1. Introduction
Along with its fast-paced advancement, the quality improvement, analysis, tracking and surveillance of video has been widely used for video security. VMS (Video Management System) is a software package that keeps under surveillance, record and control visual targets (e.g., motions of automobiles and people) by integrating network products such as networked cameras, video servers, etc. To display the transmitted video via networks, the process of decoding is needed. However, the high-performance CPU resources are required to secure multiple HD videos. We have implemented a HW/SW-combined video control system that utilizes nVIDIA's GPUs.

2. Problems
- Decoding of multiple HD videos
- High-performance PC Systems required
- Low costs and high performance demanded by the market

3. Multi Channel Video Algorithm
Main Processing Steps
- ByteStream reads data from multiple cameras with the RTSP
- Decoder pushes data to NVCUVID
- CU Videoparser performs the parser of CUDA
- CU Videodecoder decodes video bytestream

4. GPU Implementation

5. Test Report
- Evaluation
<table>
<thead>
<tr>
<th>ITEM</th>
<th>Specification</th>
</tr>
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<tbody>
<tr>
<td>CPU</td>
<td>Intel Core i3-3240 @3.4GHz</td>
</tr>
<tr>
<td>RAM &amp; OS</td>
<td>8 GB, Windows7 64bits</td>
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<tr>
<td>Test Video</td>
<td>720P HD CCTV (H.264, High Profile)</td>
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<tr>
<td>GPU</td>
<td>Quadro K4000 (3GB RAM, CUDA 768 Core)</td>
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</tbody>
</table>

- Performance (H.264,High Profile, 720P : 1280 x 720)

- Monitoring S/W (Each channel 720p HD video, 30fps)

6. Conclusion
- Implemented with low-priced PC systems (GPU : nVIDIA Quadro K4000)
- Implemented a HW/SW-combined video control system that utilizes nVIDIA's GPUs
- Multi Channel HD Video Real-time decoding (720P)
- Supports the maximum of 16 HD cameras (High Profile, H.264, Each camera upper 27 fps)