The evolution of surveillance systems and IoT applications

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Agenda

- The evolution of surveillance systems
- Why IP video surveillance?
- Video data intelligence multi-system integration
- Big Data
The evolution of surveillance systems
The revolution of surveillance industry

What can you **SEE** through surveillance system:

- High Definition
- Networking
- High Compression Rate
- High Density Storage
- Intelligence

**Trend of surveillance system:** IoT = Multi-Systems Integration

The data revolution is on the corner.
The evolution of surveillance system

1\textsuperscript{st} Generation:
\textbf{CCTV} (Closed Circuit Television) + \textbf{VCR} (Video Cassette Recorder)

2\textsuperscript{nd} Generation:
\textbf{CCTV} + \textbf{DVR} (Digital Video Recorder)

3\textsuperscript{rd} Generation:
\textbf{IP Camera} + \textbf{NVR} (Network Video Recorder)
1. The tape is prone to moisture
2. Image quality is limited with image capture card,
3. Image quality is deteriorated by frequently reuse of cassette, and hard to preserve, easy to worn out.
Disadvantages:
1. Need a lot of cables and equipment (jumpers, signal amplifiers...)
2. Video quality is poor with limited hardware specifications of image compression capability
3. Signal amplifier must be used to enhance the signal of multi-channel connections
Advantages:

1. Easy to construct and future expansion with Ethernet networking architecture
2. Standardized POE hardware specifications
3. Optimization of Image quality with the highest 10 millions pixel, and industry compression scheme (H.265...)
4. Unlimited storage system with a variety of NAS, SAN, and RAID implementation
Why IP video surveillance?
Difference between digital and analog: Digital vs. semi-digital

- Monitor
- Control
- Manage

Evolution of camera:

- **High end IP**
  - IP (Network) camera
  - Ethernet

- **Medium IP**
  - Analog Cam
  - Encoder
  - Ethernet

- **Entry IP**
  - Analog Cam
  - Network video recorder
  - Ethernet

- **Non IP**
  - Analog Cam
  - DVR
  - Coax. cable

Video Management Software (Windows + Linux) + Server/IPC or NVR (Linux)

- Local storage
- CMS
- Web browser

- Local/remote storage & Browsing
Difference between digital and analog: Digital vs. semi-digital (continuous)

Analog camera → Low Resolution → Simulated

IP camera → High Resolution → Digitized

Centralized

Digit

Multi-streaming

NVR
Median streaming Server
Smart phone, Pad
Remote, web browser
Difference between digital and analog: Digital vs. semi-digital (continuous)

HQ – Taiwan
Centralized monitoring or recording
Shortcomings of CCTV architecture
Disadvantages of traditional CCTV system

- High installation cost
- High maintenance expense
- Unclear Upgrade path
- Old technology
- Labor-intensive
Advantages of Cabling

Alarm I/O + coax. + power + RS485 cable

Easy to install

External I/O

- Pin 1 DC 12V out
- Pin 2 GND
- Pin 3 Audio in
- Pin 4 GND
- Pin 5 Audio out
- Pin 6 GND
- Pin 7 RS485-
- Pin 8 RS485+
- Pin 9 Alarm NO
- Pin 10 Alarm NC
- Pin 11 Alarm COM
- Pin 12 Alarm K
- Pin 13 Alarm A

Advantages:

- Optimized performance and stable power supply
- Easy installation and low expenditure
- Easy to maintain
- Strengthen surveillance application

Environmental protection
Time
Safety

Bicsi
Advantages of High Resolution

High resolution: Millions pixel

- 5MP 2566 x 1944
- 3MP 2048 x 1536
- FULL HD 1080 - 1920 x 1080
- HD 720 - 1280 x 720
- CCTV D1 - 704 x 480
- CIF 352 x 288
- VGA - 640 x 480
Advantages of High Resolution

5 Megapixel 2560 x 1944

D1 704 x 480
Advantages of Remote Monitoring

Remote Monitoring
Relay Viewer / Web Viewer (NB/PC)
Use IE to view synchronized video remotely
Advantages of High Compression Rate

- Innovative video encoding technology
- Innovative compressing technology

Bandwidth

- 20Mbps
- 15Mbps
- 10Mbps
- 5Mbps
- 2Mbps
- 1Mbps
- 7Mbps
- 4Mbps
- MPG-4
- JPEG

- Only need 75% bandwidth & storage than H.264

Reduce transmission bandwidth, video file size and storage
Advantages of High-Density Storage

Digital Video Recorder

Standalone Network Video Recorder

Network Video Recorder Server + JOBD

HQ
Data can be multi-used with IVA, including efficient event tracking and retrieving the stored video to make precise judgment. For example, when a car is driving abnormally or when someone tries to tamper the cameras, this kind of information will be useful references.

Advanced IVA

More IVA for video reply such as loitering detection, abandon object detection, reverse direction detection, flow detection, flow density, face & plate recognition, etc.
Video data intelligence and multi-systems integration
Surveillance system diagram and IoT applications
Based on professional IT knowledge and the upcoming IoT trend, one could fully integrate smart high-definition IP camera, video management software, IVA software, and access control products and systems, to implement smart security solutions integrating video surveillance together with IT infrastructure.

In the mean time, integrating the cloud and big data analysis into smart security monitoring solution could meet the needs of global accounts in industrial, transportation, education, and retail fields.
Application of network surveillance system
IoT E-Map Integrated System

**Video Surveillance**
- IP CAM
- Video Management System
- Video Management Software Module
- IE Viewer
- Mobile Applications

**Access Control System**
- Access Control Card Reader
- AC System & DataBase
- Access Control Module

**Perimeter Anti-break Alarm System**
- Anti-break System
- Anti-break Module

**License Plate Recognition System**
- LPR System & DataBase
- LPR Module

**Mobile Applications**
- Video Surveillance
- Access Control
- Perimeter Anti-break Alarm System
- License Plate Recognition System
Big Data
Application of people density / counting

People Counting / Crowd Density

Crowd Density

Crowd Density (12.00~12.30)

- A1: 14.76%
- A2: 15.76%
- A3: 22.02%
- A4: 12.66%