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ARCHITECTURE IS THE KEY TO UNLOCK THE BENEFITS OF IP VIDEO

by Barton Kartzog

In the late-1980's, Intel and Microsoft all but destroyed Digital Equipment Corporation by enabling desktops that could distribute computing and storage power to the edge. We continued to assume that computer efficiency would be maximized through centralization. It appears that a similar battle is being waged today about the architecture needed for effective Internet Protocol (IP) video solutions today. Will centralized architecture mirror what was possible in the past, continue to be the de-facto standard for the 21st century? Or, will a new architecture of highly distributed, "smarter" IP devices be the future of increasing video quality and performance?

First, what are the real value propositions of IP video? Why has the US market not adopted it as many anticipated?

The most significant value propositions of IP video include:

- 1. Standardized, shared pipe** - Instead of isolated signals between each recorder, IP allows multiple signals to travel on a single cable or channel. This has significant implications for ease of deployment, installation cost, and long term maintenance of the transmission/cable system.
- 2. Shared Resources** - Almost all organizations need an IP infrastructure for voice, communication, and business data. Video can be one more use for this infrastructure rather than being completely separate.
- 3. Quality** - The NTSC standards have constrained analog video quality to 480 lines @ 30 frames per second (fps) or lower since their introduction in the mid-20th century. IP standards do not limit the image size or frame rate as analog systems do, which translates into options for higher quality.
- 4. "Smarter"** - As cameras become IP devices, we gain potential to offload more computing tasks in addition to capture and transmission of video. Examples include facial character recognition and advanced motion analysis. This "intelligence" has the potential to make video more useful.

Misinformation still abounds. One major video software developer's web site states that when video quality is a primary concern, clients should consider an analog system. Because implementation of IP video to date has often resulted in lower video quality, perspective, legitimately based on early experience with poor IP video picture management, can limit anticipated acceptance rate for IP video. If IP has higher quality, more function, and lower long term cost, but real outcomes are poor quality, then who would blame users for balking?

I believe it's largely an architectural issue. Historically, video systems have centralized command and control product. From the advent of video security through the 1990's, video required home-run cabling to centralized locations.

A large majority of the video products industry is still taking a centralized approach. Beefy servers are being deployed with large numbers of cameras streaming simultaneous storage. Video analysis tools are being placed on secondary servers. While this may be a natural and understandable evolution from architecture(s) of the past, quality is being sacrificed for perceived performance to established architecture. Certainly efficiency is important, but systems truly more efficient?

Most other network-based systems that we encounter in our daily lives are. Consider your desktop or laptop, and the network it connects to. Another example home is the access control industry. Access control system makers long ago distributed architecture would promote fault tolerance, higher performance features. Video solutions are one of the most use-intensive services on network. Centralized approaches lead to even more reliance on the network. Viewed seems surprising that video systems would ever be deployed in highly centralized

All of this would be understandable if centralization were the only cost of deployment. This is not the case. Technology enables a sweeping change from distributed systems. By distributing the computing, storage and analysis of video, all of the IP value propositions discussed above can be fully realized.

Some key attributes of a distributed system include:

1. Moving decision-making analytics away from centralized servers and onto sensors or cameras they serve. It turns out that on top of de-coupling network throughput from video system reliability, this change generally lowers cost as well.
2. Keep streaming video off networks except for when it is being used.
3. Record at the very highest possible quality without impact to the network. View video at lower quality levels in general, but reserve enough network capacity for highest quality on demand.
4. Use of embedded operating systems that are less prone to network based threats.

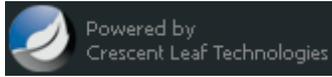
Distributed systems have other benefits. Properly engineered, these will be key to video implementations:

1. Reduce impact of equipment failures. A single failure should only impact a small portion of a distributed system.
2. Increase overall uptime of the system by removing network and centralized causes for recording and alarm generation failures. With the performance effectiveness that is becoming available utilizing IP technology, there is little doubt that analog video will not be the dominant system in the future. How far into the future this largely depends upon our collective willingness to embrace a major change in how we design and implement video systems.



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