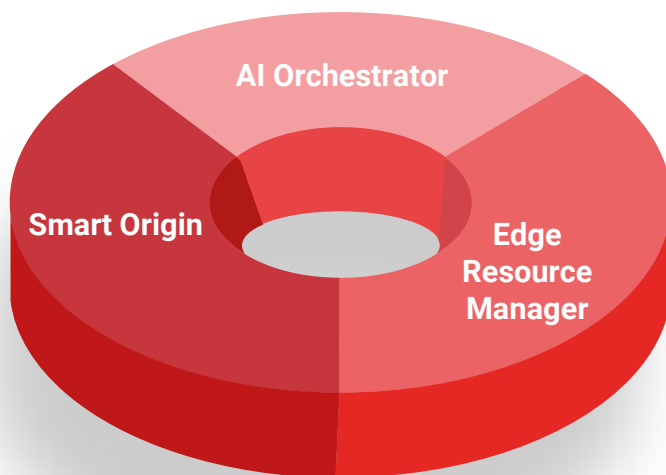


# Intelligent Software

MainStreaming's video streaming and stream monitoring software is designed to deliver broadcast-grade streaming. In other words, it is designed to simultaneously achieve maximum streaming efficiency and maximum performance for any size of audience. Everybody expects to watch videos wherever they are nowadays whilst traditional distribution networks struggle against rebuffering, video stalls and delayed start time, which results in a low quality of experience. In fact, the traditional CDN's were built originally for static content caching and website acceleration and then also used their infrastructure for streaming purposes.

Video streaming has grown exponentially over the last 15 years since the first big wave of OTT video services emerged in the mid-2000s. Looking to the next 15 years we can expect another exponential leap in streaming demand and capacity requirements. At MainStreaming, we therefore feel very strongly that streaming solutions must be built for maximum efficiency because we must first consider our environmental impact, and second the viewer experience of both Live video and VOD should be flawless in terms of quality and latency.

The overall solution involves the **three** headline features of **Smart Origin**, **AI Orchestrator**, and **Edge Resource Manager**:



Several **patented solutions** to ensure all the streams are delivered smoothless.

## WHAT DOES BROADCAST-GRADE MEAN TO MAINSTREAMING?

We will deliver:

Exactly the bitrate requested, consistently throughout the entire viewing period (no need to use ABR ladder profiles).

At a constant latency, of 5-6 seconds or lower (if low-latency or ultra-low-latency is supported by other streaming components).

To any audience size, including prime-time audiences with millions or even 10s of millions of concurrent viewers.

## Broadcast-grade. At scale. Green.

Stay in touch



marketing@mainstreaming.tv



# Intelligent Software

To achieve these outcomes, there are **6 primary features** provided by MainStreaming's software layer:

## Transparent Edge selection – an AI Orchestrator function

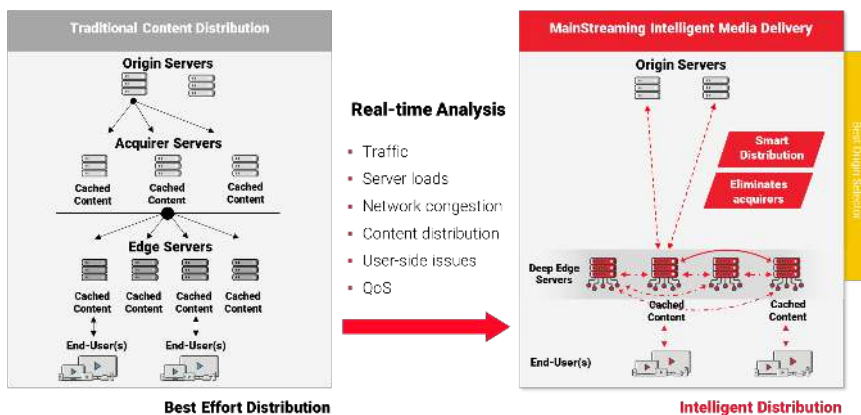
■ Once an Edge has been selected to deliver a stream, the job of flawless delivery continues. As one Edge becomes fully loaded, it will redirect new stream requests to alternative Edges. MainStreaming software can also transparently pass an existing stream, without disrupting the viewer, to a new Edge when there are performance problems observed from downstream performance. This is achieved through MainStreaming's continuous monitoring and routing process that can dynamically select a new route between Edge and viewer that protects the viewer's QoE.

## Scale-up monitoring – an AI Orchestrator function

■ Broadcast-grade streaming is initiated for a viewer when the best Edge is selected for the original stream request. But streaming operates in a constantly changing environment of consumer demand and network capacity. Therefore, continuous monitoring at scale, and acting on the data received, is critical to achieve broadcast-grade streaming. MainStreaming developed streaming and monitoring to co-exist in each server, so when streaming capacity scales up monitoring capacity also scales up, providing infinite monitoring capabilities to always match the streaming capacity.

## Distributed Edge processing – an AI Orchestrator function

■ Deploying streaming and monitoring together enables each Edge to be an autonomous unit in the CDN. MainStreaming's software distributes its processing power across its multi-Edge environment, allowing the system to flexibly deliver to best-possible standards considering all aspects of the network – upstream to the Origin, downstream to the viewer, and intra-CDN between interconnected Edges. The full visibility and use of information from all Edges simultaneously enables optimal decision-making to protect viewer QoE. See Smart Architecture for more information on network design.



## Broadcast-grade. At scale. Green.

Stay in touch



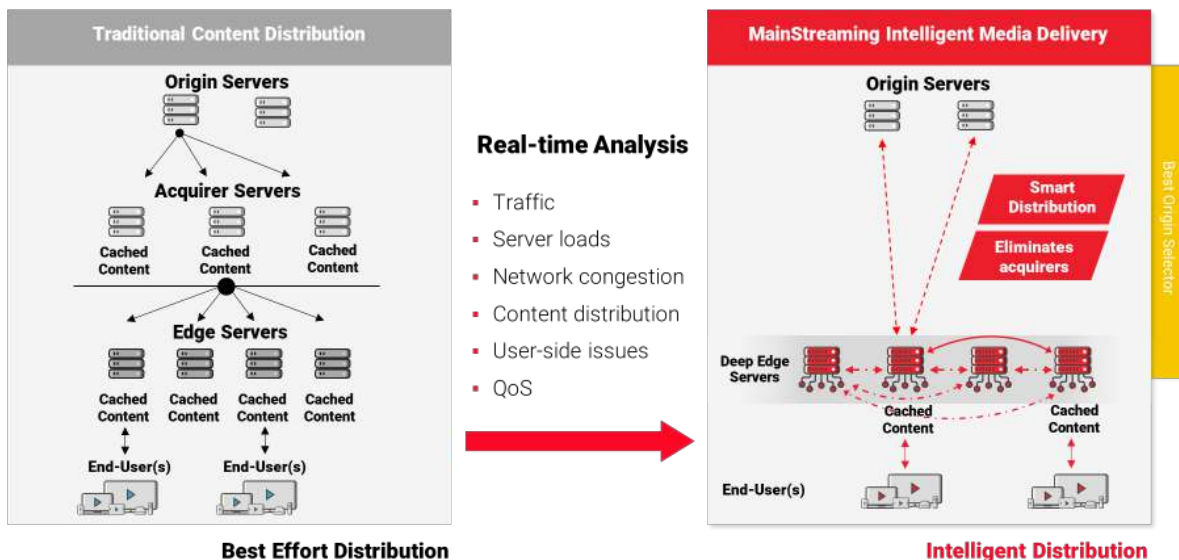
marketing@mainstreaming.tv



# Intelligent Software

## Efficient delivery from Origin to Edge – a Smart Origin function

■ Distributed processing helped MainStreaming achieve the goal of maximising efficiency of delivery between the Origin and the multi-Edge CDN environment. Inefficient delivery happens when many requests are made to the Origin for the same content that the CDN already has, which means that more streams egress the Origin environment, consuming



more power and network bandwidth than necessary. Instead, MainStreaming's Smart Origin software feature enables a resilient Master Edge to be configured in the CDN which receives the content from the Origin and then manages inter-Edge distribution.

## High Throughput Ultra Low Latency (HTULL) protocol – an embedded capability

■ A building block of broadcast-grade streaming is the ability to move content extremely quickly between Edge servers – either Origin to Edge, or Edge to Edge. MainStreaming developed and patented its HTULL protocol, a blend of TCP and UDP, to provide reliable milli-second level data transfer between servers, transparent to a 3rd party Origin and to the Player. Whenever a Master Edge distributes content to other Edges (with Smart Origin functionality), or a big live event or appointment-TV event takes place, HTULL provides the speed required to quickly scale out the Edge egress for large audiences.

## Broadcast-grade. At scale. Green.

Stay in touch



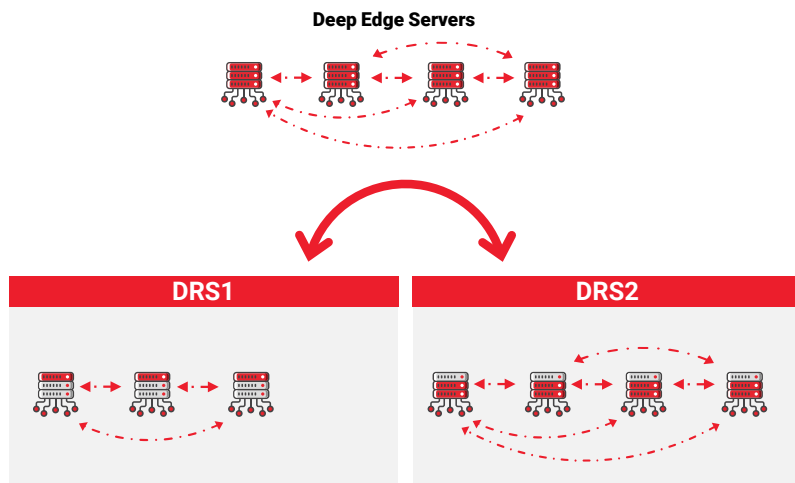
marketing@mainstreaming.tv



# Intelligent Software

## Edge Configuration Tools – an Edge Resource Manager function

■ In the Private CDN service model MainStreaming offers (versus the Public CDN service model MainStreaming also offers), the Edge Resource Manager enables a Distributed Resource Set (DRS) to use portions of available hardware resources. The same physical Edge computing server can be instantiated multiple times into different topologies dedicated to different needs and tenants. Within each DRS, the Edge Resource Manager allows the creation of user traffic distribution, content/cache allocation, computational power, priorities and power consumption rules for the Edge services that are specific to that DRS.



## Live event audience scaling – an AI Orchestrator function

■ To manage the so-called “thundering herd” for live events, not only was MainStreaming’s software designed to be distributed, use HTULL, and have the Smart Origin feature. It was also designed to work very closely with the hardware resources available in the server, and to use in-depth system KPIs that allows every Edge to fill up quickly but not become over-subscribed, with automatic and fast overflow management to MainStreaming’s Public CDN (\*see Smart Architecture for more information about network design). The combination of software features ensures MainStreaming is broadcast-grade, even under the most demanding conditions.

For **more information**, please **contact us**. Technical discussions about all the above points are available, with an NDA required to have an in-depth discussion about the AI Orchestrator functionality.

## Broadcast-grade. At scale. Green.

Stay in touch



marketing@mainstreaming.tv

