**INSTALLATION OF IP BASED DEVICES**

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**different types of network media you mentioned, along with their characteristics and uses:**

1. Infrared (IR)

Type: unguided medium

Transmission method: line-of-sight using infrared light waves

Range: short-distance, typically up to 30 meters (100 feet)

Applications: remote controls, wireless keyboards and mice, infrared data transfer (IrDA)

Pros:

Low cost

Secure due to line-of-sight requirement

No interference from radio waves

Cons:

Short range

Susceptible to obstacles and physical barriers

Not suitable for outdoor use due to sunlight interference

2. Broadcast Radio

Type: unguided medium

Transmission method: radio waves transmitted from a single antenna to multiple receivers within range

Range: varies depending on frequency and power, can cover large areas

Applications: radio and television broadcasting, mobile phone communication (older generations)

Pros:

Wide coverage area

Relatively low cost

Can penetrate buildings and other obstacles

Cons:

Limited bandwidth

Susceptible to interference from other radio signals

Not secure due to broadcasting nature

3. Cellular Radio

Type: guided medium (uses cellular towers)

Transmission method: radio waves transmitted between cell towers and mobile devices

Range: varies depending on cell size and terrain, typically covers small areas

Applications: mobile phone communication (modern generations), mobile internet access

Pros:

More efficient use of bandwidth compared to broadcast radio

Higher data rates possible

Good coverage for populated areas

Cons:

Requires infrastructure of cell towers

Costlier than broadcast radio

Coverage can be limited in rural areas or indoors

4. Microwaves

Type: guided medium (uses line-of-sight antennas)

Transmission method: high-frequency radio waves transmitted between antennas

Range: long-distance, typically up to several kilometers (miles)

Applications: point-to-point communication for backhaul networks, satellite communication

Pros:

High bandwidth capacity

Long range

Not susceptible to interference from other radio waves

Cons:

Requires line-of-sight between antennas

Limited by weather conditions

More expensive than other media

5. Communication Satellites

Type: unguided medium

Transmission method: radio waves transmitted between satellites and ground stations

Range: global coverage

Applications: satellite television, satellite internet access, long-distance communication

Pros:

Global coverage

Useful for remote areas or areas with limited terrestrial infrastructure

Cons:

High latency due to long distance travel of signals

Expensive to launch and maintain

**Q2.There are several types of network cables, each with its own characteristics and uses:**

\*1. Twisted-pair cable (UTP and STP):\*

\* Most common type used in local area networks (LANs)

\* Two insulated wires twisted together to reduce electromagnetic interference (EMI)

\* Two categories: Unshielded Twisted-Pair (UTP) and Shielded Twisted-Pair (STP)

\* UTP: Economical, widely used for indoor connections, typically in categories Cat5e, Cat6, and Cat6a

\* STP: Offers better noise immunity due to additional metal shielding, used in high-interference environments

\*2. Coaxial cable:\*

\* Older technology, used in early Ethernet networks and cable TV

\* Single conductor surrounded by insulating layer and braided metal shield

\* Offers good noise immunity and higher bandwidth than early UTP cables

\* Largely replaced by twisted-pair cable for LANs due to its bulk and inflexibility

\*3. Fiber optic cable:\*

\* Carries data pulses of light instead of electrical signals

\* Offers significantly higher bandwidth and longer distances compared to copper cables

\* Less susceptible to EMI and crosstalk

\* More expensive than copper cables but preferred for high-speed networks and backbone connections

**Q3. Materials, Tools, and Equipment for CCTV Camera Installation:**

\*Hardware:\*

\* \*CCTV Cameras:\* Choose cameras based on resolution, lens type (fixed or varifocal), weatherproofing, and night vision capabilities. Different types include bullet, dome, turret, and PTZ (pan-tilt-zoom).

\* \*Video Recorder (DVR or NVR):\* Records and stores video footage. Choose based on storage capacity, number of channels supported, and resolution compatibility with cameras.

\* \*Cables:\* Coaxial cables for analog systems, Ethernet cables for IP systems, and power cables for both. Choose appropriate length and thickness.

\* \*Connectors:\* BNC connectors for coaxial cables, RJ45 connectors for Ethernet cables, and power connectors for cameras and recorders.

\* \*Mounting Hardware:\* Brackets, poles, screws, and anchors for securing cameras to walls, ceilings, or poles.

\* \*Power Supply:\* Provides power to cameras and recorders. Choose based on voltage and amperage requirements of your devices.

\* \*Optional:\* Monitors, surge protectors, additional storage devices, wireless transmitters and receivers (for specific situations).

\*Tools:\*

\* \*Drill and drill bits:\* For mounting cameras and cables.

\* \*Screwdrivers:\* Different sizes for various screws and connectors.

\* \*Wire strippers/crimpers:\* For preparing coaxial and Ethernet cable ends.

\* \*Hammer and nails:\* For certain mounting situations.

\* \*Ladder:\* For reaching high mounting points.

\* \*Cable tester:\* To ensure proper cable connections.

\* \*Level: For precise camera alignment.

\* \*Multimeter: For checking voltage and power connections.

\* \*Tool belt: Keeps tools organized and easily accessible.

\*Software:

\* \*DVR/NVR Management Software:\* Used to configure settings, view live footage, manage recordings, and playback video.

\* \*Mobile Apps (Optional):\* Some DVRs/NVRs offer mobile apps for remote viewing and monitoring.

\*Function of Each Equipment:

\* \*Cameras:Capture video footage of the monitored area.

\* \*Recorders:\* Store and manage video recordings.

\* \*Cables:\* Transmit video and power signals.

\* \*Connectors:\* Join cables to cameras, recorders, and power sources.

\* \*Mounting Hardware:\* Secure cameras in desired locations.

\* \*Power Supply:\* Provides electricity to cameras and recorders.

\* \*Monitors: Display live and recorded footage.

\* \*Surge Protectors:\* Protect equipment from electrical surges.

\* \*Storage Devices:\* Provide additional storage for recordings (optional).

\* \*Wireless Transmitters/Receivers:\* Transmit video signals wirelessly (specific situations).

\* \*DVR/NVR Management Software:\* Configure settings, view footage, manage recordings.

\* \*Mobile Apps:\* View and monitor footage remotely (optional).

**Q4. different types of cameras**

categorized by various aspects:

By Functionality:

Point-and-Shoot: Compact and user-friendly, ideal for everyday photography. Limited manual controls but offer automatic modes for various scenarios.

Digital Single-Lens Reflex (DSLR): High-quality image sensor, interchangeable lenses, extensive manual controls for advanced photography. Bulky and heavier compared to point-and-shoots.

Mirrorless: Similar image quality to DSLRs in a smaller, lighter body. Often interchangeable lenses, making them a popular choice for enthusiasts and professionals.

Action Cameras: Rugged, waterproof, designed for capturing extreme activities like sports or adventures. Wide-angle lenses for capturing action and immersive footage.

360 Cameras: Capture panoramic views in all directions, ideal for virtual tours or creating unique perspectives. Great for travel and capturing landscapes.

Instant Cameras: Print photos immediately after capture, offering a fun and nostalgic experience. Popular for parties, events, or casual snapshots.

By Sensor Size:

Full-frame: Largest sensor size, offering the best low-light performance and image quality. Expensive but ideal for professional photography.

APS-C: Smaller than full-frame, still provides good image quality and is more affordable. Popular for enthusiasts and hobbyists.

Micro Four Thirds: Even smaller sensor, often found in compact mirrorless cameras. Offers good image quality in a smaller package.

Compact Sensors: Smallest sensor size, found in most point-and-shoot cameras. Lower image quality but affordable and compact.

Other Differences:

Zoom: Optical zoom (physical lens movement) offers better quality compared to digital zoom (image cropping).

Lens Type: Prime lenses (fixed focal length) offer superior sharpness and low-light performance, while zoom lenses provide versatility.

Features: Wi-Fi, Bluetooth, image stabilization, touch screens, and video capabilities vary depending on the camera model and type.