

Security Industry Association

RSAC Recording Devices Working Group

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Who Are We?

- **Trade association** – representing over 500 suppliers of electronic physical security and life safety products.
 - Equipment and software manufacturers, including most major camera makers.
 - Integrators that design, build and install custom solutions for rail carriers other transportation sector end-users.
- **SIA Transportation Policy Working Group** - recommendations related to short and long term technology considerations. Addresses technology currently deployed or available, as well as technology solutions available in the future.

Technology Overview

- **Transformation** - Recent technology advancements have resulted in rapid adoption of networked devices, providing higher capability at reduced costs.
- **Use in Rail Applications** - Demand for and adoption of video/audio systems is increasing for mass transit, commuter and passenger rail. Many practices relevant to recording devices can be drawn from current uses in light rail.
- **Return on Investment** – Significantly reduced liability costs, crew protection enhancements, theft/vandalism reduction and increased regulatory compliance have been reported, in addition to the specific safety benefits anticipated under RSAC Task 14-01. These factors could be included in the economic analysis requested.



- **Technical Requirements** - should promote integration with other train safety systems and capabilities for centralized monitoring and/or control.

- **Key Building Blocks** - certain technologies are essential to meet goals laid out in RSAC Task 14-01:
 - Accident/incident investigation
 - Evaluation of employee fatigue, distraction and interaction
 - Assistance for training and testing.

Systems Integration and Interoperability Architecture

- **Open Interface** – Open application programming interfaces (API) permit integration of video/audio devices with other systems and ensure interoperability with software and hardware from all manufacturers. The Open Network Interface Forum (ONVIF) has created a commonly used API.
- **Integrated Data** – Integration of recording devices with data from other safety systems on the locomotive, such as the event recorder, alerter, vehicle speed indicator, GPS, dead man switch and sensors for door actuation, brake application, etc. provides “metadata” key to event recreation and investigation.
- **Management Software** – Video Management Systems (VMS) pull together data from recording devices, and Physical Security Information Management (PSIM) software can integrate this data with multiple types of networked subsystems to provide a common operating picture for rail operators.



Cameras

IP Cameras – Becoming the standard for rail applications.

- Easy integration with other networked sensors.
- On board processing enables immediate adaptation to low-light conditions (such as entering a tunnel).
- Simultaneous independent feeds to fit different quality needs and bandwidth constraints.
- Extraction of high-quality still images.
- Scalability, and incremental cost of additional cameras.
- Lower installation and maintenance costs with power over Ethernet.
- Compression improvements (such as H.265 in development) through software updates versus camera replacement.

Edge Storage Capability

- **Selective Quality** – on board storage enables short term retention of high quality footage to be retrieved after an triggering event, with a simultaneous lower quality recording for longer term storage.
- **Redundancy** – images can be temporarily stored in the network camera in case of network failure.
- **Future “Server-less” Environments** - temporary storage of video on the camera could eventually eliminate the need for an onboard server

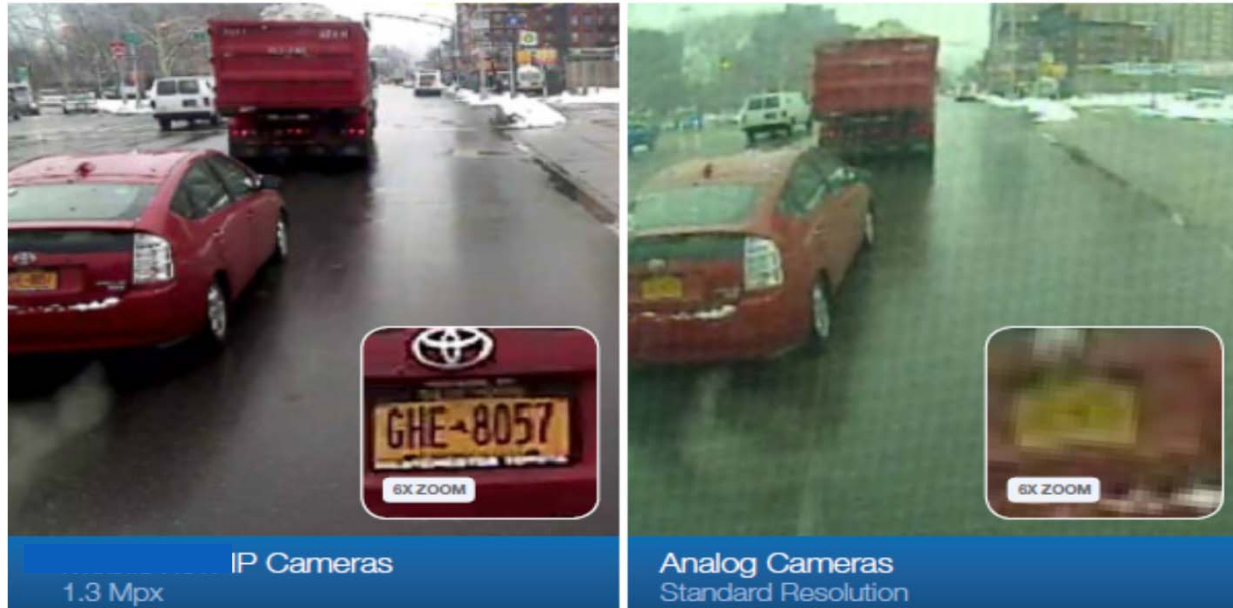


Image Quality

- **HTDV quality video** – provides “pixels on target” and fast frame rates necessary for forensic review, clear identification of individuals, and detection of fatigue/distraction. Up to 5x resolution of analog, more accurate color and wider 16:9 format.
- **Signal Aspect Ratios** – HDTV resolution is needed to distinguish signal aspect colors in dark environments with outward-facing cameras, for determining breach of signal regulations.

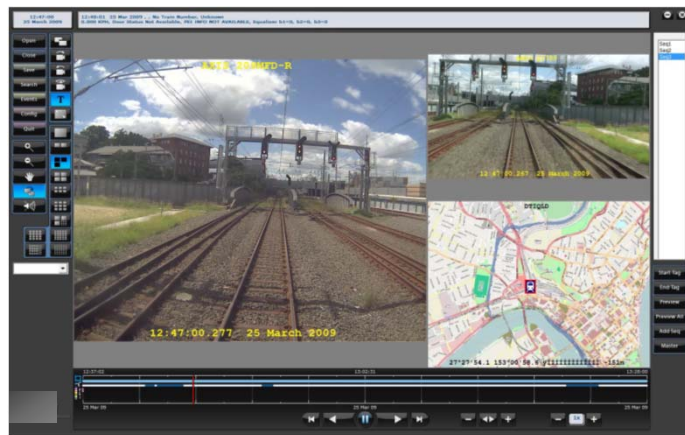


Audio

- **Capability** – monitoring all audio communications and audible sounds within the cab, synchronized with the video feed, is easily accomplished.
- **Cost** – most IP cameras have a two-way connectivity for microphone/speakers or have them built in, so the cost of adding this feature is extremely low.
- **Indicators** – lights or other indicators can be included to ensure crewmembers know when audio recording is activated.
- **Limits** – audio recording does not need to be activated at all times. Audio from the minutes just prior to a triggering event, considered the most critical in an investigation, can be recovered.

Data Storage

- **Removable Digital Media** – IP based systems typically use a network video recorder (NVR) comprised of a removable hard disk(s) with several terabytes of storage – enough to store several days to a week of HD footage before overwrite, depending on number of cameras, resolution, frame rate, compression and other factors.
- **Cost** – Affordability of hard disk drives, solid state drives and flash memory – several options for storage – has improved substantially in recent years.
- **Retention Time** – dependent on offload schedule and retention policy desired.



Data Storage (con't)

- **Data offloading** – Onboard storage is often combined with data offloading at depot using WiFi or cellular modems.
- **Real-Time Viewing/Remote Recording** – achieved with current technology, where infrastructure supports broadband requirements. Feasibility depends on broadband coverage and bandwidth availability in the future.
- **Environmental Standards** – “Ruggedized” network video recorders are available. At minimum should meet **EN 50155 Class T3** (vibration, shock, bump, temperature) the global standard for electronics on rail vehicles.
 - “Event recorders” may be inadequate to store the volume and type of data anticipated in RSAC Task 14-01.
 - Requiring storage systems to meet the exact same crash and fire protection standard as event recorders could significantly reduce usefulness and affordability of these systems.
 - Strategic placement of ruggedized recorders to reduce damage risk could be an alternative.



Privacy Protections

- **Access Control** – most available products for rail have system for controlling access to data and tracking chain-of-custody for authorized users.
 - Logical access restricted by password protected administrator rights offering different levels of access, from restricted view only to full download, etc.
 - At each level, the personnel identification, password and identification of the computer used for review and/or download should be recorded in the system log file, which is not alterable.
- **Data Security** – Prevent tampering or theft of data through encryption, watermarking and the use of proprietary software not readily available to the public, as a layered defense.

Recommendations

#1 – Recording devices should include open application programming interfaces (API) and the capability to be integrated with information from other safety devices on trains.

#2 – IP cameras recording HDTV quality video* (if video is required) are crucial for carrying out the safety purposes outlined and to accommodate future changes as technology and policy evolves.

#3 – Recording device systems should include storage capacity adequate to hold HDTV footage and data integrated from other safety systems on the locomotive, as well as the capability for wireless data offloading.

4 – Logical access to recordings should be protected via a strict set of permissions requiring user authentication, industry standard encryption techniques and preservation of a tamper-proof record of access. Physical access to the storage devices should be secured and limited to authorized personnel.

* SMPTE 296M (HDTV 720P) or SMPTE 274M (HDTV 1080p)

Questions?

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