN 60950-22, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, EN 61000-6-2, EN 55024, ICES-003 Class B, FCC Part 15 Subpart B Class B, VCCI Class B, ECE R10 rev.03 (E approval), C-tick AS/NZS CISPR 22, EN 60950-1, EN 50121, IEC 60721-3-4 Class 4K3 (temperature range -25℃ to 50℃), EN 50155 Class T3 (vibration, shock, bump, temperature), ISO 16750-3 (vibration), IEC 62262 Class IK08, IEC 60529 IP66/IP67, NEMA 250 Type 4X Weight 250 g (0.55 lb.)

Video management and storage system - AXIS Q8108-R Network Video Recorder (DATA SHEET)

AXIS Q8108-R is an 8-channel network video recorder especially designed for public and commercial transportation applications. The product is developed to withstand shocks, vibrations
and temperature fluctuations. It provides uninterrupted in-vehicle recording in full frame rate HDTV resolution for up to 8 connected cameras.

The product is tested according to prevailing shock and vibration standards. The electronic components are protected by a robust aluminum casing, which upon request can be supplied with a cable sealing to meet an IP65 rating.
The integrated 8-port PoE switch offers an easy, fast and cost-effective solution for supplying power to network cameras.
AXIS Q8108-R is equipped with battery backup to handle short periods of power drop and safe shutdown of the system. Integrated voltage protection eliminates voltage spikes that may occur in a vehicle's power system.

AXIS Q8108-R supports the use of up to 2 separate hard disk drives. SATA connectors make it easy to replace hard disk drives when needed.
AXIS Q8108-R includes an 8-channel version of AXIS Camera Station video management software but it can also be customized for third-party software. To further meet your project specific needs AXIS Q8108-R supports options such as WLAN (802.11 b/g), GPS, GSM/

UMTS / HSDPA and accelerometer.

System
Model AXIS Q8108-R: HDD 750 GB Seagate 750 GB
Processor 1.1 GHz Intel Atom Z5 series CPU
RAM 1 GB SODIMM DDR2
System disk Compact Flash SSD drive 4 GB
Operating system Windows Embedded Standard 2009
Battery backup Safe shutdown 1 minute after power loss
Network
Security Password protection, user access log
NTP NTP server included
Software
Video Management Software
AXIS Camera Station, 8-channel license included.
Application Programming Interface Open API for software integration
Video compression H.264 (MPEG-4 Part 10/AVC), MPEG-4 Part 2, Motion JPEG
Audio compression AAC, G.711, G.726
Resolutions Supports connected Axis video product resolutions*
Recording frame rate Supports connected Axis video product frame rates*
Casing Rugged IP43-rated aluminum casing
Input voltage 12 or 24 V DC
Max power 84 W
PoE output 8 PoE class 1, or 1 PoE class 0 + 4 PoE class 1, or 2 PoE class 0
Connectors 2x Hi-Speed USB 2.0, Female RJ-45 Gbit port for external connection
8x Female RJ-45 10BASE-T/100BASE-TX PoE
2x digital output ports and 8x digital input ports, 2x SATA connectors
Operating temperature -10 ºC to 50 ºC (14 ºF to 122 ºF)
Weight 3.7 kg (8.14 lb.)
Approvals EU directive 2002/96/EC, MIL STD-810F Method 516.5 Procedure I, MIL STD-810F method 514.5, EN 55022, EN 55024, EN 61000-4-2, ISO 11452-2, EN 61000-4-3, ISO 11452-2, EN 61000-4-4, EN 61000-4-5, EN 61000-4-11, ISO 7637-2, EN50121-3-2, FCC part 15 subpart B class B
Project customization: WLAN 802.11b/g, GSM/UMTS/HSDPA

LCD TV screen 19'' (DATA SHEET) – 19'' TFT LCD

Automotive advertising machine

1. Resolution: 1280x768 1650x1050
2. Screen type: 16:9
3. Angle: 160 degree (H) X130 °(V) (from the fro nt to the upper and lower left angle)
4. Contrast: 800:1
5. Illumination: 300cd/m2
6. Power: 8V-32V DC
7. Power consumption: Standby 1W; work < 35W
8. Signal input and playback modes: SD card, CF card or hard disk player

   support JEPG、MP3、DAT、WMA、MPEG1/MPEG2/MPEG4、AVI、VOB,

   compatibile with VCD、SVCD、DVD.

9. Operating temperature: 0º C-60 º C, storage temperature: -20 º C - 75 º C
10. backlight lifetime: 60,000 hours
11. Response time: ≤ 20ms
12. Highly secured casing with 2 locks, SD card password protection, system boot password protection

Video camera energy supply – (DATA SHEET)

Supply : 20-30 Vcc
Input energy/power : 5 A
Fuse :5 A
Output Voltage : 13,5 ± 0,5 V
Max load : 5 A
Continuos load :3 A
Ripple :5 mV
Mounted inside NVR chassis

Server, Local Storage Equipment and Data storage Equipment – Intel® Server System SR2600 URBANNA– (DATA SHEET)

Specifications

Form Factor	2U Rack
Drive Bays	Up to six Hot Swap 3.5" SATA HDDs One 3.5 tape drive
Optical Bay	One slim SATA optical drive bay
System Cooling	3 Non redundant fans
Power Supply	750-watt 1+0 high efficiency,hot swap, redundant capable
Add-in card support	Up to 3 full-height PCI Express 2.0 x8 or up to 2 full-height PCI-X 133 Up to 2 low-profile (PCI Express 2.0) 1 Intel® I/O Expansion Module (PCI Express 2.0 x8)
Dimensions (H x W x D)	3.4" (87.3mm) x 16.9" (430mm) x 27.75" (704.86mm)
Front Panel Features (optional front panels available)	Power LED Hard Drive Activity LED System status LED Power/sleep switch 2 NIC LEDs Reset switch NMI switch System ID LED VGA port

Components Included	Bootable USB 1.1 port Intel® Server Board S5520UR Standard front panel Intel® Server Chassis SR2600 5 hot swap HDD carriers One 750 Watt Power Supply 3 fans One full height PCI Express* 2.0 riser card (3 PCIe 2.0 x8 slots) ODD tray Pre-routed cables Passive midplane Memory blanks 2 CPU Heatsinks

Server configuration

Part number	Description	Quantity
INSR2600URBRPR_905666	INTEL SYS URBANNA "R" 2U S5520UR 6x3.5" HOT SWAP SATA HDD 12DDR3 PASSIVE MIDPLANE RED. 750W PSU	1
INBX80614E5620_S_LBV4	CPU XEON E5620 2400/5.8GT/12M/4CORE LGA1366 BOX	1
KG_KVR1333D3E9S/2GI	SERVER MEMORY 2GB 1333MHz DDR3 ECC CL9 DIMM w/Thermal Sensor Intel Validated KINGSTON	4
INAXXBASRAIL13_899080	INTEL KIT - SLIDE RAIL KIT FOR SR1600/SR1625/SR1500/SR1550	1
INAXXSATADVDRWROM_ 893643	SR1600/SR1625/SR2600/SR2625/SR1530 SATA DVDRWROM	1
SE_ST2000NM0011	HDD SATA 2TB 7200RPM 6GB/S 64MB Constellation ES ST2000NM0011 SEAGATE	1
MLP73-05128	Windows Svr Std 2008 R2 w/SP1 x64 English 1pk DSP OEI DVD 1-4CPU 5 Clt	1
INAXX750WPS_901681	SC5600BRP/SC5600LX/SR2600/SR2625 750W REDUNDANT PSU	1

Local storage equipment configuration

Part number	Description	Quantity
INSR2600URBRPR_905666	INTEL SYS URBANNA "R" 2U S5520UR 6x3.5" HOT SWAP SATA HDD 12DDR3 PASSIVE MIDPLANE RED. 750W PSU	1
INBX80614E5620_S_LBV4	CPU XEON E5620 2400/5.8GT/12M/4CORE LGA1366 BOX	1
KG_KVR1333D3E9S/2GI	SERVER MEMORY 2GB 1333MHz DDR3 ECC CL9 DIMM w/Thermal Sensor Intel Validated KINGSTON	4
INAXXBASRAIL13_899080	INTEL KIT - SLIDE RAIL KIT FOR SR1600/SR1625/SR1500/SR1550	1
INAXXSATADVDRWROM_ 893643	SR1600/SR1625/SR2600/SR2625/SR1530 SATA DVDRWROM	1
SE_ST2000NM0011	HDD SATA 2TB 7200RPM 6GB/S 64MB Constellation ES ST2000NM0011 SEAGATE	3
MLP73-05128	Windows Svr Std 2008 R2 w/SP1 x64 English 1pk DSP OEI DVD 1-4CPU 5 Clt	1
INAXX750WPS_901681	SC5600BRP/SC5600LX/SR2600/SR2625 750W REDUNDANT PSU	1

Data storage equipment configuration

Main server configuration

Part number	Description	Quantity
INSR2600URBRPR_905666	INTEL SYS URBANNA "R" 2U S5520UR 6x3.5" HOT SWAP SATA HDD 12DDR3 PASSIVE MIDPLANE RED. 750W PSU	1
INBX80614E5620_S_LBV4	CPU XEON E5620 2400/5.8GT/12M/4CORE LGA1366 BOX	1
KG_KVR1333D3E9S/2GI	SERVER MEMORY 2GB 1333MHz DDR3 ECC CL9 DIMM w/Thermal Sensor Intel Validated KINGSTON	4
INAXXBASRAIL13_899080	INTEL KIT - SLIDE RAIL KIT FOR SR1600/SR1625/SR1500/SR1550	1
INAXXSATADVDRWROM_ 893643	SR1600/SR1625/SR2600/SR2625/SR1530 SATA DVDRWROM	1
SE_ST2000NM0011	HDD SATA 2TB 7200RPM 6GB/S 64MB Constellation ES ST2000NM0011 SEAGATE	2
MLP73-05128	Windows Svr Std 2008 R2 w/SP1 x64 English 1pk DSP OEI DVD 1-4CPU 5 Clt	1
INRS2MB044	Intel RAID Controller 4 internal and 4 external SAS / SATA ports 6.0 Gb/s&3.0 Gb/s, 512 MB DDR2 ECC, Raid 0, 1, 5, 6, 10, 50, and 60,PCI Express* 2.0 x8, Low-profile	1
INAXX750WPS_901681	SC5600BRP/SC5600LX/SR2600/SR2625 750W REDUNDANT PSU	1

Expantion unit JBOD configuration

Part number	Description	Quantity
LJLSI00218	JBOD STORAGE ENCLOSURES 630J (Ebbets) 2U, 12x 3,5" SATA/SAS HDD, hot swap ESM, power supplies, cooling module	1
LJLSI00220	JBOD STORAGE ENCLOSURES - Rail Kit	1
OTH_CBLSFF8088/8088/1M	Cable SFF8088 to SFF8088 Mini-SAS 1.0m	1
SE_ST2000NM0011	HDD SATA 2TB 7200RPM 6GB/S 64MB Constellation ES ST2000NM0011 SEAGATE	10

LSI 630J JBOD ENCLOSURE

The LSI 630J is a 2U cabinet-mountable storage enclosure that supports twelve (12) 3.5" SAS or SATA drives. Building on the LSI legacy in enterprise storage, the 630J combines a trusted enclosure design with a positive customer experience. Constant access to critical data is available with fully redundant, hot-swappable ESMs, power supplies and cooling modules, which are all field replaceable by the customer.
Also, with LEDs on the ESM and each individual drive carrier, all system components are closely monitored to help your system stay up and running in the event of a component failure or malfunction.