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Network-Wide Intelligence, Opening and Sharing

— Development Trend of Video Surveillance Technology and Service

LEADING NEW ICT
What Is Video Surveillance?

**Surveillance**
View live or recorded videos using different clients.

**Collection**
Collect video signals at surveillance sites by using optical-to-electrical conversion, and send these signals to the management platform.

**Transmission**
Transmit the video information to desired places using different methods.

**Management**
Manage resources of the entire surveillance system in a unified manner, such as manage the video collecting, recording, and querying and viewing operations.
Development History of Video Surveillance

1. Analog (70-90’s)
   - Technology: Occurrence of TV and videotape
   - Meaning: Makes post-incident forensics possible
   - Device: Analog camera, video tape recorder (VTR), and optical transceiver

   - Technology: Occurrence of hard disk, video compression technology, and digital video recorder (DVR)
   - Meaning: Makes local hard disk storage and remote video querying and viewing possible
   - Device: DVR and digital matrix

   - Technology: IP network and efficient H.264
   - Meaning: Provides Internet-based video surveillance, convenient video distribution, browsing and storage, and rich IP management software functions
   - Device: Network video recorder (NVR), server, storage device, and switch

4. HD and Intelligentization (2011-…)
   - Technology: HD video, intelligent analysis, and interworking standards
   - Meaning: Video surveillance changes from passive surveillance to proactive surveillance, from surveillance on isolated island to uniform management based on Internet
   - Device: IP camera (IPC), surveillance appliance, and monitoring platform

Video Application Trend

**Operation orientation**
- Routine video patrol
- Security activities
- Case video investigation

**Information orientation**
- Emergency alarm
- Blacklist alarm
- Personnel and vehicle record

**Intelligence orientation**
- Personnel and vehicle relationship
- Thread association
- Trend prediction

From awareness extension to information analysis, finally to decision-making assistance (video big data analysis).
Challenges Faced by Video Big Data Analysis

**Video specialty**
- Large-scale
- Unstructured

**Inventory system reconstruction difficulty**
- Non-intelligent camera
- Heterogeneous platform
- Network bandwidth

**Large technical limitations**
- Single intelligent means (non-associated)
- Low hardware computing efficiency (slow)
- Insufficient computing resources (few)
Solution: Network-Wide Intelligence

Phase 1: Single-point intelligence
- Low analysis efficiency, high cost
- Small concurrent scale, inflexible
- No data association, low value

Phase 2: Hybrid intelligence
- Improved efficiency, high cost
- Small concurrent scale, inflexible
- No data association, low value

Phase 3: Network-wide intelligence
- Network-wide collaborative participation, high efficiency
- Massive parallel analysis, large-scale
- Network-wide data association, high value

From simple behavior analysis to multidimensional identification, from real-time alarm to post-incident verification and pre-incident warning, and from single-point intelligence to network-wide intelligence, finally to network-wide big data mining.
Huawei Video Surveillance Solution

- Video cloud edge
- Intelligent cloud center
- Video management platform
- Intelligent analysis cloud
- VCM
- Computing resource pool
- Storage resource pool
- Distributed VCM computing cloud (networking, analysis)

Key Features:
- Centralized management
- Unified dispatch
- Flexible capacity expansion
- Opening Sharing
- High efficiency
- Low consumption

Network-Wide Intelligence

Intelligent video capture

Intelligent video cloud

Intelligent analysis cloud

Full-time and all-dimension video sensing and intelligent analysis for all NEs, significantly improving video analysis and application efficiency.

Structured and semi-structured processing

Real-time, on-demand, and all-online

Smart Video Capture and Intelligent Metadata Extraction

Video information sensing, allowing intelligent analysis from data generation

**Smart IPC**

**Metadata**
- **Personnel and vehicle**: Face image, gender, color, license plate, vehicle model, and logo
- **Goods**: Shape, size, color, texture, and pattern
- **Incident**: Tripwire, wrong-way driving, count, left objects, trace, and time

**On-demand, extracting metadata, collecting data and target object information**
Intelligent Video Cloud for Fast Response

Video data hub, all-round support for intelligent analysis services

1. Intelligent cloud surveillance
   - High-performance and high-reliability surveillance cloud
   - Massive video resources

2. Intelligent storage
   - Metadata object storage and associated video segments

3. Intelligent analysis
   - IPC image quality analysis and metadata/rule analysis and matching

On-demand obtaining, fast response
Intelligent Analysis Cloud, Precision Analysis

Intelligent application enabler and generator

1. Intelligent big data analysis
   - Dedicated analysis engine, high-performance massive video analysis
   - Secondary metadata analysis and precision, in-depth analysis

2. Value video library
   - Video image archiving by category, ordered management and control of value data

3. Intelligent application
   - Surveillance deployment, video search, video abstract, behavior analysis, facial recognition, reverse image search……

Collaborative analysis between the PU and management platform, improving the efficiency by more than 10 times and facilitating the expansion of intelligent algorithms and applications.
Integrated with intelligent analysis algorithms of third-parties

Provides a unified metadata exchange interface for connecting intelligent analysis platforms of third-parties.

Compatible with PU intelligent analysis devices from third-parties.

Provides unified metadata storage and query.

Intelligent Video Surveillance Service Ecosystem
Contents

1. Development Trend
2. Solution Introduction
3. Case Sharing
4. Open Discussion

More Learning Resources: http://learning.huawei.com
XX Safe City

Customer requirements

- Build a large-scale city-level networking platform to share resources in different functional departments.
- Provide a practical platform consisting of pre-incident prevention, control during the incident, and post-incident evidence collection.
- Reuse the existing surveillance resources of public security, reducing the investment cost.

Solution

- Build large-scale networked platforms for one municipal public security bureau, seven city branch bureaus, and 39 police stations.
- Add 160,000 cameras, and perform practical intelligent analysis in video investigation.
- Comprehensive visual emergency command and dispatch system.

Customer benefits

- Provide three-level networked monitoring, resource sharing, and transition towards practical platform.
- Effectively improve the intelligent and comprehensive case investigation efficiency by means of a combination of prevention, control, and striking.
- Access existing surveillance devices from multiple vendors, reducing the investment by 20%.
<table>
<thead>
<tr>
<th>Crime rate</th>
<th>Case clearance rate</th>
<th>Response time</th>
<th>Citizen satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>30% ↓ 15% ↓ violent crime</td>
<td>15% → 60+%</td>
<td>10 Min. → 4.5 Min.</td>
<td>60.2% → 98.3%</td>
</tr>
</tbody>
</table>

- **Comprehensive video surveillance and warning**
- **Efficient analysis**
- **Command and dispatch center**
- **Efficient policing**

Huawei eSpace IVS Safe City Solution Makes the City Better
## Background and challenge

- As one of the top universities in China, Tsinghua University covers a large area and accommodates large numbers of people. It opens to outsiders, and numerous personnel and vehicles go in and outside it frequently, imposing challenges in management.
- The security office of Tsinghua University wants to further reduce the response time, and improve the emergency handling efficiency, helping students and teachers in a timely manner.
- Existing surveillance systems are separately deployed and unable to provide high-quality images.

## Huawei solution

- Assist the university to build a campus surveillance center and several surveillance offices, helping the security team perform accurate management and control in multiple campuses and gates using a unified campus surveillance platform and the three-dimensional GIS map.
- Use multiple HD image processing technologies and intelligent analysis technologies, including behavior analysis, video summary, and target retrieval to help in real-time processing and post-incident query.
- Use Huawei infrared bullet cameras to provide excellent night vision effect, preventing light pollution, and protecting the beautiful environment of Tsinghua campus.

## Customer benefits

- Provide a comprehensive management system integrating surveillance, dispatch, management, control, and storage functions.
- Construct a campus security network to support seamless management and linkage emergency response in a timely manner.
- Provide an automatic security protection system by integrating various applications, such as video surveillance, access control, electronic night patrol registration, and intelligent analysis.
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