

STREAMONIX

Video Streaming Planning & Design

The Streamonix team, as developers of state-of-the-art wired and wireless video streaming systems, has acquired deep expertise and experience across a wide-range of video-over-IP technologies, architectures and systems. Our consultants work with our clients to plan, design and implement optimal video streaming systems and services for wire-line and mobile IP networks. We deliver this expertise to our clients through our seven core practice areas.

1. [Video Streaming Architectures](#)
2. [Internet Video](#)
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4. [IPTV](#)
5. [Government & Military Video](#)
6. [Video-over-IP Surveillance](#)
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Typical Engagements by Client Business

Client	Client's Objective	Streamonix Practice Area
Internet Service Providers & Telecommunication Carriers	Provide IPTV, VoD and Web Video (HTTP & RTMP) services high scalability and low unit costs	Video Streaming Architectures Internet Video IPTV
Content Providers & Media Web Sites	Utilize scalable, secure video streaming systems with robust authentication and payment capabilities to deliver media content	Video Streaming Architectures Internet Video Next-Generation Mobile Video
Mobile Operators	Stream video to thousands of SmartPhones and other devices over 3G, LTE and WiMAX networks	Video Streaming Architectures Next-Generation Mobile Video
Live Content Producers	Stream live video over Unicast IP networks to large number of users with minimized latencies	Video Streaming Architectures Internet Video Next-Generation Mobile Video
Government Agencies & Military Services	Deploy low-latency video streaming solutions that comply with US and NATO standards	Government & Military Video Video-over-IP Surveillance
Surveillance & Security Organizations	Deploy and operate scalable, efficient and secure IP video surveillance networks	Video-over-IP Surveillance
Purchasing Departments	Issue technically comprehensive RFPs and RFQs to selected vendors	All Practice Areas
Movie Producers	Use IP networks to deliver Digital Cinema, 3D Programming and other high resolution formats	Digital Cinema Streaming
Venture Capitalists, Investors, Merger & Acquisition Specialists	Commission technical due-diligence reviews of video streaming-related Intellectual Property	Video Streaming Architectures Next-Generation Mobile Video

Streamonix Value by Practice Area

Video Streaming Architectures

Selecting the Right Architecture: Push versus Pull: A unique capability of the Streamonix team is our deep knowledge of, and experience with, both types of video-over-IP architectures: Push and Pull. Choosing whether to deploy a Push or Pull video streaming network is perhaps the most critical decision confronting organizations involved in video-over-IP. Each architecture has particular strengths and significant weaknesses. Understanding the trade-offs, compromises and costs of Push versus Pull is essential.

Push: When we watch broadcast video – whether via satellite or cable – we receive a continuous stream of video that is available as soon as we turn on our TV. When we change channels, the new channel displays in less than a second. This is the power of push-based streaming, where broadcast systems transmit video in real-time – just-in-time – to our TVs. Push-based streaming is not just a broadcast technology. Video can also be pushed over the Internet and other IP networks, giving the most responsive and immediate video viewing experience. But there are serious caveats. Push streaming assumes that the network will reliably deliver the video on time with virtually no packet loss. Low-loss “walled garden” IPTV networks are ideal for push-based streaming. The Internet, in contrast, is inherently unreliable and packet losses can be unacceptably high. This doesn't rule out push-based streaming over the Internet, but it does require informed choices and careful engineering to ensure a high-quality video viewing experience. *Push-based streaming protocols:* RTP over UDP/IP, Raw UDP/IP, RTSP

Pull: Increasingly, Internet video – including mobile video – is not pushed as continuous real-time streams but instead is pulled as a progressive series of downloads. The video receiver (PC, SmartPhone, Set Top Box) controls the flow of packets, pulling video as needed from the server. It determines what packets are required, sends a request to the server and then waits until sufficient packets are downloaded before decoding the video. If a video packet is late, the receiver waits until it arrives. If a packet is lost, the receiver requests a replacement. This pull-based progressive downloading is the technology used by YouTube and virtually all Internet sites to “stream” video. The primary advantage: all video packets are guaranteed to arrive eventually, even over low bandwidth, loss-prone networks. But there are major disadvantages. Unlike push-based streaming, users “pulling” video receive complete copies of the video they're viewing, copies which can then be redistributed without the owners' knowledge or permission. And latencies are excessive, imposing significant delays before the video can be viewed – changing channels, for example, can take minutes. *Pull-based streaming protocols:* HTTP (with vendor variants) and RTMP (Adobe Flash) over TCP/IP

STREAMONIX provides incisive analysis and advice to assist clients in evaluating and selecting the optimal streaming architecture for their video-over-IP project. We provide the expertise to maximize the benefits of each architecture, while mitigating the disadvantages.

Internet Video

Scaling Capacity Up and Costs Down: By 2013 video will account for 75% of all traffic on the Wired Internet and more than 60% for the Mobile Internet. Normally, such explosive traffic increases would translate into equally sharp growth in revenues for all vendors, from component manufacturers to service providers. But Internet video is anything but a normal business. Users expect ever improving image quality, ever higher video resolutions, ever greater selection and ever quicker responsiveness – at low prices or absolutely free. To meet these user expectations, providers must spend enormous sums to build and operate their networks, generating uncertain revenues through an evolving mix of business models including access fees, content subscriptions, download charges and advertising. The organizations that succeed in this expanding but challenging Internet Video market will be those that offer highly scalable and adaptable technologies and services – at costs that start low and rise slowly.

STREAMONIX can offer the expertise and experience to help our clients maximize the adaptability and scalability – while minimizing the cost – of their Internet Video solutions. Our deep understanding of push and pull streaming architectures, plus our insights into Internet Video formats – including Adobe Flash and challengers such as Google's WebM – ensure that our clients' Internet Video networks will be optimally designed and implemented.

Next-Generation Mobile Video

Realizing Optimal Video-over-LTE: Viewing live and prerecorded video carried over mobile networks is exploding in popularity with the sharp growth in SmartPhones and the advent of Long Term Evolution (LTE) next-generation mobile networks. As a result, LTE carriers and service providers are presented with a compelling revenue generating opportunity – provided they build LTE networks optimized for large-scale video streaming.

At first glance LTE, with its far higher bit-rates and IP packet-based architecture, looks ideally suited for delivering mobile video, including High Definition. But wireless network technology alone is insufficient. To meet the overwhelming demand for live and prerecorded mobile video, the transmission capabilities of LTE networks must be matched with equivalent increases in video server output. LTE networks will need to be integrated with server infrastructures with the scaling capacity, transmission efficiency and wireless network smarts to handle millions of

concurrent requests for High Definition mobile video streams. This need will be especially acute when large numbers of users request the same video content at the same time – as is increasingly common with live video streaming of popular events. LTE's increasing use of unicast networking – where a unique stream is transmitted to every user, even if the content is identical – compounds the requirement for next-generation server infrastructure.

STREAMONIX, as a pioneer in streaming High Definition video over 4th Generation and LTE networks, is uniquely qualified to assist clients in assessing, designing and building next-generation video server technologies matched to their LTE networks.

IPTV

Assuring the High Definition Experience: IPTV is beginning to take significant market share from conventional cable and satellite broadcast TV. But unless IPTV networks can deliver High Definition video to their subscribers, IPTV will at best remain a niche market. Large-scale High Definition streaming is the biggest challenge facing the IPTV industry.

STREAMONIX has in-depth knowledge of High Definition IPTV, from the streaming servers to the set-top-boxes and everything in between. We offer technical consulting to help our clients evaluate and select the most cost-effective, functional and scalable High Definition components and systems for their IPTV networks:

- Hardware Systems
 - Streaming Servers
 - Storage Systems
 - Encoding Systems
- Video Compression CODECs
 - MPEG-2, H.264, VP8, VC-1
 - JPEG 2000, AVS, Dirac
- Network Performance & Video Quality Monitoring
 - Media Delivery Index
- Software Systems
 - Middleware
 - Billing Systems
 - Conditional Access
 - Digital Rights Management
 - Services Provisioning
- Set Top Boxes
 - Chipsets
 - Firmware

Government & Military Video

Complying with Converging Commercial & Military Standards: Advanced video technologies are reshaping military and intelligence agencies worldwide, enabling a wave of unmanned vehicles and aircraft and powering a new generation of sensors. These systems generate petabytes of video, in high, sometimes extreme resolutions. Ensuring that this video can be transmitted with the greatest reliability and lowest latency to users across multiple units, services and agencies is a critically important task confronting the US and its NATO allies. Wherever possible, the US is employing proven commercial video technologies and standards, rather than re-inventing existing solutions.

The US National Geospatial-Intelligence Agency is overseeing the application of commercial technologies to military and intelligence missions and in that regard established the [Motion Imagery Standards Board \(MISB\)](#). MISB's charter is to adopt – and if necessary adapt – existing commercial standards to strengthen the interoperability and quality of military and other government video systems.

STREAMONIX has a deep understanding of MISB standards and regularly participates in MISB conferences and deliberations. For companies intending to sell commercial video systems to US or NATO governments, Streamonix provides technology consulting to bring those systems into MISB conformance. For governments seeking video technologies from the commercial sector, Streamonix assesses the suitability of those technologies.

Video-over-IP Surveillance

Delivering Multicast Benefits on Unicast Networks: Video surveillance is moving rapidly from analog to digital, using IP cameras that stream digital video imagery over IP networks. As this trend grows, so does the requirement for increased resolution and picture quality, which is driving demand for High Definition versions of IP cameras – and sharply increasing the traffic on surveillance networks. At the same time, there is growing need for one-to-many streaming, where the video from a single camera is transmitted to multiple users at local and remote locations – further increasing the load on surveillance networks and systems.

Traditionally, multicast networks are used for delivering video streams to multiple users. But multicasting is inherently insecure – all IP packets can be accessed by all users – and therefore is unsuited for most surveillance work. Advanced surveillance networks use unicasting, where a specific camera streams packets to a specific user. If more than one user must access a unicast stream, that stream must be replicated. With the increased use of High Definition IP cameras and high bit-rates, stream replication becomes extremely challenging, especially if low latency is required.

The combination of High Definition IP cameras and one-to-many streaming can cause havoc on surveillance networks. Careful planning and execution are necessary to ensure that surveillance networks and all related systems can deliver High Definition streams to one or many users with the greatest reliability and the lowest latency.

STREAMONIX, as a leading developer of one-to-many video streaming systems, has unique expertise and in-depth know-how which we bring to our Video-over-IP Surveillance engagements.

Digital Cinema Streaming

Migrating to Next Generation Digital Cinema: Digital Cinema and video streaming are normally poles apart, but that is about to change. The current generation of D-Cinema equipment uses no streaming at all: digital projectors are tethered to their own file servers and hard-disk arrays. This disk-based approach has serious drawbacks, especially in multi-screen cinemas. With each screen requiring a projector and a server, at \$150,000 for the pair, the cost of equipping large multi-screen cineplexes is prohibitive. Increased hard-disk and server failures, plus much higher training, maintenance and electricity expenses, cut into profits. This is slowing the move from analog film projectors to Digital Cinema systems.

There is another and perhaps larger problem with the current server-per-screen design: theatre operators lose the ability to freely choose which screen will display which movie. The Hollywood studios – through their [Digital Cinema Initiatives \(DCI\)](#) consortium – require the use of very strong anti-piracy technology that locks each copy of each digital movie to the specific file server and projector that will display it. This makes it impossible for theatre operators to switch movies at the last minute to screens with greater or fewer seats in response to changes in movie popularity. Revenues suffer as a result.

The emerging solution is Digital Cinema Streaming – a single D-Cinema streaming server that transmits movies to an array of next-generation networked D-Cinema projectors. With just one server supporting all screens, overall costs and complexity will be substantially lower, and last-minute screen changes will be easy.

STREAMONIX offers companies entering the D-Cinema market the expertise to ensure that their products fit within this still evolving environment, as DCI extends its specifications to include streaming to networked digital projectors.

Recent Engagements

<u>Client</u>	<u>Practice Area</u>
Major Japanese Mobile Telecommunications Carrier	Next-Generation Mobile Video
Leading Digital Cinema Component Manufacturer	Digital Cinema Streaming
Government Agency	Next-Generation Mobile Video

Consulting Team Locations

Streamonix consulting services are delivered by our in-house experts and partners located in the world's major technology and communications centres including:

Berlin	Milan	Singapore	Vancouver
Hong Kong	Ottawa	Sydney	Washington D.C.
London	Shanghai	Tokyo	
Los Angeles	Silicon Valley	Toronto	

To learn more about Streamonix Video Streaming Planning & Design Services and the value we can deliver to your organization, please email us at consulting@streamonix.com.