IP Video Surveillance

Depending on who you listen to, IP CCTV is either the solution to all the security world's problems, or an under-performing over-complicated attempt by the IT manager to expand his area of control into security and surveillance. The real situation is probably somewhere in between. This paper aims to cut through the hype and present the facts about IP CCTV so that you can come to your own conclusion.

www.sipssglobal.com

11/6/2012

BACKGROUND

The traditional CCTV system consists of a number of analogue cameras, with the video image from each camera routed back over a dedicated copper or fibre-optic communications infrastructure to a central control room. The video inputs are switched to one or more monitors by a video matrix, and the video images may be recorded on a VCR or DVR. Operators typically use a keyboard to select cameras and monitors by number, and a joystick to move the camera. There are established industry standards (1V peak-to-peak video signals, PAL and NTSC video formats) so that any combination of camera, matrix and monitor can be interconnected.

While this technology has served us well for over 30 years, it has a number of limitations:
Complex cabling – each camera typically requires a dedicated cable from the camera to the video matrix, another cable for power, and often a third cable for camera control.

Limited monitoring capabilities – each viewing position requires a dedicated video monitor and cabling, with limited capacity for remote monitoring.

Limited recorded picture quality – traditional VHS tape quality is limited, and picture quality degrades every time it is copied.

Inflexible recording – retrieving a recording from tape is slow and labour-intensive.

Video signal degradation – an analogue video signal degrades depending on the length and quality of the transmission path.

Limited scalability – a video matrix imposes physical limits on the number of video inputs and outputs. Restricted to interlaced standard-definition images.

Depending on your application and your specific requirements, these limitations may not affect you and a traditional analogue CCTV system may be perfectly adequate. However, in today's world where there is increasing pressure to move CCTV from a dedicated infrastructure to a multi-service network then it is clear that we need an alternative solution that embraces modern network technology.

EARLY DIGITAL CCTV TECHNOLOGY

The first attempts at using digital video technology in CCTV substituted digital equivalents for specific components in a traditional analogue CCTV system to overcome some of the limitations outlined above.
DVR – the Digital Video Recorder (DVR) is a direct replacement for the traditional VCR and multiplexor. It is a device that accepts a number of analogue video inputs and records them in
digital format to a hard-disk. It may be controlled by VCR-style buttons on the front of the unit, or by software via a serial or network connection. More basic DVRs replay recorded video to an analogue video output in the same way as a VCR, while others can be connected to a network and allow video to be replayed on a PC.

NVR – the Network Video Recorder (NVR) is an extension of the DVR where the storage and encoding are separated. Rather than connecting analogue video directly to the recorder where it is compressed before being recorded, the video is compressed by an encoder or IP camera and transmitted over the network to the NVR where it is recorded to hard-disk. Some of the latest DVRs can now also accept video feeds from IP cameras, blurring the lines of distinction between a DVR and an NVR.

Encoders/decoders – a video encoder takes analogue video from one or more cameras, encodes it in a digital format, and transmits the encoded video over a network to a corresponding decoder. The decoder converts the digitally encoded video back to an analogue signal. In this configuration the encoder and decoder are used to transmit analogue video over a point-to-point network link.

IP cameras – the first IP camera was released in 1996 by Axis. The early IP cameras were effectively a traditional PAL or NTSC camera and a video encoder within the same enclosure. They were typically used for simple point-to-point systems that didn't require complex switching or control.

GUIs – the control-panel can be replaced by a PC with a Graphical User Interface (GUI) that is used to control the video matrix. In some cases, this GUI is also used to digitise and display the video image, replacing the operator's analogue monitor.
While these new products overcome some of the earlier limitations, they are generally just digital components in what is still essentially an analogue solution. The VCR and multiplexor may be replaced by a DVR, the copper cable may be replaced by a network cable, and the video monitor and control-panel may be replaced by a PC, but the central video switching and control – if any – is still usually an analogue video matrix and control system. This type of system is often referred to as a Hybrid Analogue/IP system – it is an analogue system at heart, with some IP components.

IP CCTV SYSTEMS

An **IP CCTV System** or Network Video Management System (NVMS) uses a standard IP network to transmit digitally encoded video, audio and other data. Unlike in a traditional analogue system the IP CCTV System uses standard IP network switching and routing technology to manage the connection of live or recorded video sources to one or more destinations, resulting in a 'Virtual Matrix'.

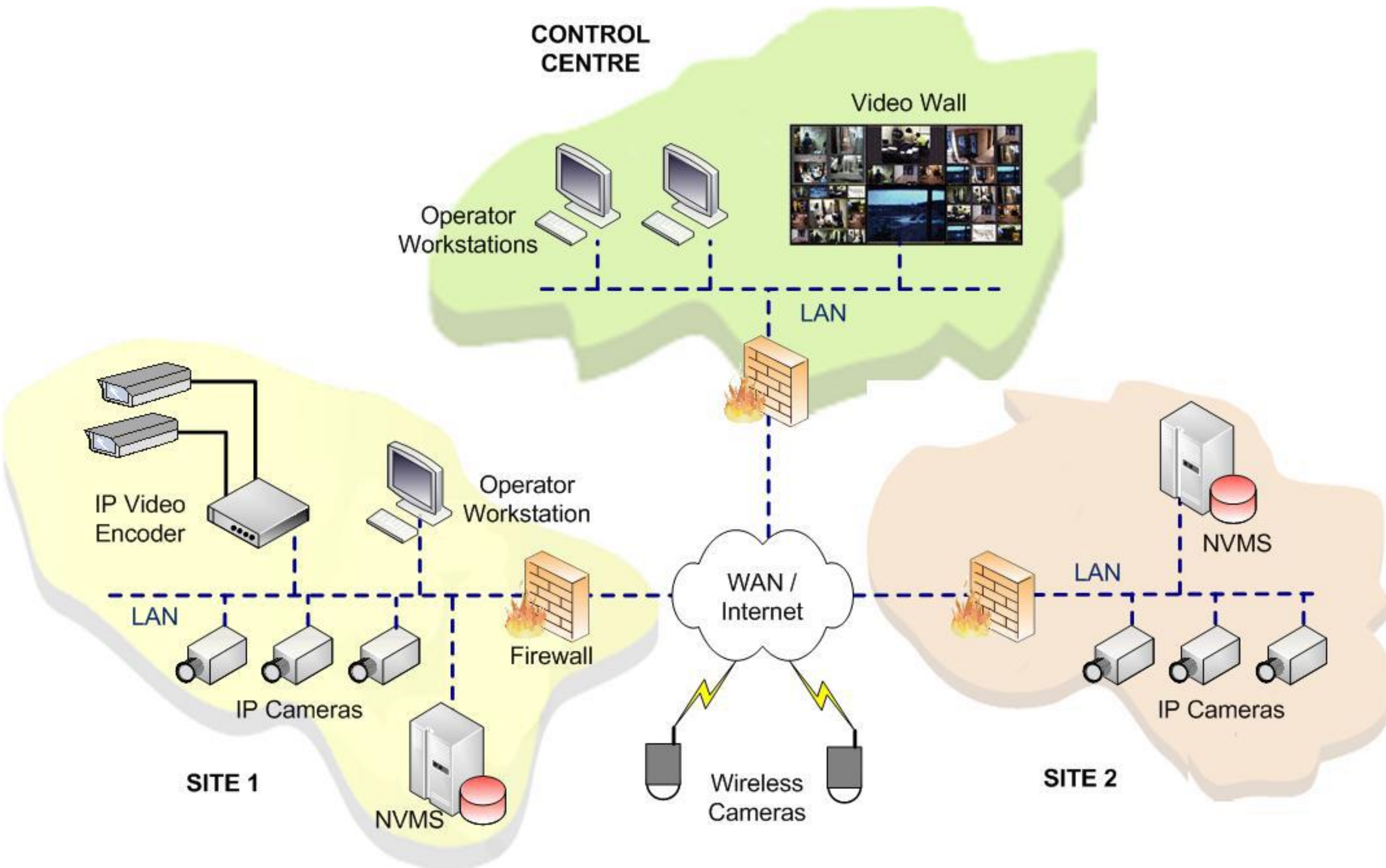
IP Networks

A *Local Area Network* (LAN) is a group of devices that are connected together in a localised area to communicate with one another over a shared network. The most widely used LAN technology is Ethernet. In a typical LAN configuration the individual devices on the network (IP cameras, servers, workstations, etc.) are each connected to a network Switch which distributes the data to the appropriate device(s) on the network. Several switches may be connected to form a larger LAN. Multiple LANs may be connected by Routers to form a Wide Area Network (WAN).
The *Internet Protocol* (IP) provides a universal standard for fragmenting data into individual packets and routing them over the network. Each device has a globally unique 32-bit IP address, indicating the individual subnet or LAN and the individual node on that subnet.

Devices on an IP network may use a number of different Transport protocols (layer 4 in the OSI model) to communicate. Most IP CCTV systems use either Transmission Control Protocol (TCP) or User Datagram Protocol (UDP). TCP uses handshaking between the sender and receiver to provide guaranteed delivery of data. UDP is a simpler transmission protocol without any handshaking, so data delivery is not guaranteed. UDP is simpler and more efficient, and is used in some CCTV applications where the occasional missed frame of video can be tolerated.
IP CCTV Systems can use either *Unicast* or *Multicast* transmission to send video data. In a Unicast system, the camera or encoder sends a separate video stream to each decoder or other network destination. If there are several destinations then sending multiple streams may overload both the camera and the network. In a Multicast system, the camera or other source transmits a single stream of data and multiple decoders or client applications can connect to this stream simultaneously. This is a much more efficient way to transmit video data to multiple destinations. However, it requires a more complex network configuration and does not typically work across WANs.

IP CCTV Overview

A typical single-site IP CCTV system (site 1 in the diagram below) consists of a number of IP cameras and/or video encoders, an NVR or NVMS to record and manage the IP video streams, and one or more operator workstations.



Multiple sites may be interconnected by a WAN, so that operators in Site 1 can also view live or recorded video from Site 2. Operators in a separate Control Centre may be able to monitor live video over the network from cameras at any of the distributed sites, and to retrieve and replay recorded video from any of these sites. Video images may also be displayed on a video-wall, either by decoding the IP streams back to composite video and displaying them on traditional analogue monitors, or by displaying the IP streams directly on large computer screens. Remote cameras – either wired or wireless – may be connected to the system via either a private (e.g. ISDN or leased-line) or public (i.e. Internet) network. Similarly, remote operators may be connected to the system from anywhere in the world.

Digital Compression

When a typical PAL video image with a resolution of 704x576 pixels is digitally encoded, every one of the 405,504 pixels is given an 8-bit value for each of the Red, Green and Blue components. This results in 9.3Mb (704x576x24) per image. At 25 frames per second, an uncompressed digital image would therefore require a network bandwidth of 232Mbs, and would require storage of 2.5TB per day. This isn't practicable for most applications, and so the video image is typically compressed to approximately 1% of this size.

Broadly speaking, there are three types of compression that can be applied to video images:
Lossless compression – each individual frame of video can be compressed using an algorithm that takes advantage of any redundancy within the image (e.g. successive pixels with the same RGB values) to compress the image in such a way that the original image can be exactly recreated. This is akin to using PKZip to compress a document. Depending on the content of the image, a compression factor of 3:1 or more may be achieved. While lossless compression of video is possible, it is rarely used because the data-rates are too high for most applications.

Frame-by-frame compression – unlike when compressing documents, we can usually afford to lose some of the fine detail within a video image without it being noticeable to the human eye. We are all familiar with using JPEG to compress photographs and other images. We can use this same technology to compress each individual frame and generate a Motion-JPEG or MJPEG stream with a typical compression factor of 25:1 or more, resulting in a bitrate of 6-10Mbs for a 4CIF image at 25 frames per second.

Inter-frame compression – in addition to compressing each individual frame, we can also take advantage of similarities between successive video frames. Compression formats such as MPEG2, MPEG4 and H.264 will typically send a complete encoded frame or 'I' frame every few seconds, then for subsequent frames only send the difference between this frame and the previous 'I' frame. In scenes with little or no movement this is much more efficient than transmitting each image in its entirety. Since inter-frame compression refers to a specific I-frame, if this I-frame is lost in transmission then it will also affect all subsequent frames until the next 'I' frame is successfully transmitted. MPEG2 was the first widely adopted inter-frame compression format, and achieved a typical bitrate of 4-6Mbs. MPEG4 was more efficient and typically reduced this to 2-3Mbs, while the latest H.264 format reduces this to 1-2Mbs for a 4CIF image at 25 frames per second.

Storage

Storage is often the largest – and most expensive – component of an IP CCTV system. With many users wanting to store video at the highest quality and frame-rate for evidential purposes, the technology employed for video storage is critical. In addition to a large – and scalable – capacity, the storage system must be secure and reliable. The vast majority of recorded video is never replayed, but when it is needed the video is likely to be required as critical evidence and so it is essential that it can be reliably and easily retrieved.

The capacity required to store digital video is dependent on a number of factors: the compression format (H.264, MPEG4, etc.), the compression quality (i.e. how much the video is compressed), the frame-rate, the resolution (4CIF, 2CIF, etc.), the amount of movement within the scene, the retention period, and the number of cameras. For this reason, it is very difficult to calculate exactly how much storage is required, particularly for inter-frame formats such as MPEG4 and H.264. The following table illustrates the storage capacity required to store a 4CIF video image recorded at 25 frames per second with H.264 compression at 2Mbs.

1 camera	5 cameras	25 cameras	50 cameras	100 cameras
1 day	22GB	108GB	540GB	2.1TB
7 days	151GB	756GB	3.8TB	15.1TB
30 days	648GB	3.2TB	16.2TB	64.8TB

Digital video is generally stored on hard-disks by the NVR or NVMS. Depending on the size of the system these may be internal hard-disks within the NVR chassis, or they may be in a separate RAID (Redundant Array of Independent Disks) array. On larger systems, the storage may take the form of a Storage Area Network (SAN) consisting of several SAN storage units connected to a high-speed fibre-channel or iSCSI network. A typical 42-disk SAN unit populated with 2TB SATA disks has a physical capacity of 84TB. However, when this is arranged as four separate RAID5 sets with two hot-spare drives then the usable capacity is reduced to 72TB.

The storage architecture for an IP CCTV system can typically be categorised as centralised or distributed. In a centralised system the storage is located in a central location. This makes it easier to manage the data in a secure air-conditioned data centre. However, it requires a large storage system and a high-performance network infrastructure to route all the video back to a central location. By contrast, a distributed system will have several smaller storage units located at remote sites, typically close to the cameras. This reduces the reliance on the core network, but makes it more difficult to manage the recorded video data and to maintain the storage units.

Video Export

A key requirement of any CCTV system is to be able to export previously recorded video for off-site storage or investigation. The UK Home Office Scientific Development Branch (HOSDB) have released a comprehensive Digital Imaging Procedure document which clearly details the processes involved in the correct capture and handling of digital video images. Most IP CCTV systems can export selected video clips to a CD, DVD or external hard-drive. Unlike copied SVHS tapes, these digital exports are an exact copy of the original recording. They are copied to the disk with a replay program so that the video can be easily replayed on a standard Windows PC. The exported video will generally be encrypted and watermarked so that it can't be modified, and the replay program will be able to check the watermark and authenticate the recording.

Megapixel

Whereas earlier IP cameras use either the traditional PAL 4CIF image resolution of 704x576 or a VGA resolution of 640x480, megapixel network cameras are now readily available with typical resolutions of 1280x1024 or 1600x1200. These cameras use a megapixel image sensor to deliver images with one million pixels or more, breaking the shackles of traditional analogue CCTV.

The higher resolution image provided by megapixel cameras can be used to provide a much larger field of view than traditional cameras, and so fewer cameras are required to cover the same area. A typical 1080P resolution (i.e. 1920x1080) megapixel camera can view an area over three times bigger than a standard resolution camera, and can digitally zoom in up to 3x while still providing the same resolution and detail as a standard resolution camera. If the whole megapixel image is recorded then this 3x zoom capability is also available on recorded video.

However, these benefits come at a price. Higher-resolution images require more network bandwidth and more storage capacity, although this can be partially mitigated by using efficient H.264 video compression. Also, the smaller pixels on megapixel camera sensors mean that they are generally less light sensitive than traditional cameras. This in turn means that you need either a slower shutter-speed to let in more light – resulting in increased motion blur, or a wider aperture – resulting in a smaller focal range.

Features & Benefits of IP CCCTV

While IP CCTV isn't necessarily the answer to every problem, it does provide some real benefits over traditional analogue CCTV technology. Some of these benefits can be quantified and deliver measurable cost benefits, while others are more difficult to measure but are convincing nonetheless.

Lower Cabling Costs – while traditional analogue CCTV systems typically require a dedicated fibre-optic or copper cable for each camera with additional cables required for power and camera control, IP cameras can use standard Cat-5/6 structured network cabling. With PoE (Power over Ethernet) the same cable can be used for video, audio, data, camera control and power, and the network infrastructure can be shared with other network services to achieve IP network convergence.

Increased Scalability – the use of a standard network infrastructure means that it is relatively easy to add additional devices to the system – cameras, workstations, storage, etc. Adding a new camera just requires connecting the camera to the network, configuring the network settings on the camera, and configuring the NVR or NVMS so that it knows about the new camera. The camera or other device may be on the same physical site, or may be on the other side of the world.

Storage – whereas in the past recorded video has been stored in specialist video recorders, the use of IP CCTV means that we can take advantage of standard IT storage systems. Storing large amounts of data is nothing new in IT systems, and we can now use high-capacity Storage Area Networks (SAN) to reliably store huge amounts of recorded video and provide instant access to this data. As the video is now stored as digital data, it can be stored alongside other video-related 'metadata' such as the camera ID, date and time, alarm information and video-analytics information to provide instant content-based retrieval of recorded video.

Resilience – most Network Video Management Systems provide options for resilience and redundancy. In addition to dual-redundant power-supplies and cooling fans, most NVRs use standard RAID (Redundant Array of Independent Disks) technology to provide data storage with implicit resilience so that a single disk failure will not compromise the integrity of the data. NVRs can themselves be replicated so that video is stored twice in separate physical locations. Network infrastructures typically use Spanning Tree or some other multi-path routing protocol to provide redundancy at the network level. The control servers within an NVMS will often be replicated so that the system is resilient to any single device failure.

Future Proof – IP CCTV is based on international IT standards so that there is a clear evolution path from current technology to future developments. As new technology is developed for PC hardware, operating systems, data storage, network transmission and video encoding then IP CCTV will be able to ride on the crest of the wave and take advantage of these developments.

Integration – another advantage of using standard IT technology is that it makes it easier to integrate IP CCTV with other applications. CCTV is no longer a separate application, but can be integrated with standard IT systems to provide centralised control and monitoring. Data from other security devices and from business systems can be associated with IP CCTV images and recordings to provide full 'situational awareness'.

Video Analytics – while early video analytics systems were server based with each camera routed back to a central analytics server, the advent of IP video and video encoders has led to edge-based architectures where the analytics is performed in a DSP (Digital Signal Processor) on the video encoder or camera. This distributed architecture has the advantage that high-resolution video does not necessarily have to be transmitted to a central server for processing.

Transmission – the exponential growth of the Internet has fuelled enormous development in IP transmission technology, and IP video data can be easily and securely transmitted between two devices within the same building or between continents, using any combination of wired and wireless networks. Unlike traditional analogue video signals which lost some quality during transmission, IP video data can be re-transmitted and re-recorded as often as required without any change in quality.

Megapixel – while traditional CCTV systems have always been restricted to a maximum 4CIF interlaced picture resolution, IP CCTV has allowed us to move beyond this limitation and develop megapixel cameras with much higher resolution than traditional cameras.

AT A GLANCE COMPARISON OF ANALOGUE AND IP (

	IP CCTV	Analogue CCTV
Cameras	Tried and tested, but restricted to interlaced PAL or NSTC resolution. Available with a wide range of CCD and CMOS sensors. Better in low-light situations.	Wide range available from cheap & cheerful low-resolution web-cams to megapixel, with options for wireless transmission, PoE, analytics, etc.
Installation	Install dedicated coax or fibre cable for every interconnection, with separate cables for power and control. Boosters needed for longer distances.	Simply connect the camera to the network and configure its network settings. Single network cable can be used for video, data and power.
System Expansion	Difficult. Each analogue camera requires its own cable. Image quality is lost when using long cables.	Connect additional devices to the network and add them to the NVMS software.
Recording	Video stored on VHS tapes which require constant changing and lots of storage space. Recorded video quality degrades over time.	Digitised images recorded on hard-disk arrays enabling easy management and retrieval. Video can be recopied and does not degrade.
Export	Physical tapes can be easily provided as police evidence, and standard SVHS format guarantees easy replay. However, quality degrades when tapes are copied.	Working copy is an exact copy of the original recording. Export process can be slow and cumbersome. There is no standard export format, so a proprietary player program is required.
Video Quality	Limited resolution, and motion-blur between interleaved fields. Signal loss during transmission, and when recordings are copied.	Constant video quality (after initial compression), with no loss in quality during transmission, recording or export.
Resilience	Very limited.	Flexible options for different levels of resilience for storage, network transmission and system control.
Standards	Well-established video signal standard, but otherwise manufacturer-specific.	International IT standards for video compression and transmission. Evolving standards (ONVIF, PSIA) for device interoperability.
System Platform	Proprietary CCTV-specific hardware, infrastructure and operating platform.	Standard IT equipment, operating-systems, network and storage.
Connectivity	Dedicated point-to-point cables with very limited scope for remote access or distributed systems.	Can use existing LAN or dedicated network. Virtually unlimited flexibility for connectivity via LAN, WAN or Internet.
Video Analytics / ANPR	Separate bolt-on system with little scope for integration.	Basic video analytics can be done by the encoder DSP. Software platform allows integration of alarm information and analytics metadata.

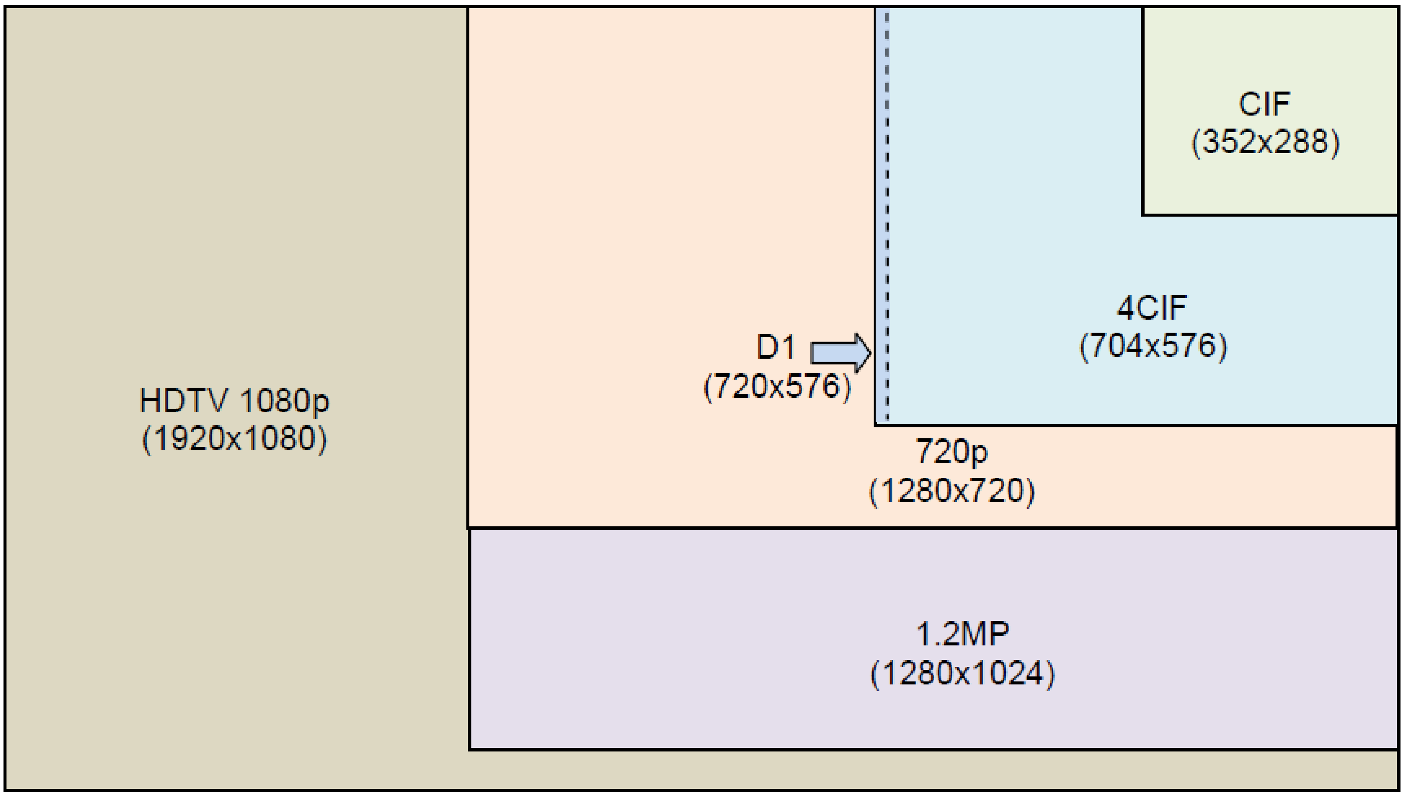
STANDARDS

Analogue CCTV is a mature technology based on established CCTV and broadcast television formats such as CCIR 601 and PAL/NSTC. One of the key benefits of traditional CCTV systems is that it is possible to connect cameras and monitors from any manufacturer without any compatibility worries. IP CCTV on the other hand is a newer technology with evolving – and sometimes competing – IT standards.

Resolutions

CIF (Common Intermediate Format) is the standard format used for PAL (European) television signals, and represents a resolution of 352 x 288 pixels. Related resolutions are QCIF (i.e. quarter-CIF) which is 176 x 144 pixels, and 4CIF which is 704 x 576 pixels. The CCIR 601 television standard encodes each frame of video as two separate interlaced fields, one for the odd-numbered lines of pixels and one for the even-numbered lines. Some CCTV systems discard the second field and use a resolution of 704 x 288, referred to as 2CIF. CIF is roughly equivalent to VHS quality, while 2CIF resolution is comparable to S-VHS. The terms CIF and SIF (Standard Input Format) are often used interchangeably. In theory, CIF always refers to a resolution of 352 x 288, whereas SIF measures 352 x 288 for PAL cameras, and 352 x 240 for US-standard NTSC cameras.

D1 and 4CIF are often used interchangeably, but D1 is actually a slightly higher resolution – 720 x 576 as opposed to 704 x 576. This recently became a political 'hot potato' in the UK when the Department for Transport (DfT) ruled that traffic enforcement cameras must record at D1 resolution, whereas most digital CCTV systems use 4CIF resolution.



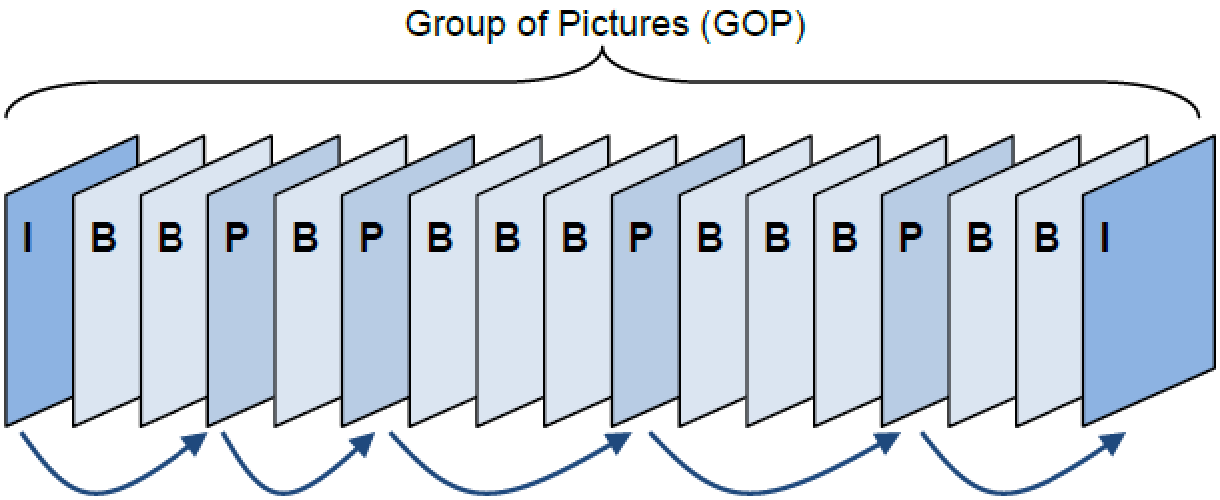
The move away from traditional analogue television technology to digital video and mega-pixel cameras has introduced a range of new video resolution standards. The digital equivalent to 4CIF and D1 is VGA resolution (640 x 480), sometimes referred to as Standard Definition (SD). 1.2 mega-pixel cameras typically use a resolution of 1280 x 1024. 720p has a resolution of 1280 x 720 – the 'p' stands for progressive-scan where every pixel is scanned, rather than alternate lines. 1080i (i.e. interlaced) and 1080p (progressive-scan) have a resolution of 1920 x 1080 (i.e. 2 mega-pixel). These HDTV standards have an aspect-ratio of 16:9, unlike the traditional 4:3 analogue TV standards.

Compression

As the CCTV industry has moved to digital video and IP transmission, a number of standards have evolved for video compression. None of these standards is specific to CCTV – they have been developed for broadcast television and other multimedia applications, but have been widely adopted by IP CCTV manufacturers.

Some early IP CCTV systems used H.261 compression. This was widely used in video-conferencing applications, but was too low quality for most CCTV systems. Other early systems used proprietary Wavelet compression. Motion-JPEG or MJPEG was probably the first widely adopted compression standard for IP CCTV. MJPEG delivers a stream of independent JEPG images, and as a result any of its images can be used as a single frame for identification purposes. While it can deliver a very high quality image, it requires considerably higher network bandwidth and storage capacity than other formats.

MPEG-2 was developed for high bandwidth applications such as HDTV, and is the compression format used on standard video DVDs. It uses temporal compression in the form of 'P' frames and 'B' frames to encode the differences between full 'I' frames. While it is capable of high quality, it does not scale down well to lower bandwidth applications. MPEG-4 is a further evolution of this standard, with more efficient compression and better performance at lower bandwidths. MPEG-4 has been the encoding format of choice for several years in the IP CCTV industry.

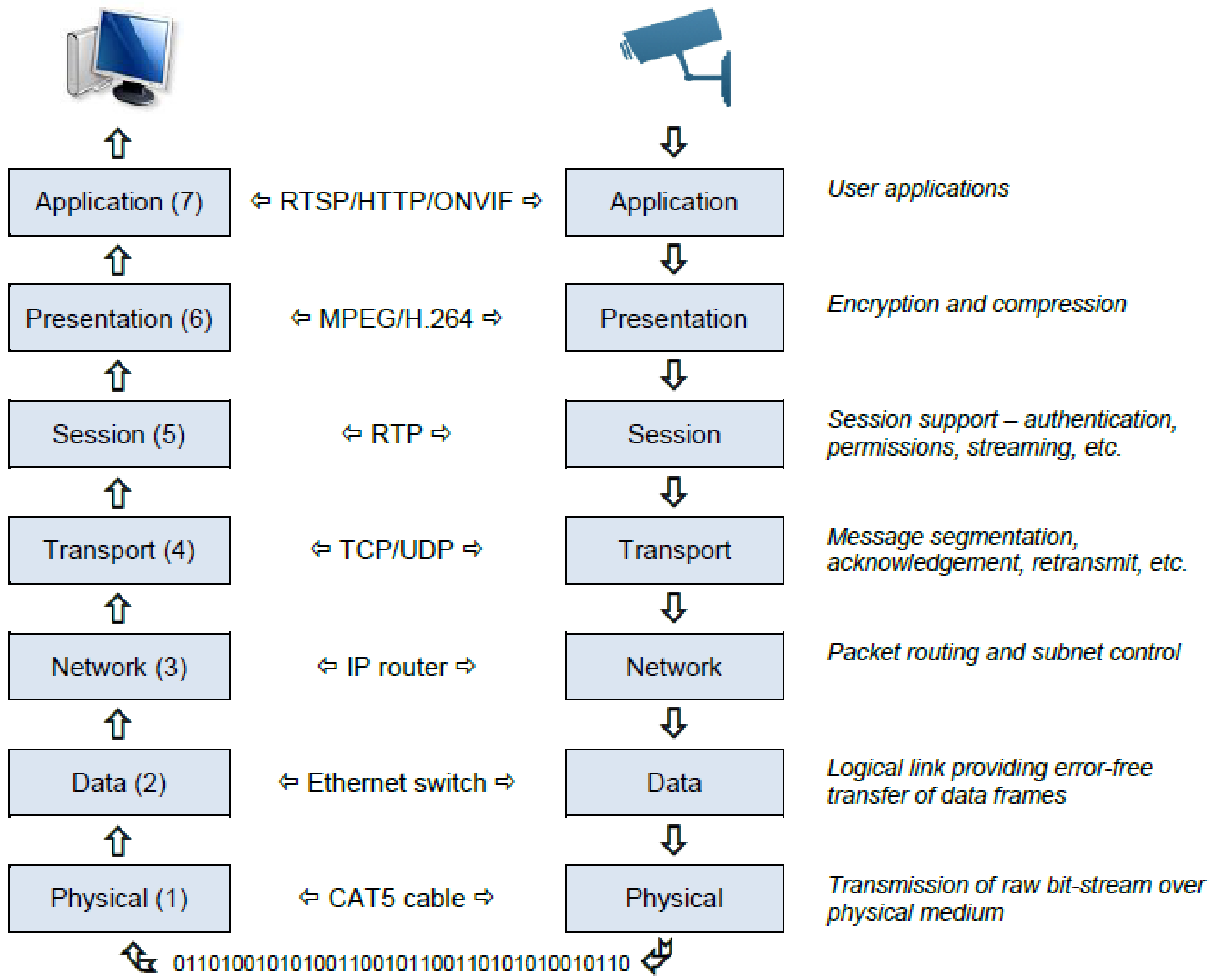


The Intra 'I' frame contains a complete picture. Each Predictive 'P' frame encodes the difference from the previous 'P' or 'I' frame. Bidirectional 'B' frames add more efficiency but also require more computational power and are not normally used in IP CCTV.

H.264 or MPEG-4 Part 10 is the latest video compression standard to be used in IP CCTV. It uses a similar I/P/B frame concept to the earlier MPEG standards but uses a more efficient encoder to deliver the same quality as MPEG-4 with typical savings of between 20 and 50% in network bandwidth and storage capacity. The H.264 standard defines a number of different profiles, with higher profiles that are more efficient but require considerably more computational power. While the Main profile delivers better video quality, most of today's IP CCTV systems use the simpler Baseline Profile. This is a simplified implementation that only uses I and P-frames, requiring relatively low processor power and delivering low latency.

Network

The key standard in IP CCTV systems is the IP network. A full explanation of the theory and technology behind IP networks is beyond the scope of this document – and it's author! The Internet Protocol (IP) is only one of seven layers in the OSI model. The Open System Interconnection (OSI) reference model is an abstract description for layered communications between networked computer systems. Each layer in the model provides services to the layer above it, and communicating devices on a network have compatibility at each of these layers. The diagram below illustrates each of the seven layers in this model in an IP Video context.



Integration

While compression standards such as MPEG4 and H.264 provide a level of standardisation between different manufacturers' IP CCTV systems, they only govern how the video stream is compressed and encrypted. In general, the method to connect to an IP camera or encoder and ask it to start streaming is specific to the camera or encoder manufacturer. However, within the last year there has been a concerted effort to develop standards for connecting cameras and encoders to video recording and management systems.

The *ONVIF* (Open Network Video Interface Forum) specification defines a common protocol for the exchange of information between network video devices, including automatic device discovery and video streaming. The forum was established by Axis, Bosch and Sony in October 2008 and now has over 100 members. It is based on standard web-service technologies such as SOAP, WSDL and XML.

The *PSIA* (Physical Security Interoperability Alliance) was founded in February 2008, and has a membership of over 50 security manufacturers and systems integrators including Cisco, Pelco, Honeywell and Tyco. While ONVIF is concerned almost exclusively with network video, PSIA has a wider remit and includes all segments of the security industry, including video, access control and alarm management. However, PSIA is also focussing on IP video at the moment so we effectively have two competing interoperability initiatives for IP CCCTV. ONVIF and PSIA also use competing technologies: while ONVIF is based on web-services and SOAP, PSIA uses a competing architectural style called REST (Representational State Transfer) which was originally developed in response to the perceived complexity and rigidity of SOAP and Web services.

CHOOSING A PROVIDER

IP CCTV is a fast moving area with a number of evolving standards and competing technologies. Providing an effective system means understanding not just the traditional CCTV and security-management disciplines, but also the latest network and IT skills. Your systems integrator should have the knowledge and experience to be able to recommend the best solution for your particular needs – whether that be analogue or IP – and should be able to support you throughout the lifetime of your system through system selection, design, installation, training, support and growth. So what should you look for when choosing a systems integrator?

Knowledge of CCTV – the most important requirement is a partner who understands CCTV. A general-purpose IT installer may be able to supply a webcam and plug it into the network, but there is a lot more to an IP CCTV system than this. Your system integrator should understand the operational requirements of a CCTV system, including the applicable standards, procedures and legislation.

Knowledge of IT and networking – the technology underlying a modern CCTV system has changed hugely in the last few years, and is rapidly evolving. As a result, the skills and abilities required to deliver a CCTV system have changed. Many traditional systems installers do not yet have the knowledge or experience to recommend, supply and support an IP CCTV system. In addition to the traditional CCTV skills, you should look for Cisco CCNA/CCDA qualifications and other IT credentials.

Knowledge of optics – A camera is only as good as its lens. It is important that your CCTV partner has an in-depth understanding of optics and is able to recommend the most appropriate combination of camera, lens and illumination for each camera site. This is particularly true for megapixel cameras, when the traditional analogue CCTV rules don't necessarily apply.

A solutions provider – IP CCTV shouldn't be seen as a technology, but as part of an integrated solution. It is more important than ever that your CCTV system is able to integrate with your other security systems, and is also able to interface with other business systems. You should select a systems integrator who is not tied to one particular manufacturer, but is able to integrate different products, technologies and applications to provide a fully integrated solution.

Software development capabilities – the key to modern systems integration – the 'glue'– is software. This is a very different engineering discipline to traditional CCTV engineering. It is important that your systems integrator has a fundamental understanding of how software works, and has the skills and experience to be able to build – and support – a solution that meets your individual needs.

Reliability – finally, it is as important as ever to choose a partner with a long track record for supplying and supporting high-quality solutions.

CONCLUSION

While the move to IP CCTV brings real benefits to the security industry, it also poses some significant challenges. In general, IP CCTV systems are more flexible, more scalable, and cheaper to install. As with any evolving technology, standardisation will take a while to catch up so in the meantime we will have to contend with a variety of competing standards. The change in focus from traditional engineering technology to IT systems means that a very different skill-set is required to sell, install, manage and support these systems. This is already exposing a skills-gap in these areas, and has led to a migration of IT companies into the security industry. We are only just beginning to see the benefits of IP CCTV, and as we break the shackles of traditional analogue CCTV and fully embrace the concept of IP network convergence then we will see CCTV finally move into the 21st century.

Want More….

Keep Browsing- http://sipssglobal.blogspot.in/

Explore How SIPSS-GLOBAL can enable you to establish and adopt the best practices of information technology solutions & its deployment.

Your Feedbacks & Suggestions

We are excited to receive your valuable feedbacks to improve our self

Please e-mail to info@sipssglobal.com