

Motion Tracking



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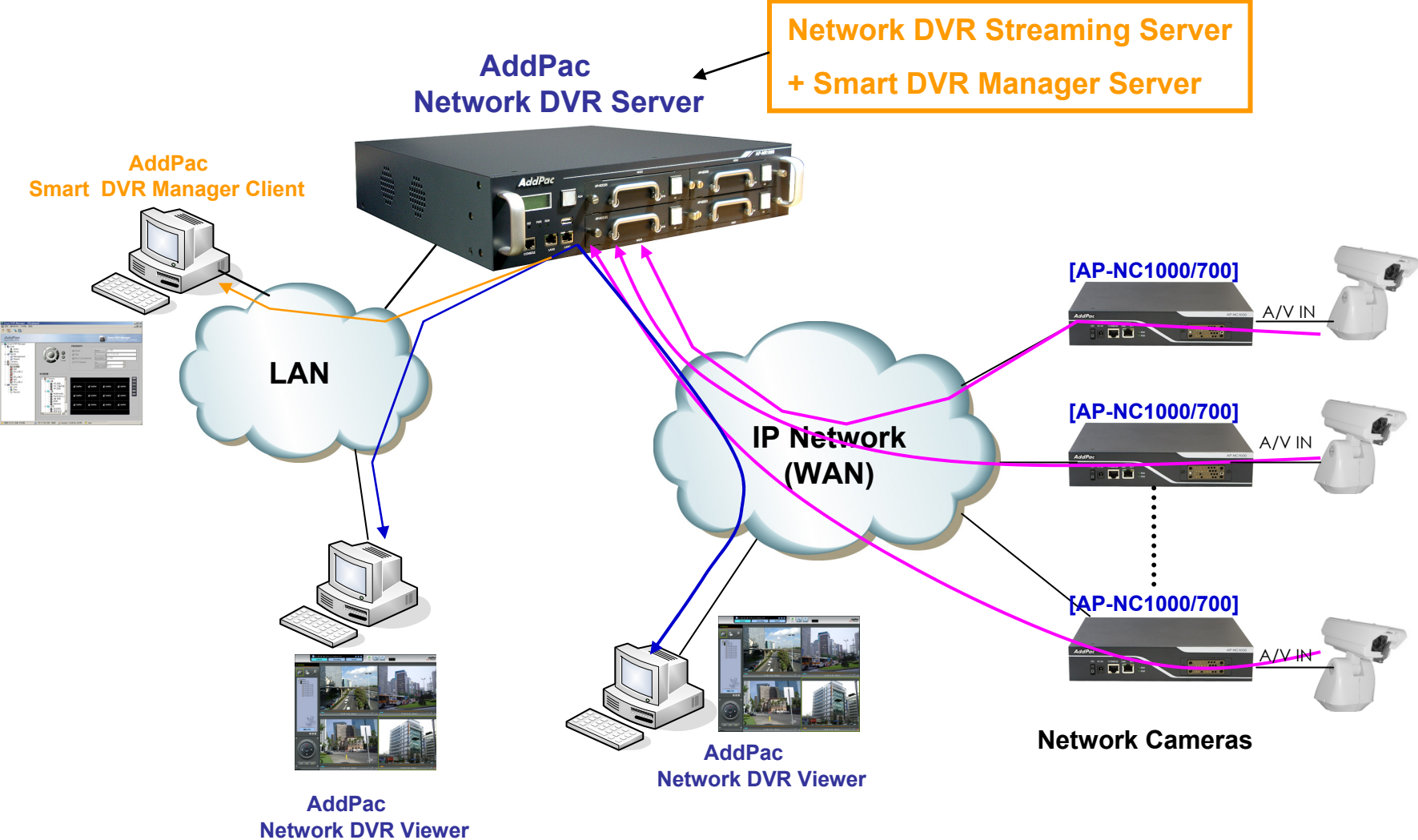
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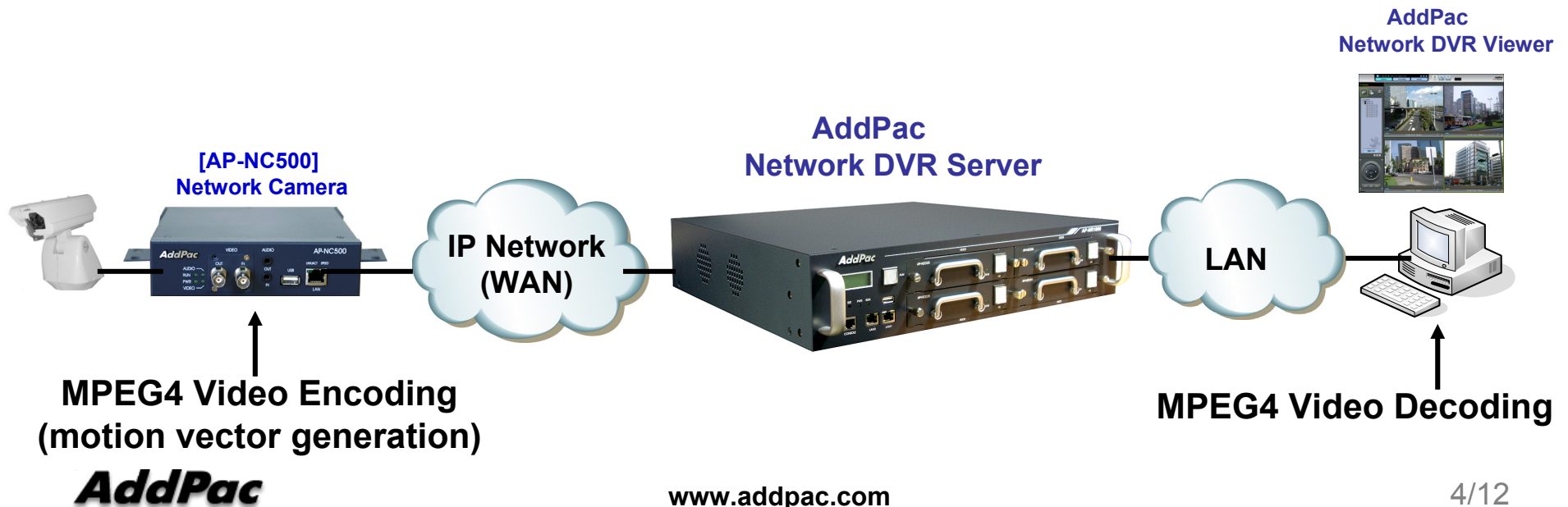


Network DVR Service Diagram

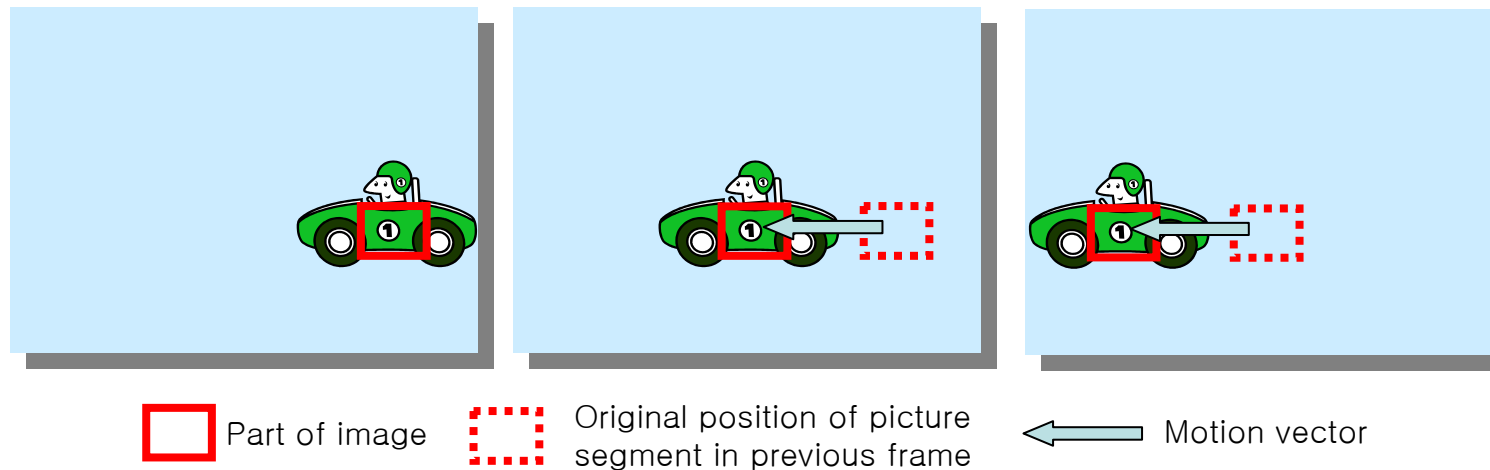


Motion Tracking Features

- Provide object tracking in Smart DVR Viewer
- Provide efficient motion tracking algorithm using motion vectors
- Motion Tracking in Video Decoder Smart Viewer Side
- Adjusting sensitivity can correct fine oscillation



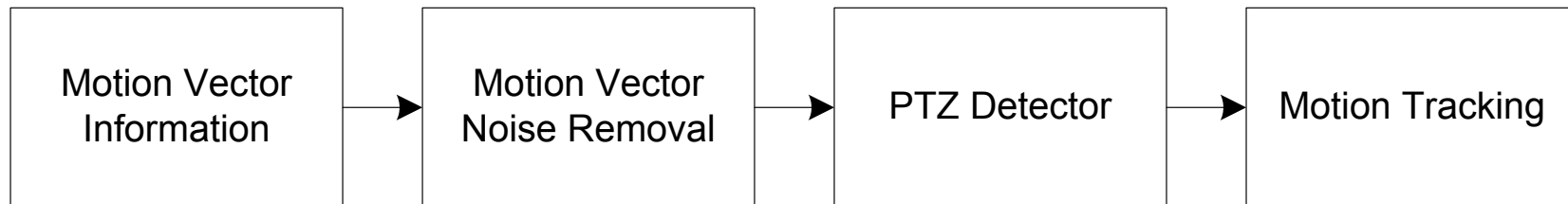
Motion Estimation in MPEG4



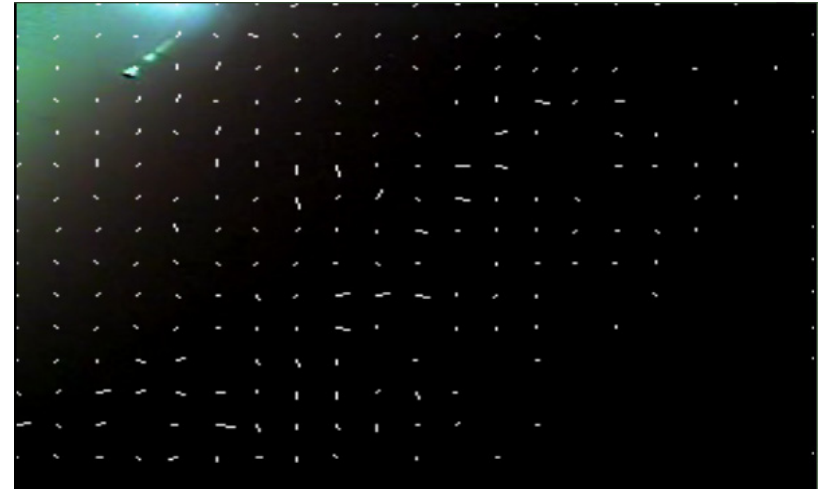
- Motion Estimation
 - Reduces temporal redundancy when compressing video
- Motion Vector
 - Produced by the motion estimation
 - Indicates moving route of each pixel unit (macroblock or block)

Motion Tracking Algorithm

- Diagram

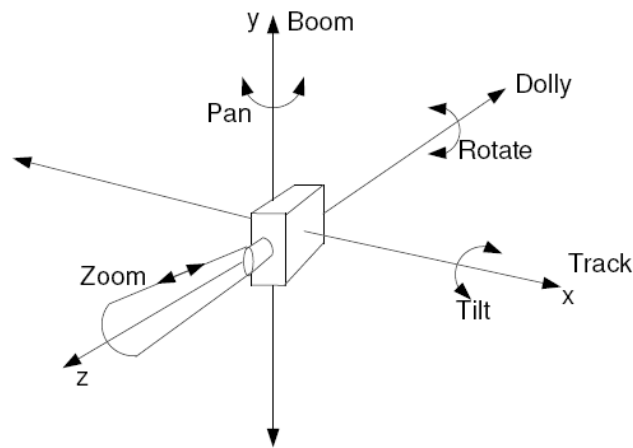


Motion Tracking Algorithm



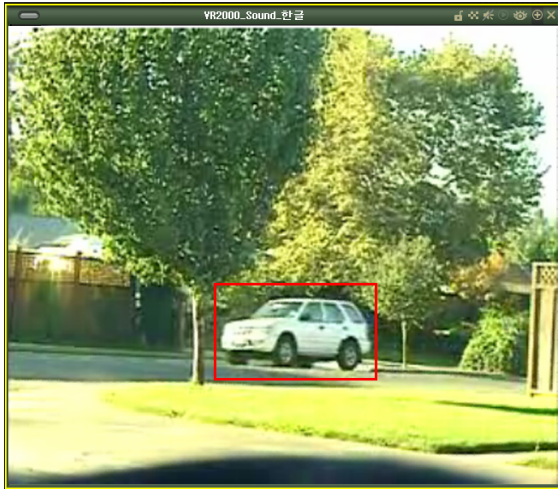
- Motion Vector Noise Removal
 - Pure motion vectors include many noises
 - SAD (Sum of Absolute Differences) produced by decoder removes noises
- Figure
 - White line: The motion vector
 - Homogeneous region has many noises

Motion Tracking Algorithm



- PTZ Detector
 - When cameras are moving, the motion vectors show terrible noises
 - PTZ Detector stops tracking the motion
- Figure
 - White line: The motion vector, Green line: The motion vector in 4MV mode
 - When the camera is moving to panning direction, the motion vectors show terrible noises

Motion Tracking Algorithm



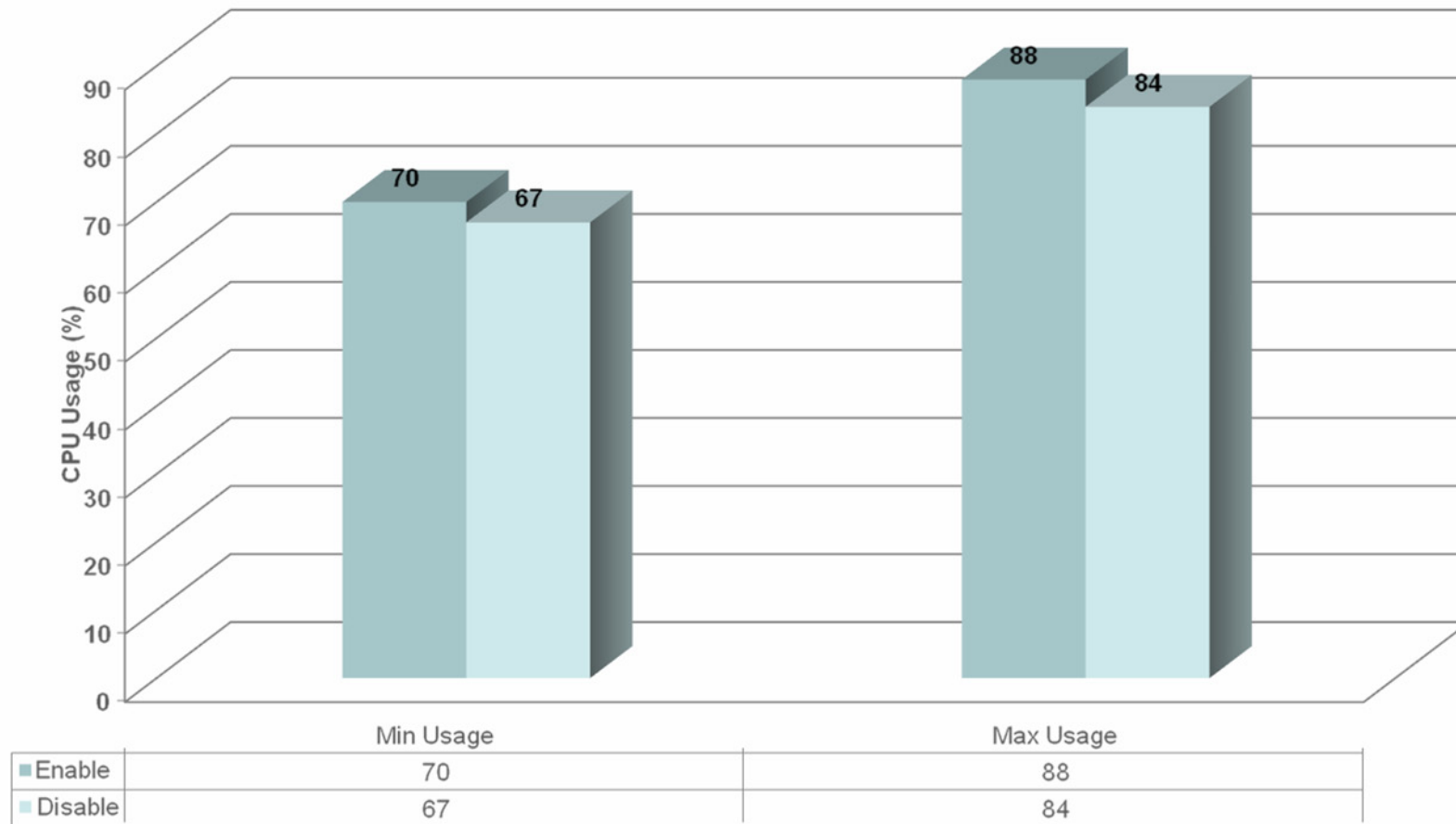
- Motion Tracking
 - Assumption: Motion has temporal and spatial continuity
 - Uses the motion vector that has temporal and spatial continuity
- Figure
 - Red box: An object moving

Performance

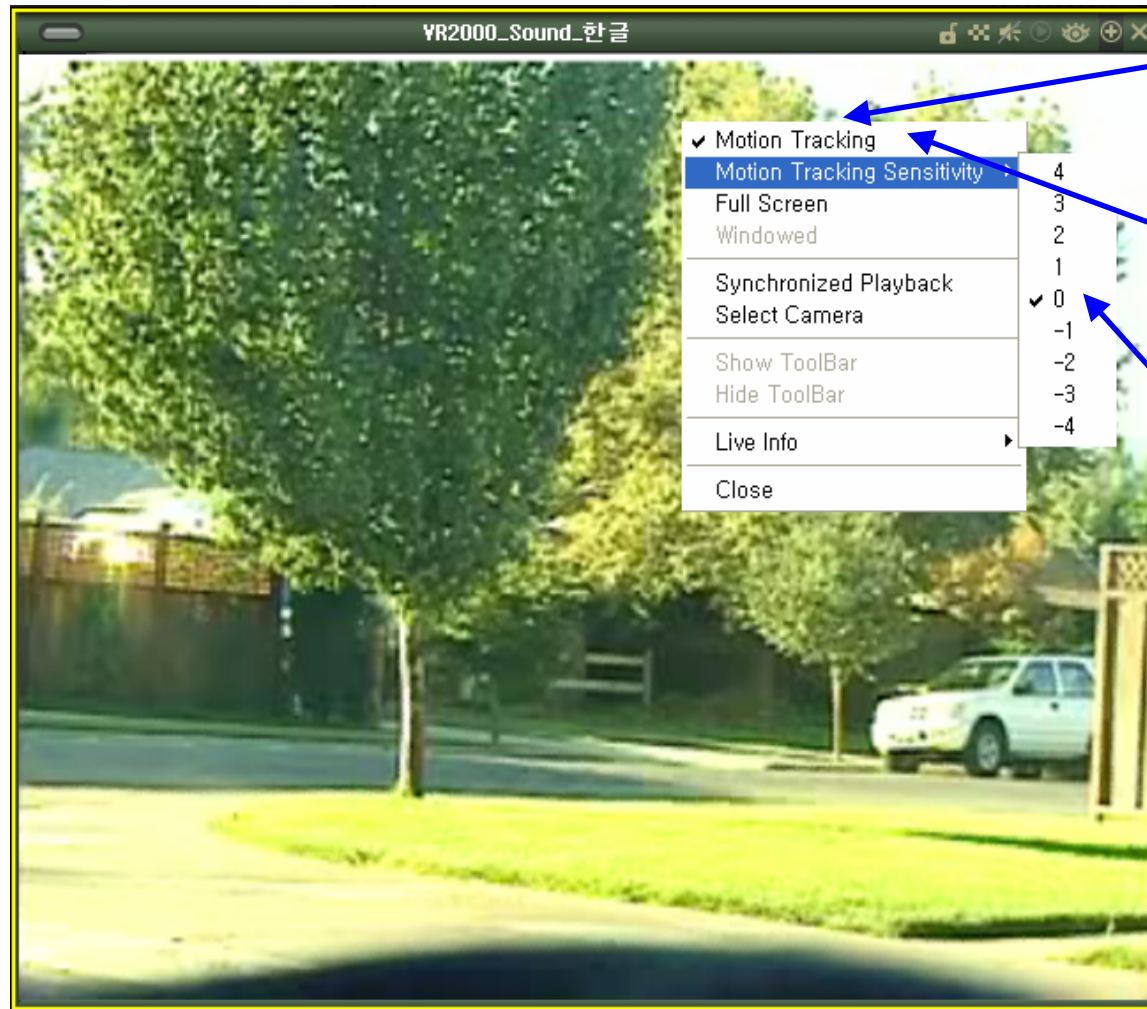
- Environment
 - CPU: Centrino Mobile 1.6GHz
 - RAM: 1GB
- Method
 - 8 live surveillance views
 - Check the CPU usage
- Result
 - Only uses 3-4% more CPU for Motion Tracking

Performance

Motion Tracking Performance Test



Usage - Setting



1. Click right mouse button

2. Set motion tracking

3. Increase or decrease motion tracking sensitivity

Usage - Indication



A red box tracks the car