

APTA BUS 2018

Innovations in IP Video

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Axis – continuously driving innovation

1996

World's first network camera



1998

World's first video encoder



1999

World's first network video chip



2004

First MPEG-4 and Motion JPEG compression camera



2008

First H.264 compression standard for network camera



2009

First network cameras with HDTV, and with remote focus & zoom functions



2010

First thermal network camera



2011

Lightfinder technology



2012

Unique high-performance WDR camera



2012

First network camera with active cooling



2013

Physical Access Control



2015

Zipstream technology & Sharpdome technology



2015

Open standard network loudspeaker & Open IP-based door station



2016

Pan, Tilt, Roll, Zoom (PTRZ) technology & laser focus technology

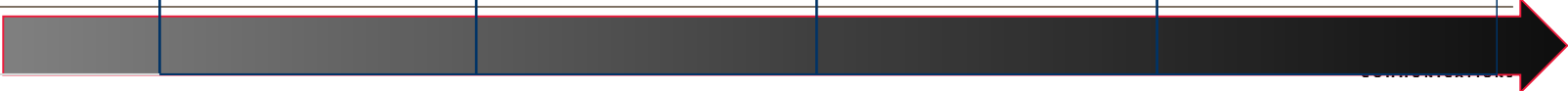


2017

Radar detection



	ARTPEC-3	ARTPEC-4	ARTPEC-5	ARTPEC-6
CPU	CRISv32	MIPS 34Kc	MIPS 1004Kc	ARM Cortex A9
CPU type	Single-threaded	Multi-threaded	Dual Core	Dual Core
Analytics	-	VADMX 64bit SIMD	VADMX2 128bit SIMD	NEON 128bit SIMD
Clock frequency	200 MHz	400 MHz	400 MHz	1.066 GHz
Mem. bandwidth	400 Mbps	800 Mbps	1333 Mbps	2125 Mbps
Encoding	M-JPEG H.264 Baseline	M-JPEG H.264 Baseline and Main	M-JPEG H.264 Baseline, Main, and High, Zipstream	M-JPEG H.264 Baseline, Main, and High, Zipstream
Performance	1x	4x	8x	20x



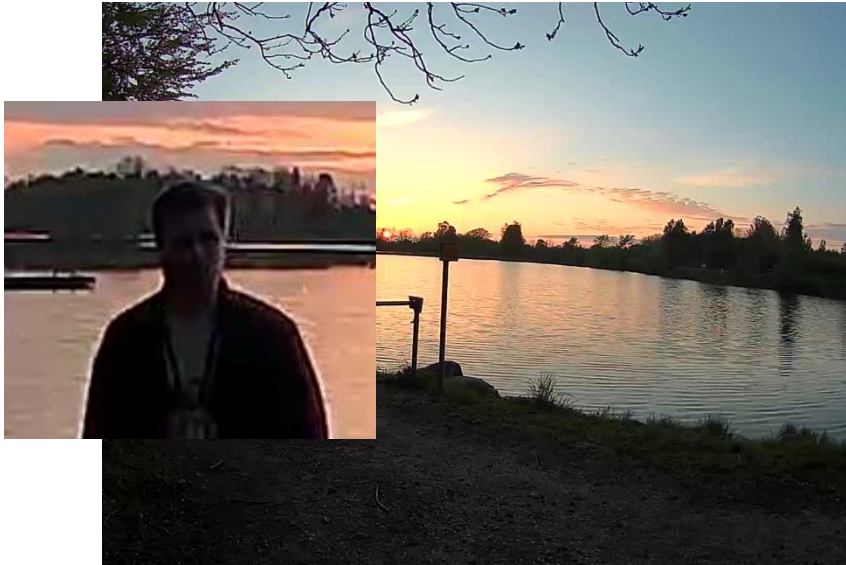
Low light Technology



Extreme light sensitivity

Wide Dynamic Range: Back & Blinding Light conditions

Enables extreme level of detail in both dark and bright areas of a scene



High-end security camera with conventional WDR



Camera with WDR-Forensic Capture

Image quality makes a difference

Identification



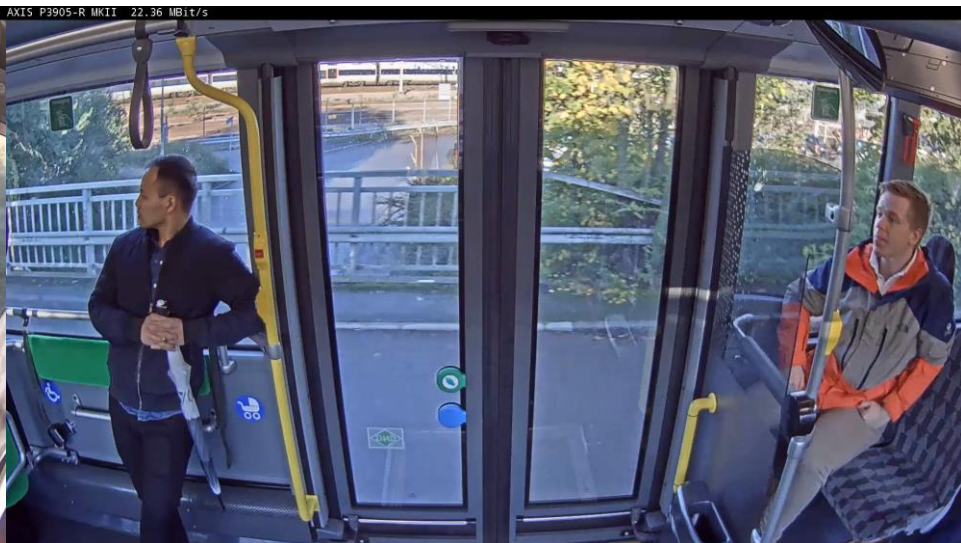
WDR performance



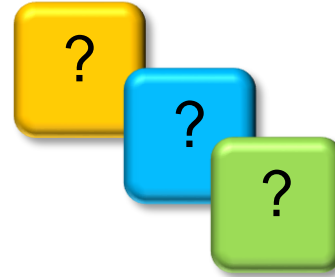
Older Generation



AXIS P39 Mk II



Apps for security cameras?



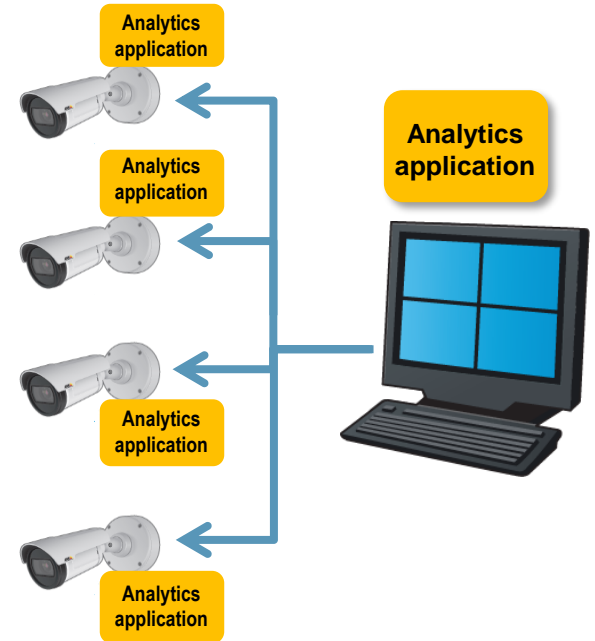
Open Camera Application
Platform

Microprocessor



Distributed intelligence Benefits

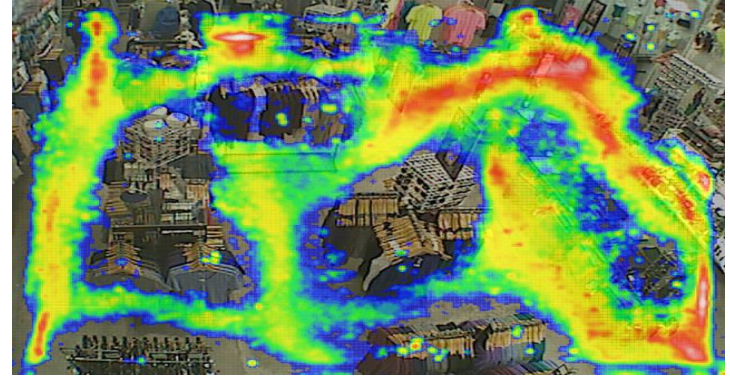
- > Analytics "at-the-edge"
 - Software runs as an "App" in the camera
 - Processing significant portions of video within camera and encoder
 - Streaming event metadata and only required video
- > Overcome limitations of centralized intelligence
 - Reduce system cost and complexity
 - Reduce bandwidth and storage consumption
 - Design truly scalable deployments
 - Easily deploy and integrate with existing systems



Uses of Edge intelligence

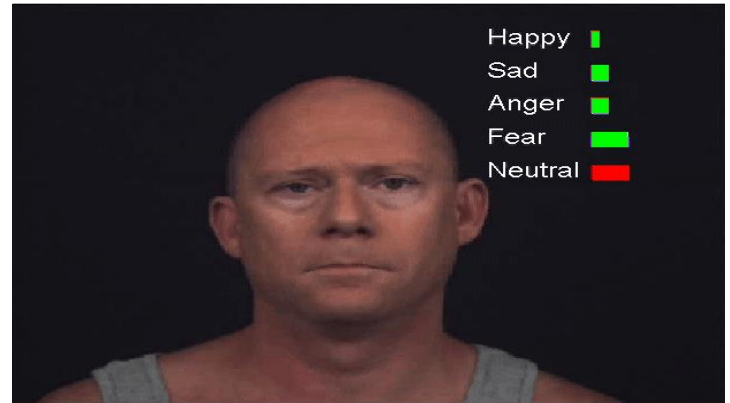
> Classic Uses:

- Vehicle / People counting
- Traffic incident detection
- License Plate Recognition
- Queue / Dwell Management
- Heat mapping



> Newer Use Examples:

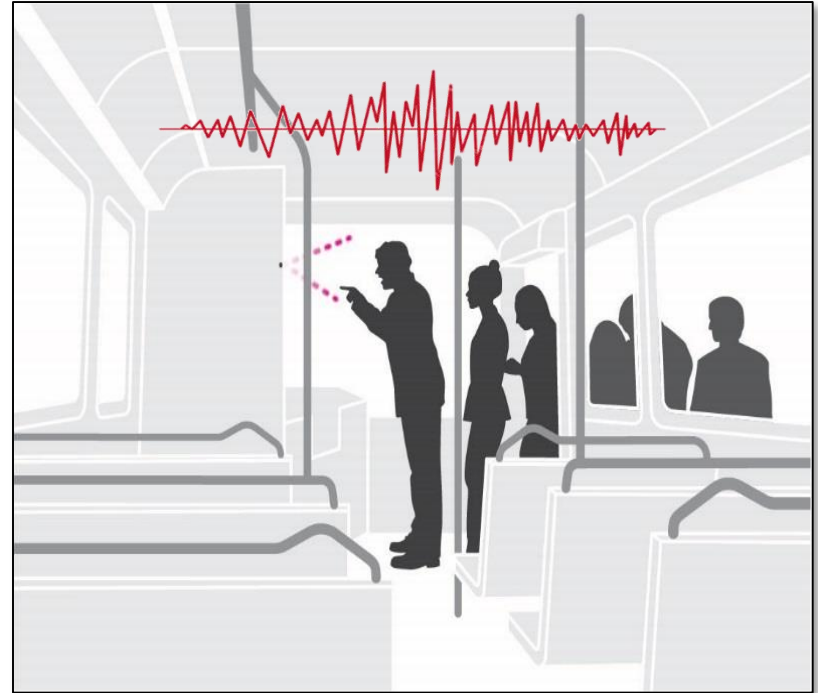
- Perimeter / long range detection
- Smoke Detection
- Sound: aggressive behavior, gun, explosion
- Flare Analysis
- Facial Expression Analysis



Aggression detection.... against bus driver or passengers

Sounds that trigger right actions

- > In-camera analysis of audio characteristics - not content
- > No audio stored (unless allowed)
- > Remote help in vulnerable situations
- > Self-starting trigger of responses
 - for early intervention and more positive outcomes



Demographic Identifier

Know gender & age of everyone onboard!

- > In-camera analysis of gender & age
- > No video stored (unless allowed)
 - Only gender & age data + time/date, bus ID and location
- > For everyone onboard, everywhere in your fleet, at all times
- > Great for improving the travel experience, target advertisement etc.



MSaaS....unique way to buy and manage video onboard buses

	Traditional	MSaaS
Philosophy	System Owner	Subscription Service
Architecture	Vehicle hardware centric	Distributed intelligence
Workflow	Onboard actions - "Visit-vehicle" oriented	Remote Collaborative actions – centralization, scale, efficiency
Investment	Incremental steps	Lifecycle centric
Standards	Local onboard policy	Mass-management policy – adapt to local regulations and service levels
Evidence	Onboard confiscation	Remote evidence retrieval for faster investigation speed
Other		Complete fleet device health Additional surveillance functions

Hardware is cheap – maintenance of hw is NOT



Camera Cluster Requirements

- > Communication in the vehicle,
- > no "NVR" needed
- > Cameras with edge storage
- > Open App Platform

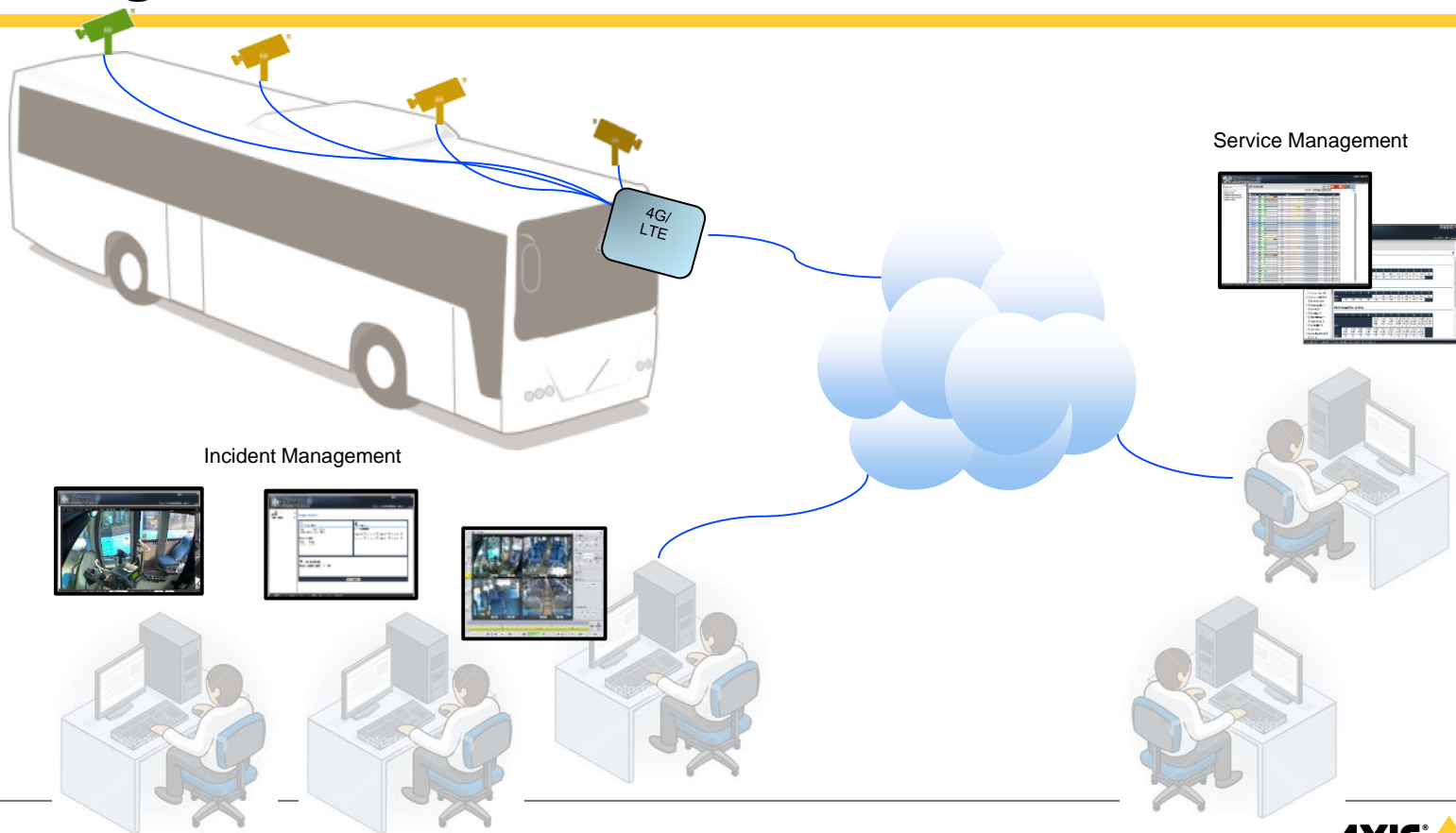


Camera Cluster ACAP software functions

- > Config & Settings
- > Status reporting
- > Activity logging
- > Recorded Video upload service
- > Realtime remote streaming
- > Camera Cluster
 - Camera neighbour management
 - Realtime local video display
 - Audio recording
 - Two way Realtime audio streaming
 - Event integration
 - Firmware management

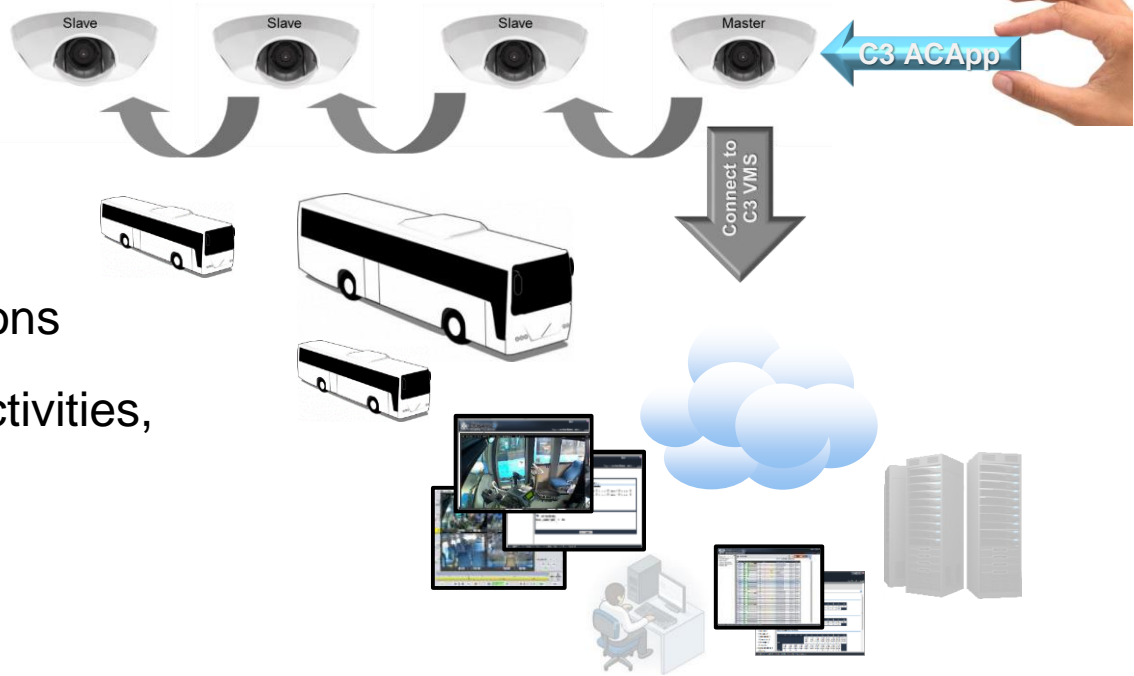


C3 Delegated Service



Connected camera cluster

- > In vehicle local camera interconnect
- > Self monitoring of connected cameras
- > Automatic corrective actions
- > Camera in cooperative activities, Installation, reporting etc



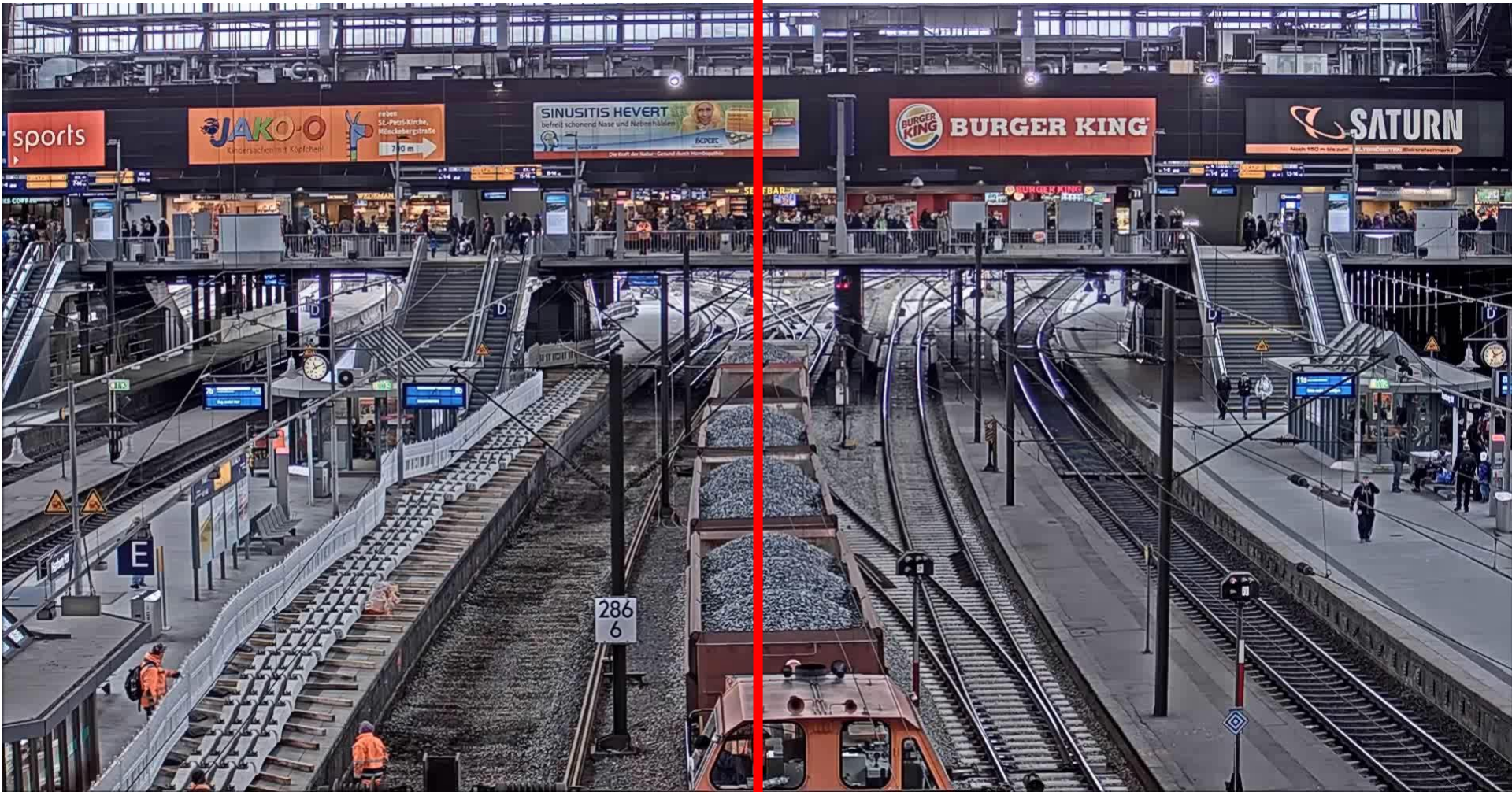


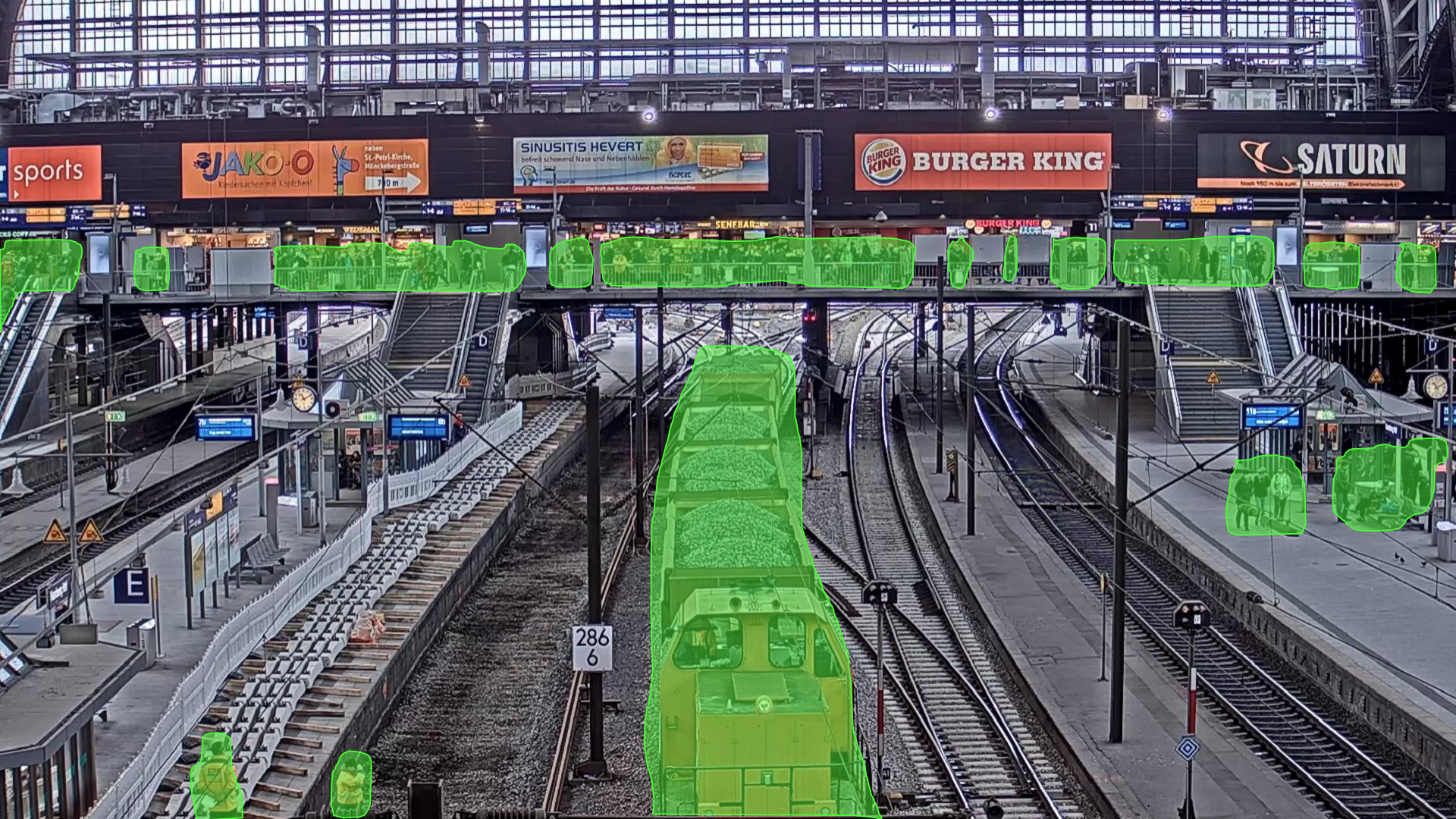
Bandwidth

Storage

ON

OFF





sports

JAKO-O
Kindersachen mit Köstchen!

SINUSITIS HEVERT
befreit schonend Nase und Nebenhöhlen

BURGER KING
BURGER KING

SATURN
Neu! 190 cm bis zu 1,8 m! SATURN ÖKO-ENERGY Elektrofachmarkt

286
6

Algorithm off - Bitrate: 15442 [kbps], Algorithm high - Bitrate: 1950 [kbps]



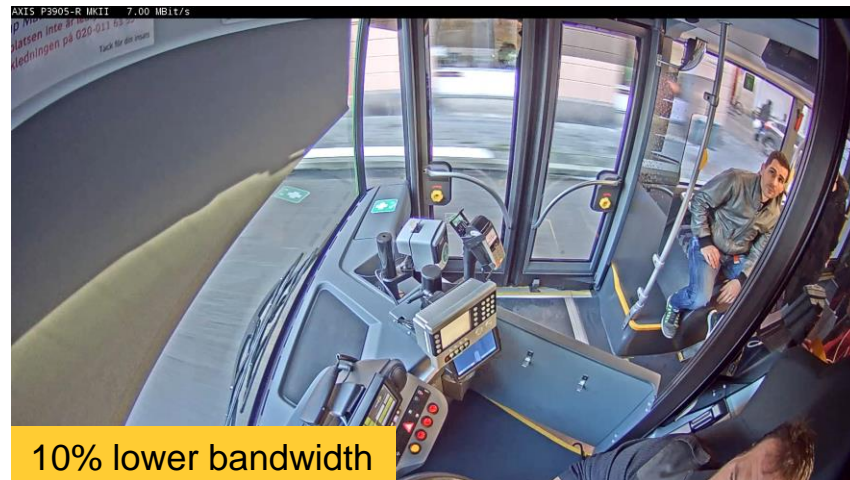
Large bandwidth savings due to noise reduction

Bandwidth daytime – P39 vs P39 Mk II

AXIS P39



AXIS P39 Mk II



Zipstream settings: **default**
Strength: **30**
Dynamic GOP: **off**
Dynamic FPS: **off**

Bandwidth night lights off – P39 vs P39 Mk II

Bus moving night time lights off	P39	P39 MkII	P39 vs MkII
Video 1	93732	29493	-68.5%
Video 2	159404	45261	-71.6%
Average	126568	37377	-70%

Zipstream settings: **default**
Strength: **30**
Dynamic GOP: **off**
Dynamic FPS: **off**

