
# OTT 101 whitepaper

## and introducing the

## OTT Super Server™

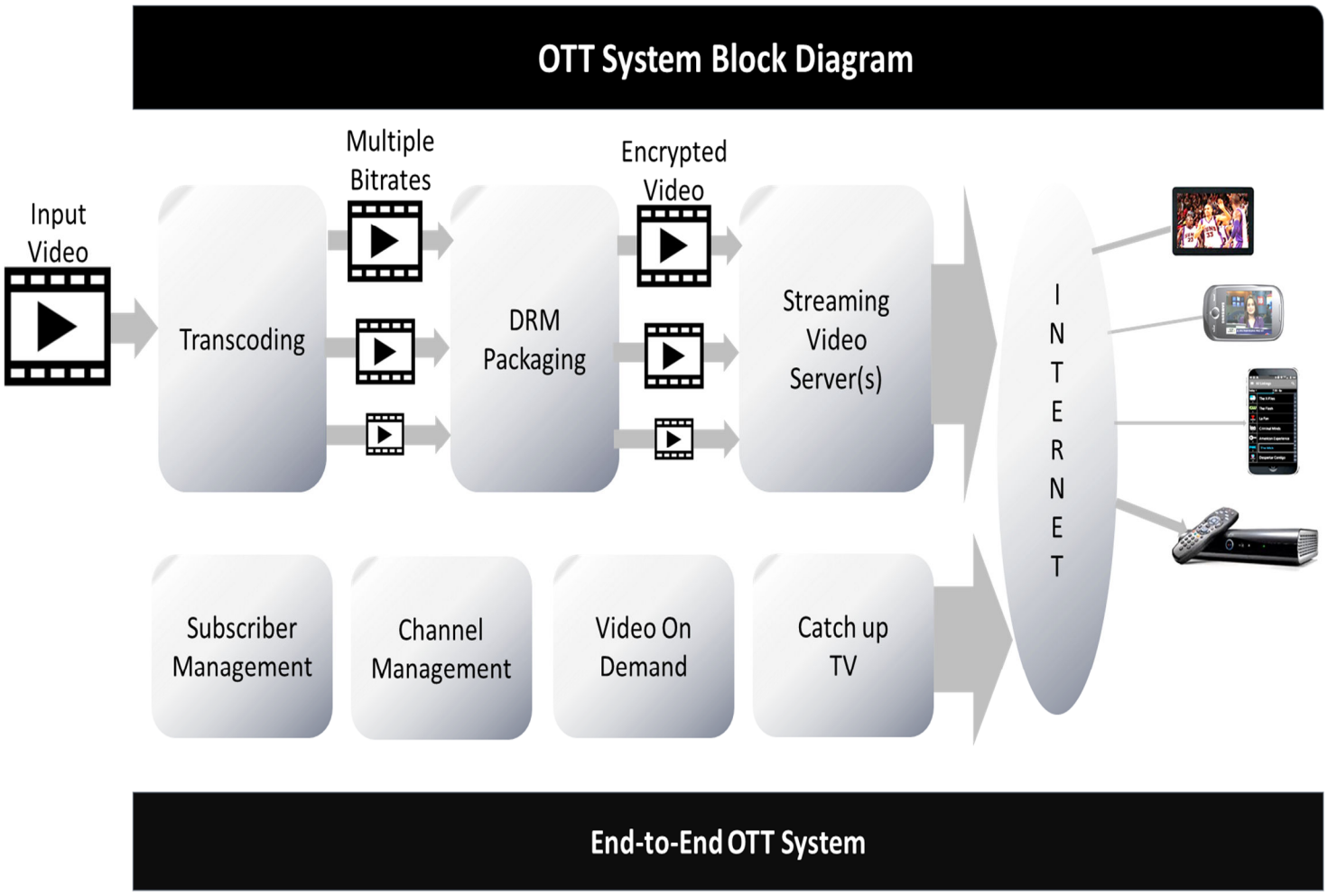
## Introduction

This guide will introduce you to the technology required for an OTT (Over The Top) Video Delivery Service. OTT Video shares some processing with cable TV systems and there are additional processing functions not found in cable systems.

OTT technology will be explained and then Secure TV's OTT SuperServer™ will be presented. The OTT SuperServer is an integrated one server system providing *all the technology required for a* ***complete OTT system and service.***

## OTT System Block Diagram

An OTT block diagram is provided below and each system will be discussed.



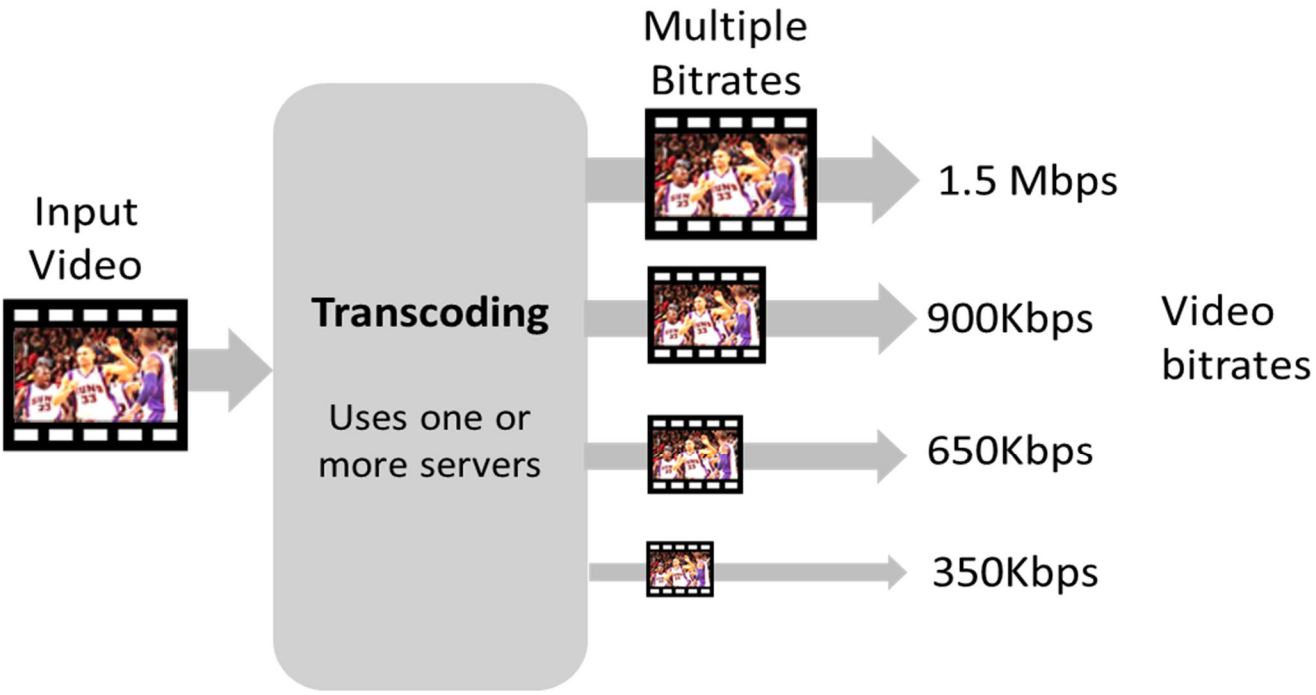
## **Live TV feed** – same as Cable TV

Live TV (Linear TV) channels are input to the OTT System and these channels can be the same channels as broadcasted to cable TV Set Top Boxes (STBs). Typically, the TV channels will be H.264 encoded and sent to the Transcoding system over a TCP/IP network. Other interfaces such as ASI and SDI are supported but add additional hardware costs. The preferred format for live TV is Single Program Transport Stream (SPTS) format typically sent from the QAM or MUX.

## **Transcoding** – new for OTT

Transcoding processing takes the Input Video streams and creates what is called Adaptive Bit Rate (ABR) channels or streams. For OTT the transcoder outputs Multiple Bit Rate (MBR) videos typically ranging from 1.5 megabits per second (Mbps) down to 400Kbps. The reason for MBR video is to assure videos will play with minimal buffering on slow networks (400Kbps video), as well as providing better video quality (1.5Mbps) over higher speed networks.

One important note about Adaptive Bit Rate videos output from the Transcoder is that the multiple video bitrate streams are Aligned (called GOP Aligned) so that video playout can adapt to changes in network quality. For example, a user may start video playout when they are close to their home router and will get the highest quality/highest bitrate video, and then as they move away from the router and have lower signal strength the player will automatically drop down to a lower speed and lower quality video for the same channel to prevent buffering. This automatic adjustment for network quality happens without frames being dropped or skipped so playout is continuous even as network conditions change.



An example of the transcoders various outputs is provided in the Figure above. The Transcoder is transcoding the input video into four output bitrates with different screen resolutions. The term for each transcoded output stream is called a profile. In the above example there are four output profiles.

**Transcoder Process**

Transcoding processing can be simplified into the following steps:

a. Decode the incoming compressed input video to uncompressed video on a frame by frame basis.
b. Filter and Resize the video for each output bitrate (profile)
c. Re-encode each output video adjusting video quality for desired output bitrate
d. Stream the multiple transcoded video out to the network

**Transcoder Hardware**

Transcoding hardware will be one of the larger or the largest single hardware expense for an OTT system. The per channel hardware transcoding costs will be multiplied by the number of channels transcoded plus the number of output transcoded video profiles.

As will be described later in this document Secure TV has developed a very high density, energy efficient, single server transcoder for Standard Definition and High Definition TV channels. Support for Ultra-High Definition UHD or 4K transcoding will be released in Q4-2018.

Secure TV's Transcoder is based on tiny transcoding modules and each module supports up to 12 Standard Definition videos. Multiple tiny modules are housed in a single server to provide support for 80 SD channels and 20 HD channels of transcoding plus the other OTT system components.

## **Video Server** – new for OTT

Each individual video played in an OTT video system is sent as an individual stream referred to as a Unicast. Cable TV systems send the same video to all STB viewers and this is called Multicast. Unicast sends one stream to only one client device (mobile phone, tablet, OTT STB). If there are 100,000 subscribers in an OTT system and 20,000 subscribers are watching TV on the OTT system there are 20,000 Unique video streams being sent to the viewer. Assuming an average bitrate of 1 megabit per stream then the OTT system will be streaming 20 Gigabits of video data (20,000 * 1 mbps. 20 Gigabits of streaming video requires hardware that is finely tuned with multiple CPU cores, multiple 10 or a single 40 gigabit Ethernet interface, 64 gigabytes or more of fast RAM, and server hardware that is designed for handling such high network output.

Secure TV in addition to its Transcoder products has developed a line of high performance, energy efficient, small form factor OTT Video Streaming servers that will be described later in this document.

For sizing the network streaming requirements for the Video Streaming Server take the peak number of subscribers using OTT and multiply by the average bitrate (typically between 1 and 2 mbps) to determine the networking load.

## DRM – similar to CAS

In OTT systems Digital Rights Management (DRM) handles the video encryption content security and subscriber authorization. DRM is very similar to Conditional Access Systems (CAS) used in cable TV systems.

The OTT Super Server Secure TV can provide DVB-CAS, IPTV-CAS, and OTT DRM allowing one server to secure multiple networks and supporting Set Top Boxes, Mobile phones, Tablets, PCs, and Smart TVs. Secure TV has developed its own DRM and also supports the Widevine DRM.

The Secure TV DRM manages the number of OTT devices that can be authorized by the subscriber based on subscription level. For example, a basic cable TV customer may only be allowed to authorize one DRM device, and a Gold or All Channels subscriber can authorize 5 or more.

## Subscriber Management (SMS)

Like in CAS systems, OTT subscribers are managed by an OTT Ready SMS. Secure TV has integrated a multiple-network SMS supporting OTT along with DVB CAS (cable, satellite, terrestrial) and IPTV. The multiscreen, multinetwork SMS meets all of the TRAI requirements for CAS systems and includes an extensive list of features and reports required by the Broadcasters. The Secure TV SMS has been audited and approved at dozens of operator sites in India. Highlights of the Secure TV SMS include:

CAS + DRM + OTT Subscriber Management

MSO manages Local Cable Operator (LCO) inventory

MSO or LCO manage LCO inventory

Broadcaster audited and approved reporting

Bulk ingest for subscribers, channels, devices

## Channel Manager

In OTT systems there is no QAM or MUX and the live streaming channels are managed by the OTT system. Secure TV has an OTT Channel Manager that is unified with the Secure TV CAS and IPTV Channel Manager. The unified Channel Management provides multi-network management from a single GUI for any combination of OTT, IPTV, DVB CAS networks.

## Video On Demand (VOD)

Video On Demand for OTT is very similar to VOD on other networks and the main difference is that OTT VOD needs to support MPEG-DASH or HLS streaming protocols along with DRM encryption. Secure TV provides the complete software for OTT video ingest, transcoding, encryption, content packaging, VOD streaming, and VOD subscriber management. VOD highlights:

Automated Video Ingest Tools
Video Transcoding
Video Packaging
VOD GUI Page Builder
VOD Streaming
VOD ingest processing logs

## Catchup TV

Catchup TV is a service option where TV from prior days can be accessed without subscribers needing to record any content. Typically operators will offer Catchup TV for select channels at select times for five to seven days. An example is recording the TV shows on 20 channels that are broadcasted between the hours of 8PM and 11PM daily. OTT subscribers will have access to the shows and can watch the recorded shows at anytime when the recording is saved. After a number of days the recording is deleted allowing the disk spaced used for recordings to be reused for another TV show.

The VOD server in the OTT Super Server is used to deliver Catchup TV programs to subscribers.

# Apps – Android & iOS Apps

An operator can deploy OTT using applications (apps) or a web-portal where no app is required and the viewer uses a browser to watch OTT videos. Secure TV provides Android and iOS apps that support live TV, VOD, and catchup TV. Secure TV recommends deploying OTT with apps because browser based deployments are more difficult to manage. Also, subscribers are accustomed to downloading apps for phones and tablets.

The Secure TV Apps have the look and feel of a cable TV service and the apps can be rebranded to customer requirements. A few screen shots of the Secure TV apps are provided below:

**EPG** **Live TV on Android Tablet** **Video On Demand**


**Example screen shots from the Secure TV Apps**

# Introducing the *OTT Super Server* ™

## A complete OTT system with transcoding, streaming, DRM, Subscriber Management, Live TV, VOD, Reporting, Catchup TV *in a single 2RU server*

The OTT Super Server is a breakthrough OTT system including all the processing required for a complete end-to-end system, starting from content ingest and subscriber management through delivery to Secure TV's applications. The single server includes redundant power supplies and is extremely energy efficient.

OTT SuperServer Features

| Processing features | Description |
|---|---|
| Transcoding | 80 Channels of SD, 20 Channels of HD, VOD with Multiple Profile ABR output, scalable using SecureTV's Transcoder Modules |
| OTT Streaming | Multiple 10 gigabit Ethernet NICs two SFP+, two 10GBase T, 16 core CPU |
| DRM & CAS | DRM for OTT and IPTV, DVB CAS for cable, terrestrial, satellite. Hollywood Approved and independent audited. |
| System Manager | Database, Operator GUIs, Logging, Reporting, system configuration, etc. |
| Subscriber Management System | Broadcaster approved, complete Reporting, Alacarte and Package mgmt.., Bulk Ingest, MSO, LCO, and Distribution management |
| Middleware | EPG processing and display, VOD processing and display, APIs to interface with 3rd party middlewares, App GUI manager |
| Apps | Android and iOS apps |
| Ads | Interfaces to 3rd Party Ad Networks delivery ads to Android and iOS apps |
| CPU technology | 4 core and 16 core processors, up to 64 total cores on multiple CPUS |
| RAM | Up to 384 Gigabytes of DDR 4 RAM |
| Management Interface | Separate Gigabit Ethernet System Management Interface |
| Power Supply | Redundant Power Supply Unit with Hot Swap, 100VAC to 240VAC |
| Form-factor | 2 Rack Unit (RU) |

SecureTV's product line includes the following products:

## *UltraCAS*
Conditional Access System

*UltraCAS 4K* is the latest generation of cardless Conditional Access System products from SecureTV. Designed by Bob Kulakowski who co-founded Verimatrix and a team of World-class developers, *UltraCAS* is *ultra-secure* incorporating innovative security features for cable, satellite, IPTV, OTT delivered in a fully redundant configuration.

| | | |
|---|---|---|
| **DVB Based CAS** | **4K-UHD, HD, SD** | **High Performance** |
| **DVB Simulcrypt** | **MPEG, H.264,H.265** | **Cost effective** |
| **PPV, VOD,sVOD** | **Advanced Security** | **Trustzone support** |

## *UltraDRM*
Digital Rights Management

*UltraDRM 4K* is the DRM component of the Unified CAS & DRM product called *Ultra*CAS. With the unification of CAS & DRM Secure TV is able to provide operators with a *single server solution* for **secure content delivery on one-way and two-way networks** to Set Top Boxes, mobile phones, and tablets.

| | | |
|---|---|---|
| **HLS, MPEG DASH, UDP** | **4K-UHD, HD, SD** | **Secure Player app** |
| **Secure Android App** | **Secure iOS App** | **Widevine option** |

## *OTT Streamer*

OTT Streamer is a high performance, scalable Live TV and VOD streamer for OTT and IPTV. Streaming is the **heart of OTT** and Secure TV's OTT Streamer scales from supporting 1000's of subscribers up to 100,000's of subscribers.

| | | |
|---|---|---|
| **One-way DRM** | **MPEG, H.264,H.265** | **Secure Player app** |
| **Secure Android App** | **Secure iOS App** | **Transcoding is optional** |

## *Transcoder*

*Transcoder* is Secure TV's video and audio encoder/transcoder for 4K UHD, HD, SD, and mobile resolution video transcoding. *vCoder* is a highly scalable and efficient software based encoder/transcoder using *Advanced Video Processing* capabilities contained in Intel CPUs.

| | | |
|---|---|---|
| **Intel Quick Sync** | **MPEG, H.264,H.265** | **MPEG-DASH, HLS, UDP** |
| **Futureproof** | **Live stream and VOD** | **Super fast decode/encode** |

## *SMS+*
Subscriber Management System

Every great CAS needs an SMS and *SMS+* is Secure TV's Subscriber Management System for CAS and DRM. *SMS+* was designed for MSO's managing Local Cable Operators as well as CAS, DRM and TV Everywhere subscriptions. Meets stringent TRAI and Broadcaster requirements. Rest APIs interface to other CAS vendors. Can run on CAS server for single server deployments. REST APIs are included to interface to existing SMS systems.

| | | |
|---|---|---|
| **MSO, LCO Support** | **Distributed HE support** | **Bulk Ingest support** |
| **Alacarte/Package support** | **Package support** | **Studio Report Generation** |

## Lightweight Middleware

Secure TV's Lightweight Middleware provides features and functions focused on video delivery to subscribers over IPTV and OTT networks, including automated content ingest processing and management and support for Andoid and iOS applications and web-portal deployments.

| | | |
|---|---|---|
| **Live TV EPG** | **Catchup TV, VOD** | **Recommendation Engine** Q2-18 |
| **Content Management** | **Analytics** Q2-2018 | **iOS, Android Apps or portal** |

# Powerful OTT Streaming Servers

## Up to *42,000* streams per server

### MaxStream 42K

Capacity: **Streams 42,000 concurrent 1-mbps streams**

| | |
|---|---|
| Dual XEON CPU | ECC Memory |
| Six 10GigE ports | Redundant Power Supplies |
| 3 RU Server | High Efficiency Server |
| HLS & DASH | Video Encryption & DRM |

### MaxStream 7K

Capacity: **Streams 7,000 concurrent 1-mbps streams**

| | |
|---|---|
| Single XEON CPU | ECC Memory |
| Six 10GigE ports | Redundant Power Supplies |
| 1 RU Server | High Efficiency Server |
| HLS & DASH | Video Encryption & DRM |

### MaxStream 1000

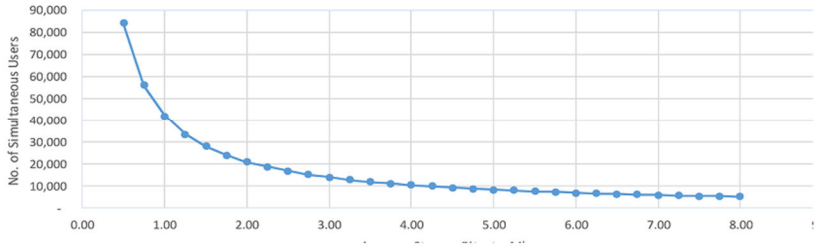
Capacity: **Streams 1000 concurrent 1-mbps streams**

| | |
|---|---|
| Single I7 or XEON CPU | Up to 32GB Memory |
| Dual 1GigE ports | Low Power PC |
| HLS & DASH | Small Form Factor or 1RU |
| Video Encryption & DRM | |

| Support | MaxStream 700 | MaxStream 7000 | MaxStream 42K |
|---|---|---|---|
| **Input Video and Audio Codecs** | | | |
| Video: H.264/AVC, H.265/HEVC | ✓ | ✓ | ✓ |
| Audio: AAC, AC3, MP3 | ✓ | ✓ | ✓ |
| **Live Inputs from Encoder** | | | |
| RTMP, RTSP, MPEG-TS (UDP) | ✓ | ✓ | ✓ |
| **File Input Formats for VOD** | | | |
| TS, MP4, Multi-bitrate File, other formats upon request | TS only | ✓ | ✓ |
| **Live and VOD Output Formats** | | | |
| HTTP Live Streaming (HLS), MPEG DASH, Progressive FLV, MP4, HTTP Dynamic (HDS), RTMP, RTSP (TCP/UDP), MPEG-TS, SRT Subtitles, WebVTT Subtitles, JSON metadata, DLNA | ✓ | ✓ | ✓ |
| **Output Content Security/DRM** | | | |
| AES-128 Encryption incl. Simulcrypt/ECMG support | ✓ | ✓ | ✓ |
| Secure TV UltraCAS, Widevine | ✓ | ✓ | ✓ |
| **Performance** | | | |
| No. of Simultaneous Users at 1 Mbps (see charts for number of simultaneous users as a function of average bitrates) | 700+ | 7,000+ | 42,000+ |
| **Hardware** | | | |
| Form Factor (RU = Rack Unit) | 1RU | 1RU | 3RU |
| Redundant Power | | ✓ | ✓ |
| Ethernet Ports Gigabit Ethernet | 2 | 4 | 2 |
| Ethernet Ports 10 Gig/E | | 1 | 2 standard, up to 6 |
| Processor technology | One 4 core XEON CPU | One 14 core XEON CPU | Two 14 core XEON CPUs |
| Intelligent Platform Management Interface IPMI | ✓ | ✓ | ✓ |

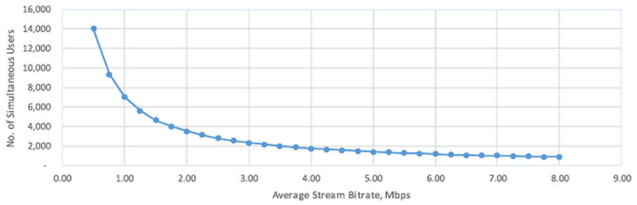
# Catch up TV/VOD Server Performance

Maximum Performance MaxStream 42K



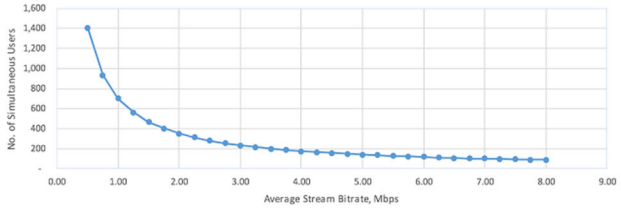

In the above chart for the MaxStream 42K Performance for Simultaneous uses is provided. A total of approximately 42,000 one-megabit video streams is supported from the highest performance unit in the MaxStream product line.

MaxStream 7000 (1 RU unit)




In the above chart for the MaxStream 7000 Performance for Simultaneous uses is provided. A total of approximately 7,000 one-megabit video streams is supported from the mid-range unit.

MaxStream 1000 (1 RU unit)




In the above chart for the MaxStream 1000 Performance for Simultaneous uses is provided. A total of approximately 700 to 1000 one-megabit video streams is supported.

For more information on the OTT Super Server contact:


**Bob Kulakowski**
CEO

4275 Executive Square, Suite 200, La Jolla, CA 92037 USA

+1.760.533.5888
+1.844.401.5777
bobk@secureTV.TV
www.SecureTV.TV