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# Fundamentals of Video Surveillance

## Concepts and Technologies to Create an Effective Video Security Solution

*Objective:* At the end of this program, attendees will be able to identify the essential components of a video surveillance system. Guides, tools, and resources will be provided that allow an attendee to perform a basic site survey. With the knowledge gained, an attendee will be able to clearly communicate the basic system design required for a variety of common applications. With this knowledge the attendee will be able to work with other professionals to finalize a project parts list that reflect the immediate and long-term expectations of the site owner.

*Delivery Methods:* This program can be attended in two different manners: classroom or online. Classroom attendance may provide continuing education credits from one or more agencies. Online attendance is in the form of pre-recorded videos. No continuing education credits are available for online attendance.

*Presenter Considerations*: public internet connection and speed. Pre-downloaded video clips or active links. Projector. Whiteboard. Audio capability. Download & install calculators.

*Supporting Documentation*: Presentation USB for attendees

*Class Structure*: The class is divided into several major components as outlined below

**Introduction to Course and Presenter**

- Why am I here?
  - Compelling video showing intense, active use of surveillance
- Introduce presenter
  - Current position/responsibility
  - Past relative experience & years
  - Personal – public service, volunteering, etc.
  - Site logistics: bathrooms, breaks, Wi-Fi access, refreshments, emergency exits
- Case examples of success vs. challenge

**Market Layout**

- Manufacturer > Reseller > Specifier/End User – Function and Relationship

- Manufacturer – rep vs direct, tech support (pre/post), customer service
- Reseller – integrator or distributor
- End User – specifier, IT, finance, owner, operator

**Common System Description**

- System diagram and images
- Camera, transmission infrastructure, recording, viewing, connection to other systems (integration)

**Site Survey**

- Importance of doing one – setting/meeting expectations
- AHJ driven vs “eye of the beholder” driven
- Determination of technology types vs physical location
- Who should be there?
- Guide
- Budget setting – does budget cover expectations?
- Performance
  - Demonstration
  - Proof of concept
  - Try before you buy

**Break**

**Camera and Lens Technologies and Uses**

- Indoor vs outdoor
- Dome, bullet, box
- Fixed vs PTZ – preselected scene vs manual operation
- Fixed: panoramic or traditional FOV
- PTZ
  - Presets

- Tour
- Manual Operation
- Analytics Controlled

Lenses

- Fixed vs Motorized/Zoom
- Standard vs Megapixel
- Glass Quality
- True Day/Night vs Electronic
- f-Stop / Shutter Speed
- mm Range/Adjustability
- Focus manually vs Auto-focus
    - Field install methods – Handheld Monitor vs Laptop

Specialty Housing

- Extreme Rugged PTZ
- High/low Temperature
- Intrinsically Safe (explosion proof)

Image Resolution

- DCRI
- Standard definition
- High Definition
- Mega Pixel
- More pixels = higher resolution …usually
- Impact on Storage
- Digital pan/zoom
- Project/jurisdictional requirements

- Demo pixels/foot calculator
- Specialty
- License Plate Capture vs Vehicle Characteristics Capture
- Thermal
- No-Grip Corner

- Frame Rates
  - 1-15 vs 30 vs 60
  - Camera capability
  - Project/jurisdictional requirements
  - Impact on storage

**Lunch**

**Camera and Lens Technologies and Uses (Continued)**

- Lighting
  - Ambient light
    - Level and Type
    - Reflectivity of scene materials
    - Always on vs Motion
    - Indoor night lighting policies
  - Higher resolution needs more light
  - Higher speed target needs more light
  - Visible vs Infrared vs Thermal IR
    - Low light Imaging
    - Infrared Illumination
      - Short Range Integrated
      - Long Range Integrated

- Integrated PTZ
- 2nd Device
- Thermal
- Fixed vs PTZ

**Camera Smarts**

- PoE: 15w vs 30w vs more…
- Masking scenes
- Data reduction (bit rate)
- Analytics
  - Edge vs Server
  - Live alarming vs Forensic investigation
  - Applications: people counting, behavior detection, security, human resources, fire/smoke
  - Rules: line cross, loitering, left behind, counting, tracking, etc
- Security Certificates / Data Security / Encryption
- Edge recording
- Firmware

**Break**

**Transmission Methods**

- Analog vs IP
- Copper
  - Coax for Analog and Ethernet over Coax
  - Unshielded Twisted Pair (UTP)
  - Category (Cat 6)
  - Common cabling method

- Fiber
    - Multimode vs Singlemode
    - Ease of installation
    - Benefits
        - Surge/EMI/RFI
        - Bandwidth
        - Distance
        - Analog channel capability
    - Limitations
        - Installation familiarity
        - PoE
- Wireless
    - Point to Point Ethernet
    - Point to Multi-Point Ethernet
    - Existing Mesh
    - Benefits
        - No pathway
        - Cost to establish pathway
    - Limitations
        - Installer knowledge
        - Line of site
        - Environmental
- Network considerations
    - Get IT involved early
    - Shared network or separate network

- Hardware separation
- VLAN
- User access
  - Local
  - Remote
  - Policies

**Recording & Video Management Solutions**

- Digital Video Recorder
- Network Video Recording
  - 1-32 cameras
  - 33-128 cameras
  - 33- Thousands of cameras
  - Specialty needs, policies, requirements
- Hybrid Solutions
  - Encoding legacy cameras
- Storage Calculations
- System Topography
  - Network Limitations or Policies
  - Project Demands or Policies
- Video Management Software

**Integration**

- Manufacturing Partners
  - SDK vs ONVIF
- Access Control
- Barriers/Entrance Control

- Fenceline/Perimeter Detection
- Intrusion Detection
- Intercom / Pull Station
- Fire
- PSIM
- Other 3rd Party Systems

**Break**

**Power Management**

- Cameras – relies on network for power
  - PoE only or supplemental power
- Network – supplies power to cameras
  - Uninterruptable Power remote
  - Uninterruptable Power data center
- Workstations
  - Uninterruptable Power at Desk
- Command Center
  - Uninterruptable power for large monitors and multiple workstations

**Command and Control**

- Active vs Reactive Monitoring
- Workstation Computer Capabilities
- Monitor Walls vs Workstations
- Command Center Layout
- Remote Notification/Control

**Applications**

- Example: Mall with 100 analog cameras - Journey from Analog to IP

Forklift vs Staged Approach

End user expectations

IT leader

Mall manager

Guards

Example: New hospital/campus needs 250 cameras

IP from day 1

End user expectations

IT Department

Legal / HIPPA / Student Privacy

Finance

Facilities Department

Example: Bridge with 25 cameras

Environmental Concerns

IT involvement

Electrical team

Example: Tunnel with 12 cameras with 3rd party VMS in place already

Integration: ONVIF or SDK

Environmental

**Attendee Project Examples**