



Live Broadcasting over the Internet

May 20, 2015

Live Broadcast Quality Video Delivery over the Internet

Multi-platform

Convenient

Cost-effective

Reliable

Secure

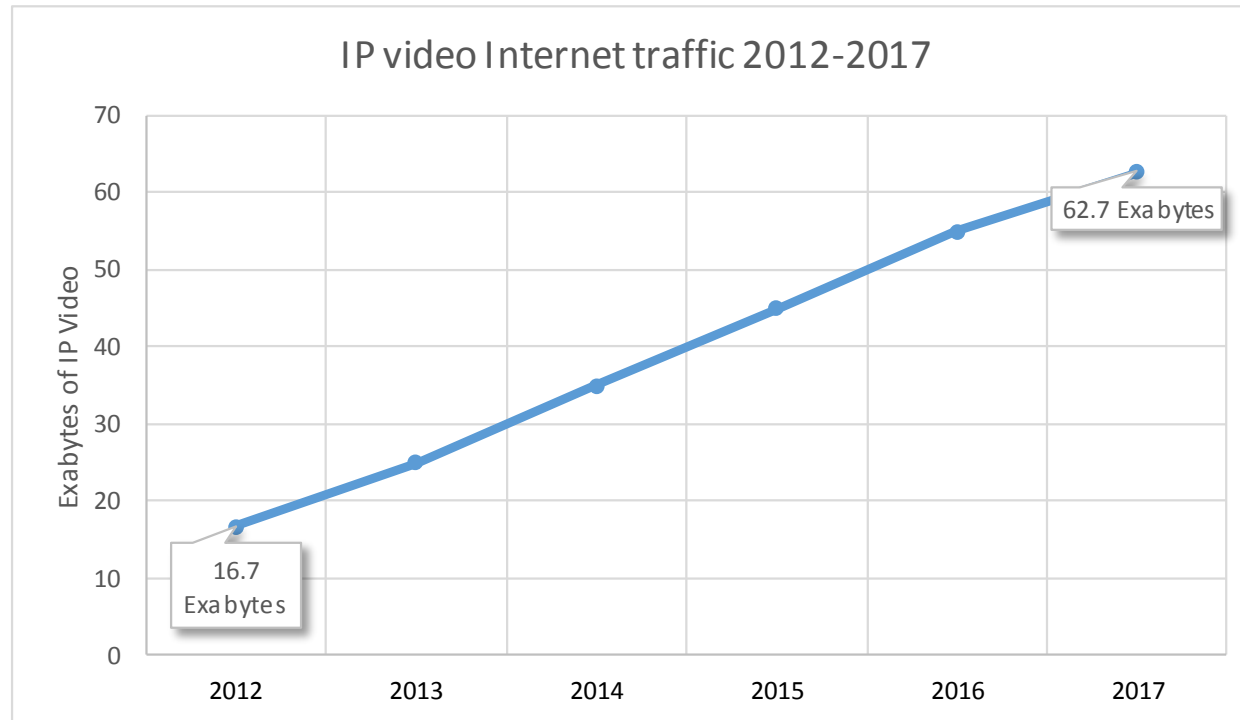
Scalable

Disruptive



From anywhere...to everywhere

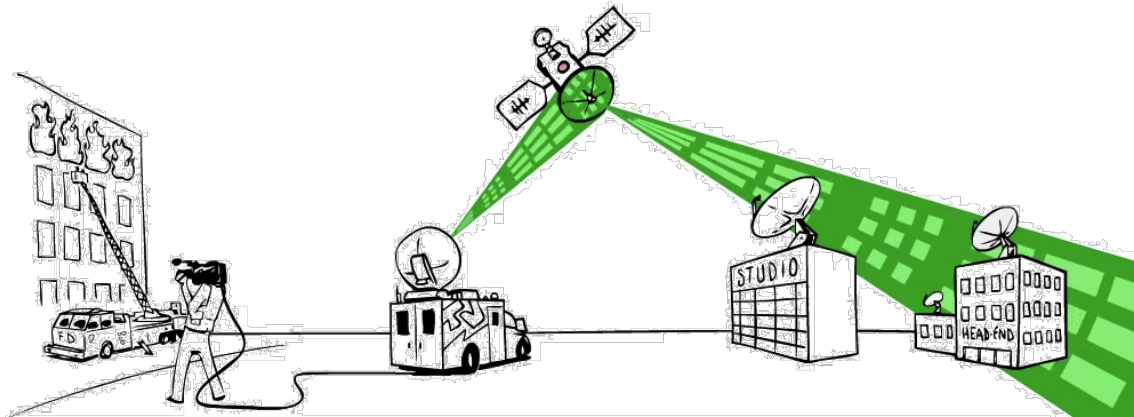
The Trend: Video over the Internet



Broadcasters, live event producers, content distributors, enterprises and higher education institutions are looking to transport **live** studio-quality video over the Internet

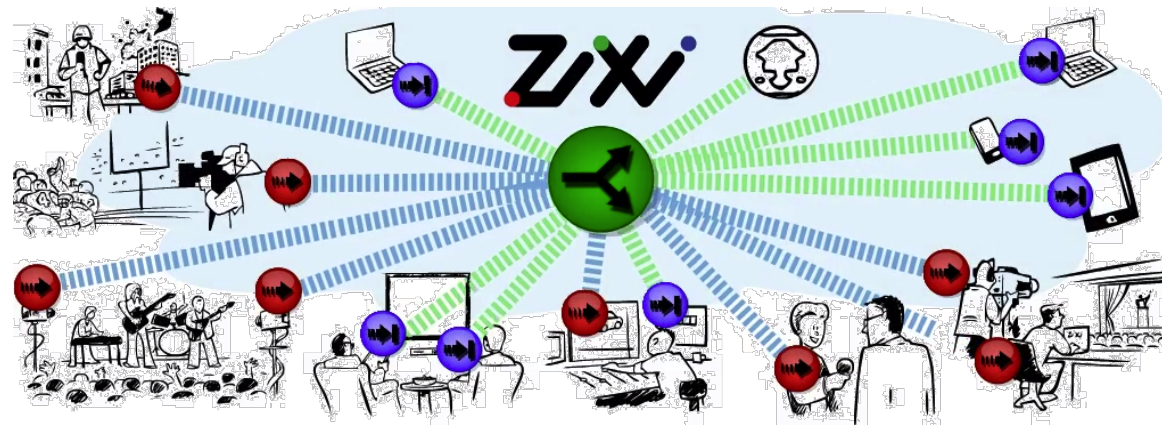
How video moves today

- Cameras capture live events
- Uplinked via satellite and fiber
- Received at studio for production
- Satellite and fiber used to distribute to consumers/affiliates
- *Expensive, time-consuming and capital-intensive*



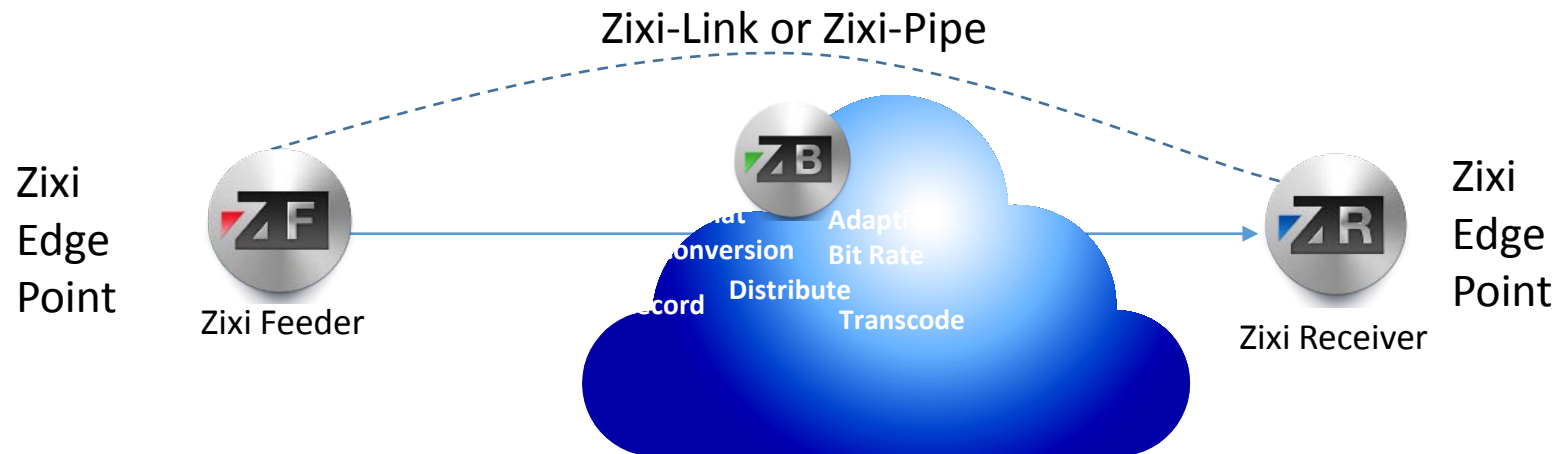
How Zixi moves video

- Cameras capture live events
- Camera/encoder sends video stream *over the Internet* in full fidelity to studios, broadcast centers or directly to subscribers
- *Quick, cost-effective and capital efficient*



Zixi Technology

- Software-based Platform allows reliable transmission of broadcast-quality HD video globally over unmanaged internet connections and private IP networks
- Zixi uses advanced technologies to manage jitter, packet-loss and latency to ensure error-free video transmission
- Platform-agnostic. Appliance, standalone installable application or SDK for any platform
- Zixi EcoZystem: Growing number of partners building Zixi into their platforms extending Zixi standard for IP delivery
- Mobile, embedded and on-premise edge-based software, complemented with cloud-based service platform



Under the Hood

Video-centric

Codec-agnostic

Low latency

B/w Optimization + Hybrid Z-FEC & Z-ARQ

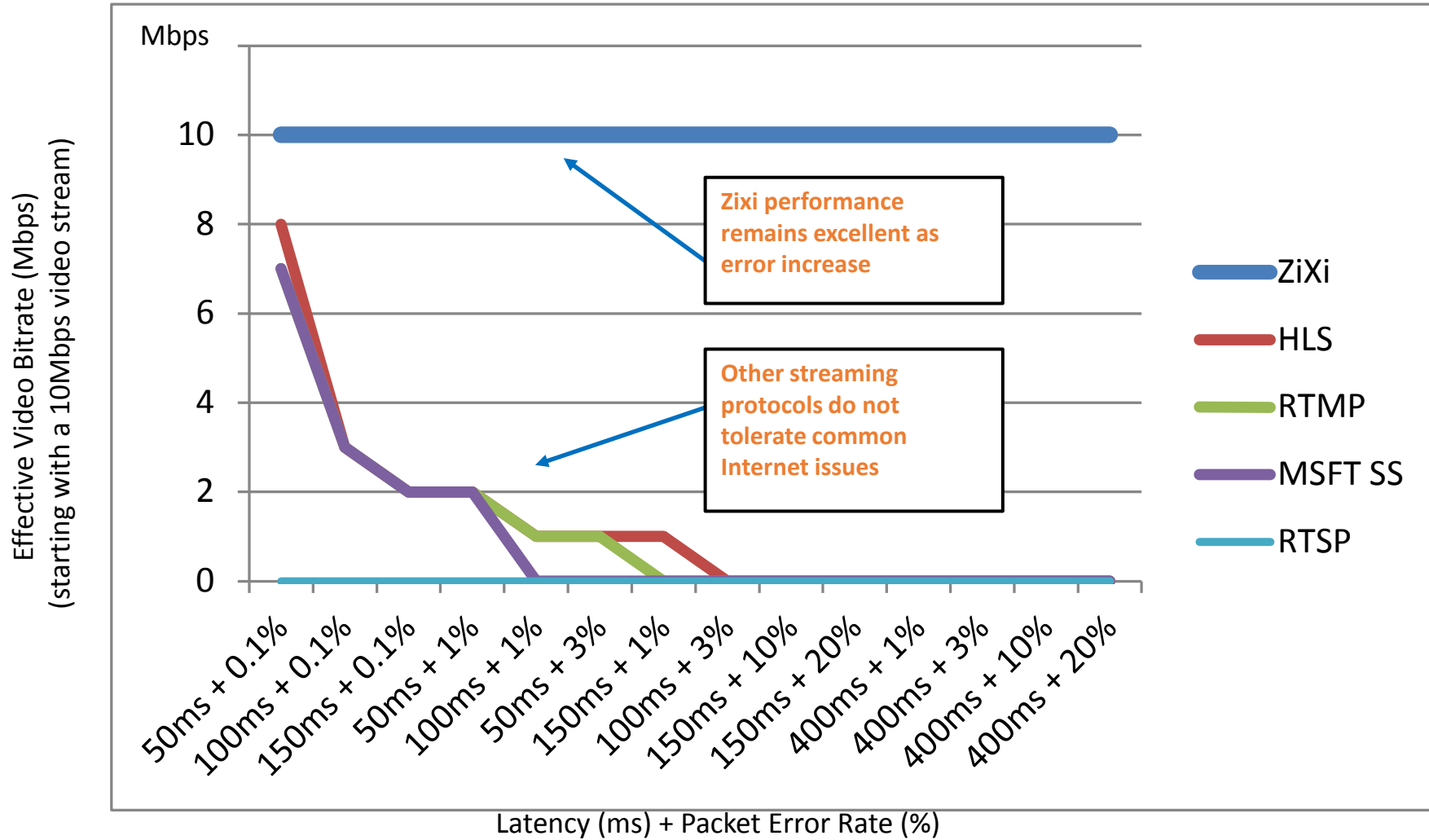
Encryption support

Support for all protocols

Network-aware

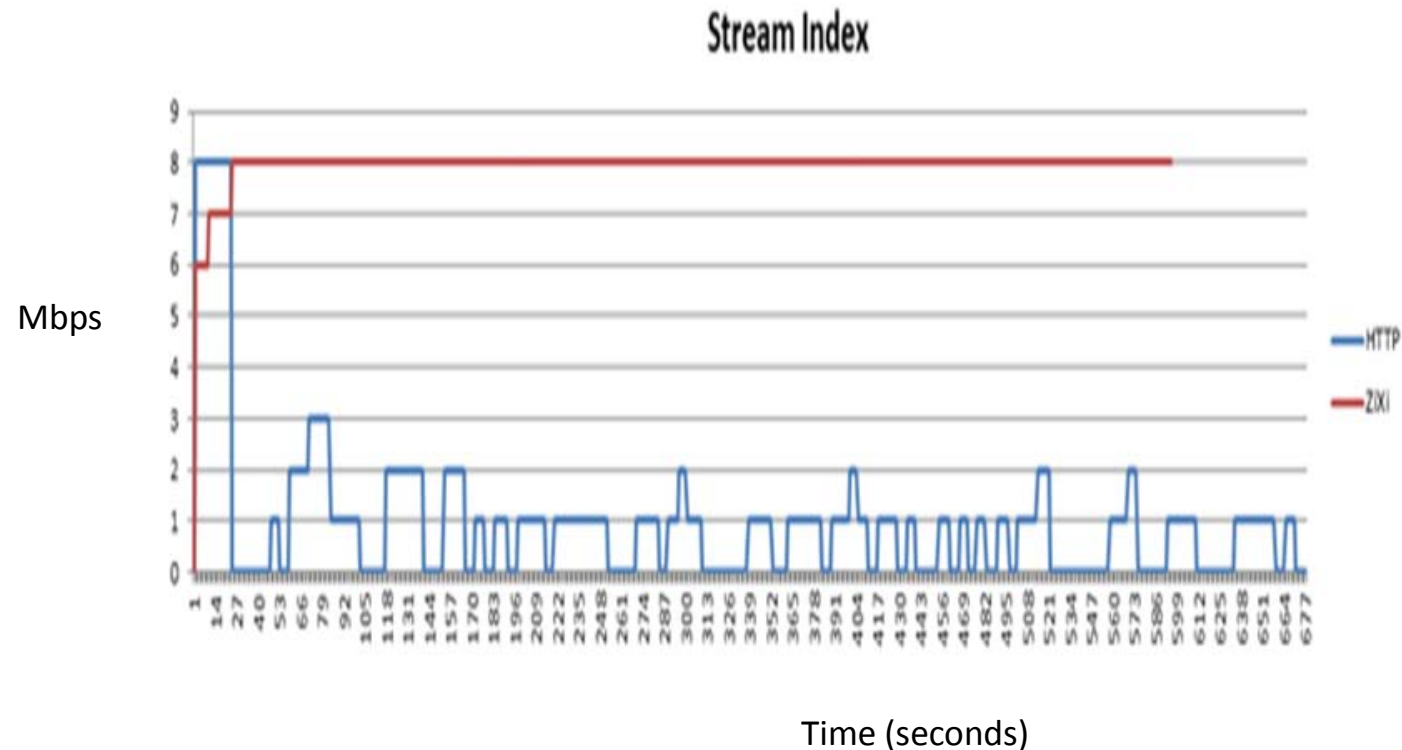


Zixi provide rock solid broadcast-quality video delivery



Accelerated VoD

Zixi provides up to 1,000x faster VoD file delivery and sustains 4~8x higher quality bit streams vs. HTTP/TCP over the Internet



- Tested over a home-grade ADSL, with max 10Mbps bandwidth, and consistent 2% packet loss

Video Quality

Live HDTV Broadcast over the Internet

with **ZiXi**



vs.

without ZiXi



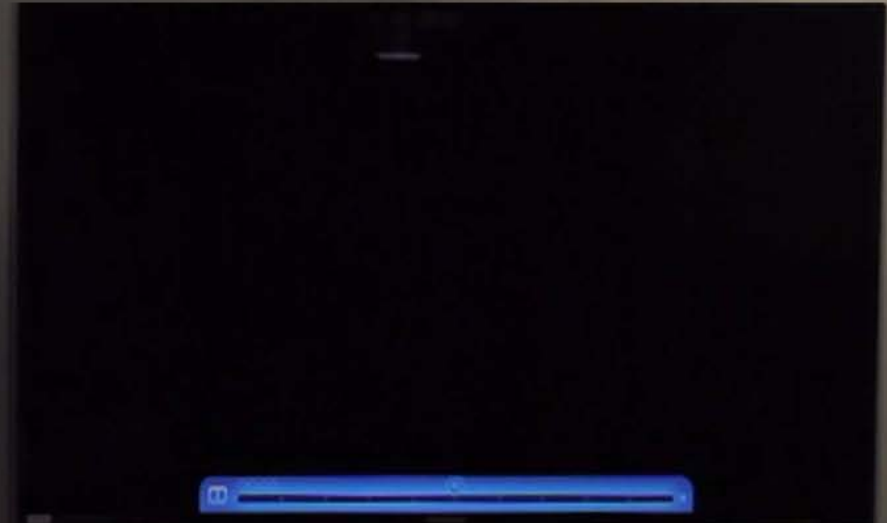
Pauses and Block Artifacts as alternative internet streams can't play 5mbps video on a 5.3 mbps end-to-end pipe

Startup Time

Live HDTV Broadcast over the Internet

with **ZiXi**

without ZiXi



00:00:400 seconds

Less than 0.5 seconds

01:02:400 seconds

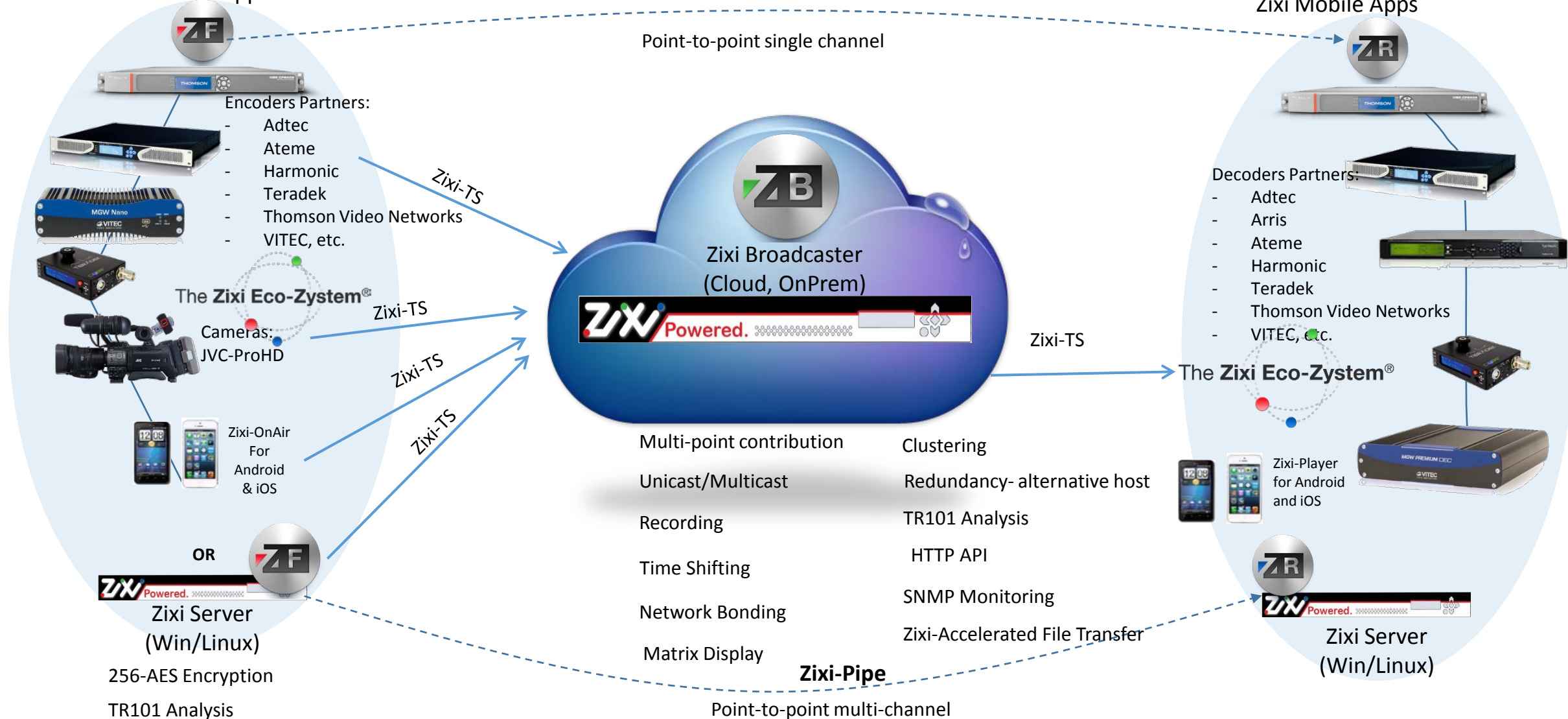
Both TVs streaming the same live news broadcast, a 5Mbps bitrate video, globally via the Internet [from Boston, MA to Singapore to San Jose, CA] over a 5.3 Mbps end-to-end network bandwidth

Contributions and Distributions

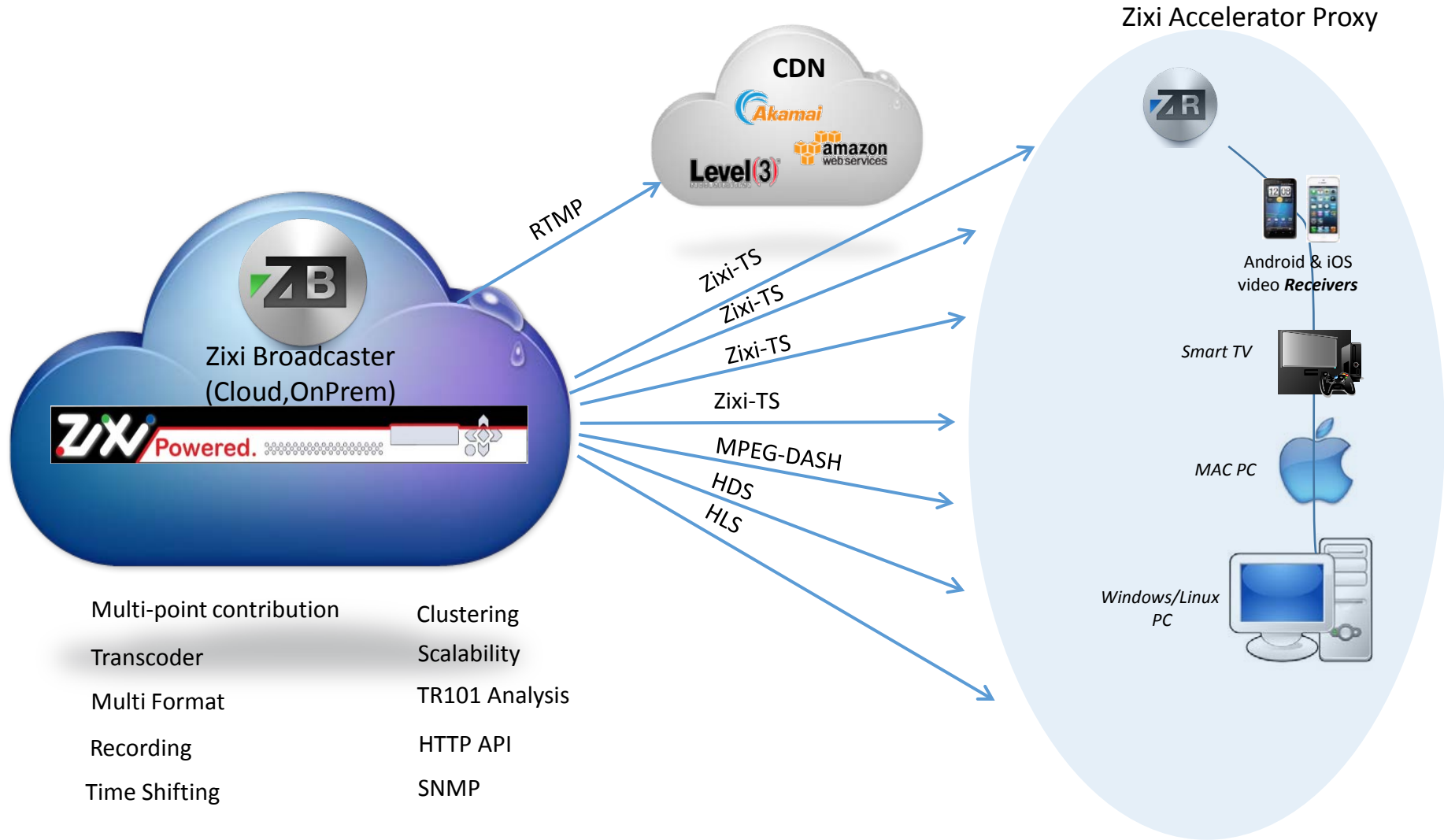
Zixi Embedded Feeder
Standalone Feeder
Zixi Mobile Apps

Zixi Link

Zixi Embedded Receiver
Standalone Feeder
Zixi Accelerator SDK
Zixi Mobile Apps



Education/Enterprise/Government OTT



- | | |
|--------------------------|----------------|
| Multi-point contribution | Clustering |
| Transcoder | Scalability |
| Multi Format | TR101 Analysis |
| Recording | HTTP API |
| Time Shifting | SNMP |

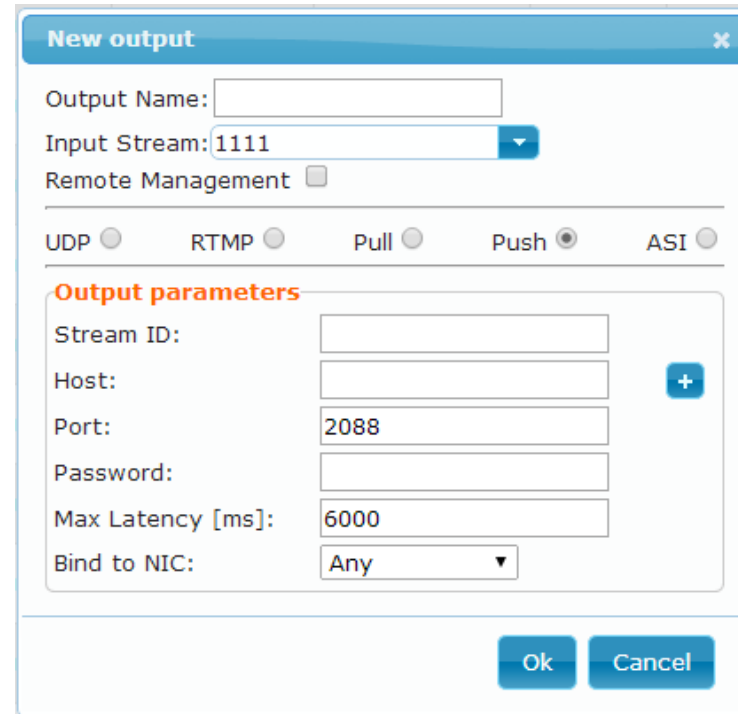
Apps & SDKs – Linux/Windows/IOS/Android
 HTTP output – HTTP/HTTPS/HLS
 ZIFT – accelerated file transfer

Zixi Broadcaster Platform



Manages and delivers video streams wherever & whenever needed

- Simplify user configuration
- Automatic setting of QOS parameters
 - Setting only Latency, all other parameters are set 'behind the scene':
 - FEC overhead: 30% (if latency < 1500ms)
 - FEC block : 300ms (if latency < 1500ms)
 - Automatic FEC (avoid congestion)



New output

Output Name:

Input Stream: 1111

Remote Management

UDP RTMP Pull Push ASI

Output parameters

Stream ID:

Host: +

Port: 2088

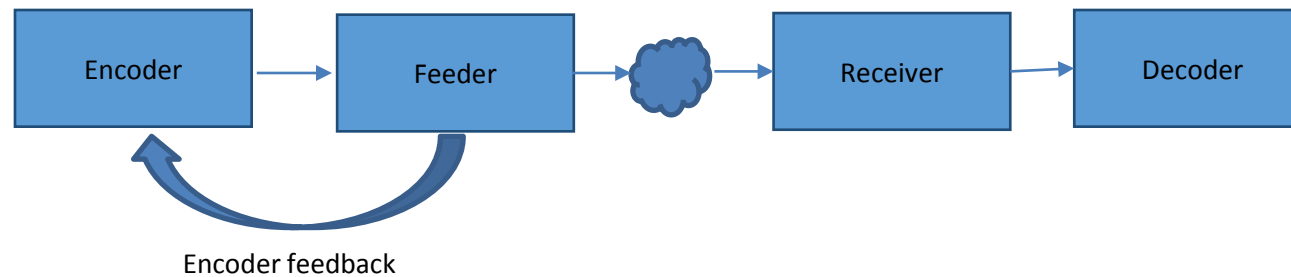
Password:

Max Latency [ms]: 6000

Bind to NIC: Any

Ok Cancel

- Providing feedback to the encoder of available bandwidth to control its Bitrate
- Provided on:
 - Zixi Feeder SDK – with ‘setter’ function (tight integration)
 - Zixi Feeder – with external script (loose integration)



- ‘force padding’ – encoder-feedback with CBR padding on the network level to improve the feedback sensing and the control on the encoder.

Matrix Display



- A switching and distribution management system
- One page UI panel
- Controls the Broadcaster's Inputs and outputs
- Video preview

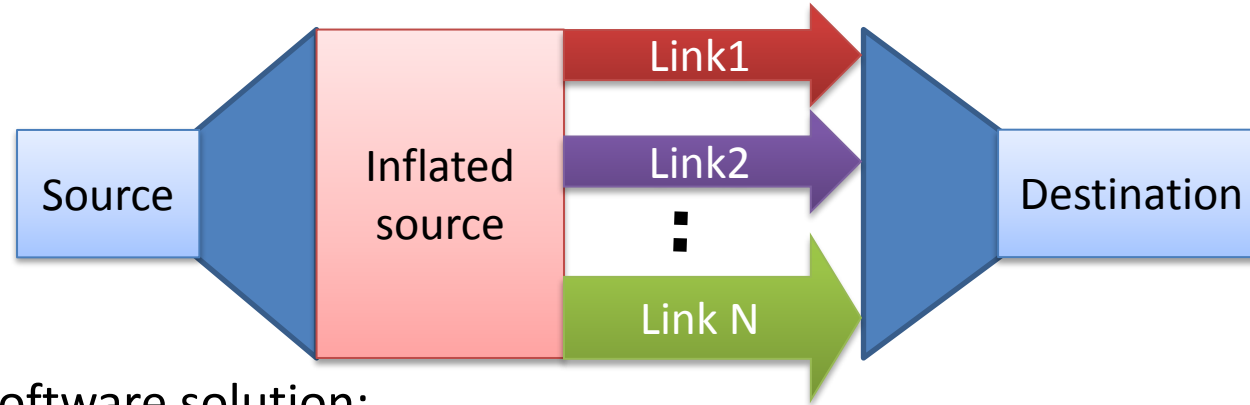
The screenshot displays the Zixi Matrix interface, which is a one-page UI panel for managing video inputs and outputs. The interface is divided into two main sections: **Inputs** and **Outputs**.

Inputs Section: This section is titled "Inputs" and includes a search bar and a "Drag to switch. Click for info" instruction. It contains four video preview windows arranged in a 2x2 grid. The top-left window shows a close-up of a character's face with the label "pullsourcepull" and a bitrate of "5644kbps". The top-right window shows a character in a field with the label "pushtest" and a bitrate of "4061kbps". The bottom two windows show a character sitting in a field, with the same label "pushtest" and bitrate "4061kbps".

Outputs Section: This section is titled "Outputs" and includes a search bar and a "Click for info" instruction. It contains two video preview windows side-by-side. Both windows show a character's head in a field. The left window has the label "In: test2" with a bitrate of "2058kbps" and "Out: UDP: 127.0.0.1:7000" with a bitrate of "3772kbps". The right window has the label "In: test2" with a bitrate of "2058kbps" and "Out: uri" with a bitrate of "3772kbps".

The interface also features the Zixi logo and the word "Matrix" in the top left, and a "Back to administration" link with a gear icon in the top right.

- Use multiple connections to aggregate bandwidth
- Hitless recovery from complete link drops or congestions



Generic software solution:

Bonding creator is part of:

- Zixi Feeder
- Zixi Feeder SDK

De-bonder is part of:

- Zixi Broadcaster
 - As a licensed feature

De-Bonder on Broadcaster



zixi Broadcaster Version 1.8.0.15293 Linux 64-bit Copyright (c) 2007-2013, Zixi LLC. CPU: 1.54%

Status Inputs Outputs Adaptive VOD Files Settings Cluster Event Log

Inputs [Delete] [Stop] [Edit] [Record] [Stop Analysis] [New Output] [New Input] [Refresh]

Status	ID	Type	Source	Bitrate[kbps]	Up Time	TR 101 290	Error	Outputs	Links
Offline	1111	rtmp_push		0	00:00:00	P1:0 P2:0	Stopped	0	[Warning] [Close]
Offline	8000	File	/zixi/files/8000.ts	0	16:15:07	Not analysed	No Source	0	[Warning] [Close]
Offline	8001	File	/zixi/ts_from_pcap.ts	0	00:00:00	P1:0 P2:0	Stopped	0	[Warning] [Close]
Offline	bond2	Push		0	00:00:00	P1:0 P2:0	None	0	[Warning] [Close]
Offline	chubchub_2	rtmp_pull		0	00:00:00	P1:0 P2:0	Stopped	0	[Warning] [Close]
Connected	james	Push (Bonded)	0.0.0.0	9025	00:00:00	P1:5 P2:425	None	2	[Warning] [Close]

Links	Source	Bitrate[kbps]	Up Time
test_user@0	10.7.0.166	4630	00:47:16
test_user@1	10.7.0.79	4521	00:47:16

Bitrate graph - james

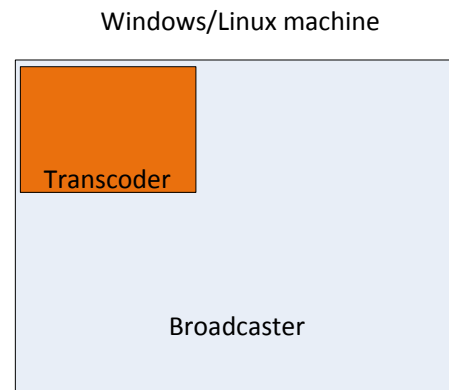
Statistics

Bitrate (kbps): 8447	Total Packets: 431869	FEC Packets: 215849 [reset]
Up Time: 00:09:24	Packet Rate: 774	FEC Recovered: 0
Reconnections: 3	Packet Loss %: 0	ARQ Requests: 0
RTT(ms): 0	Dropped Packets: 37	ARQ Recovered: 0
Jitter(ms): 19	Recovered Packets: 0	ARQ Duplicates: 0
Latency(ms): 2000	Not Recovered Packets: 0	Overflows: 0

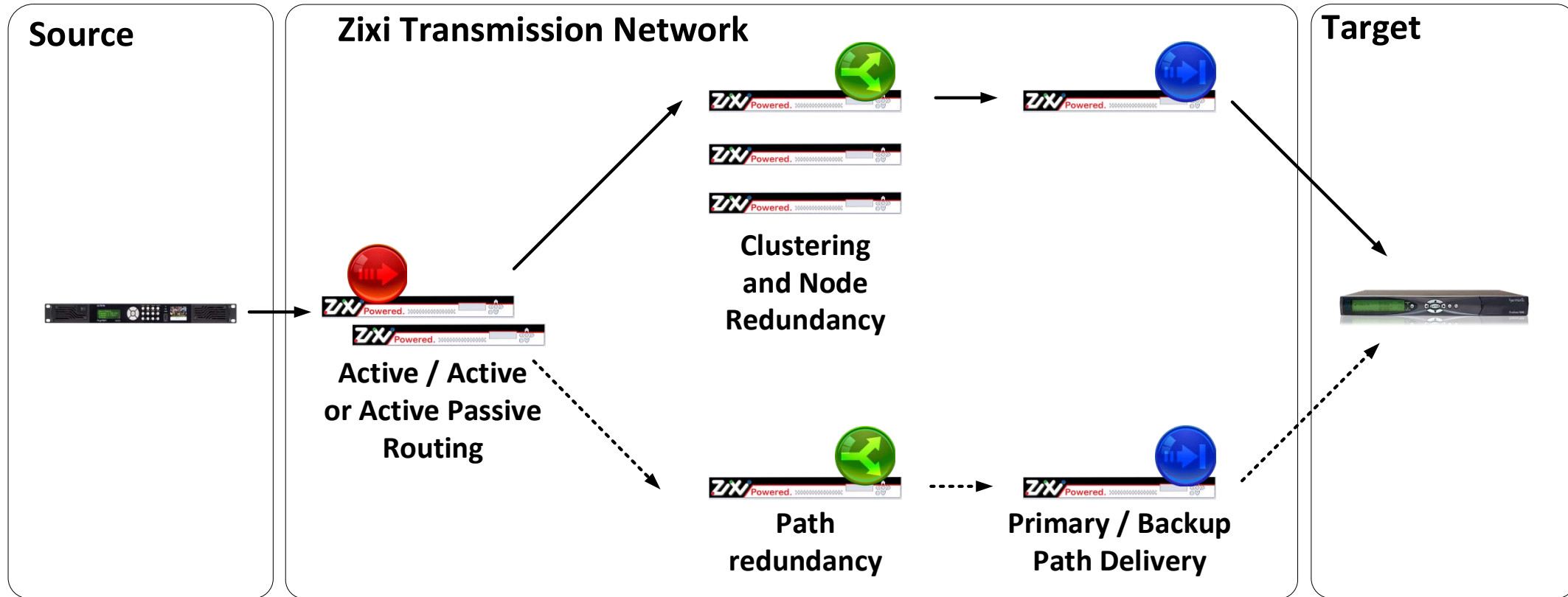
Bonded stream

Bitrate Graph

- **Server side transcoding**
 - Running on Windows/Linux machines.
 - Licensing on broadcaster
 - Providing cloud transcoding and ABR solutions.
- **Single server**
 - 'Broadcaster + Transcoder' on a single machine:



Scalable and Failsafe



Full Scalability and Redundancy can be introduced at each point within the Zixi-powered network

Zixi Customers

Enabling Live *Broadcast-quality* Video Transport from *Anywhere to Anywhere*

- Broadcasters
- Live Event Producers
- Content Providers
- Media Service Providers
- Enterprise
- Government
- House of Worship
- Higher Education

April 23, 2015

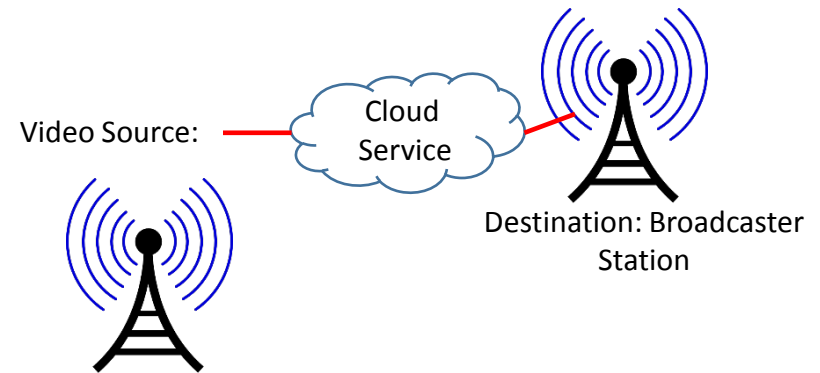
“Guys, I LOVE the system. It’s blowing the minds of our traditional TV engineers over here.”

*VP Chief Information Officer
Major USA Live Event Producer*

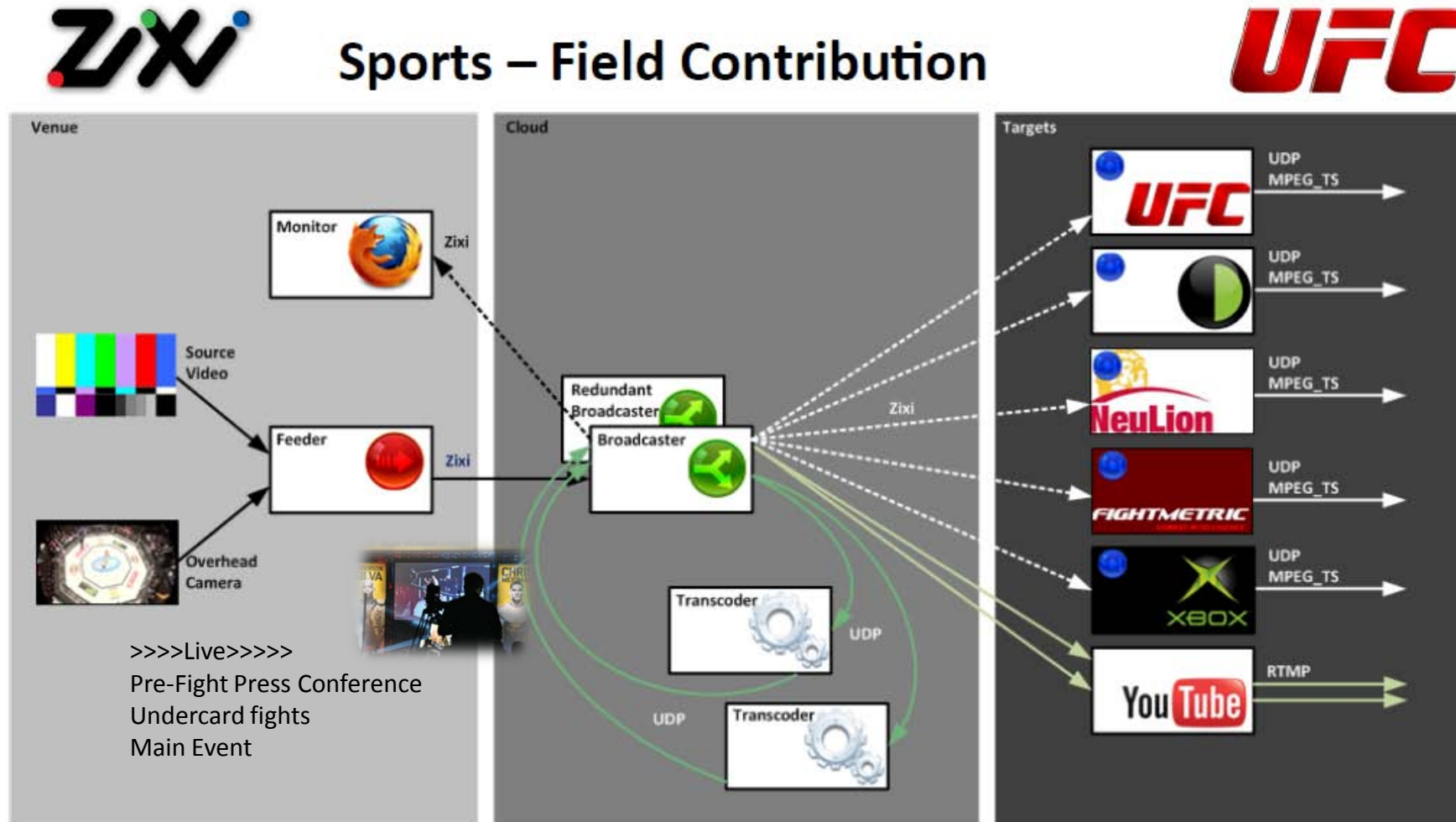
JVC – Zixi inside their cameras

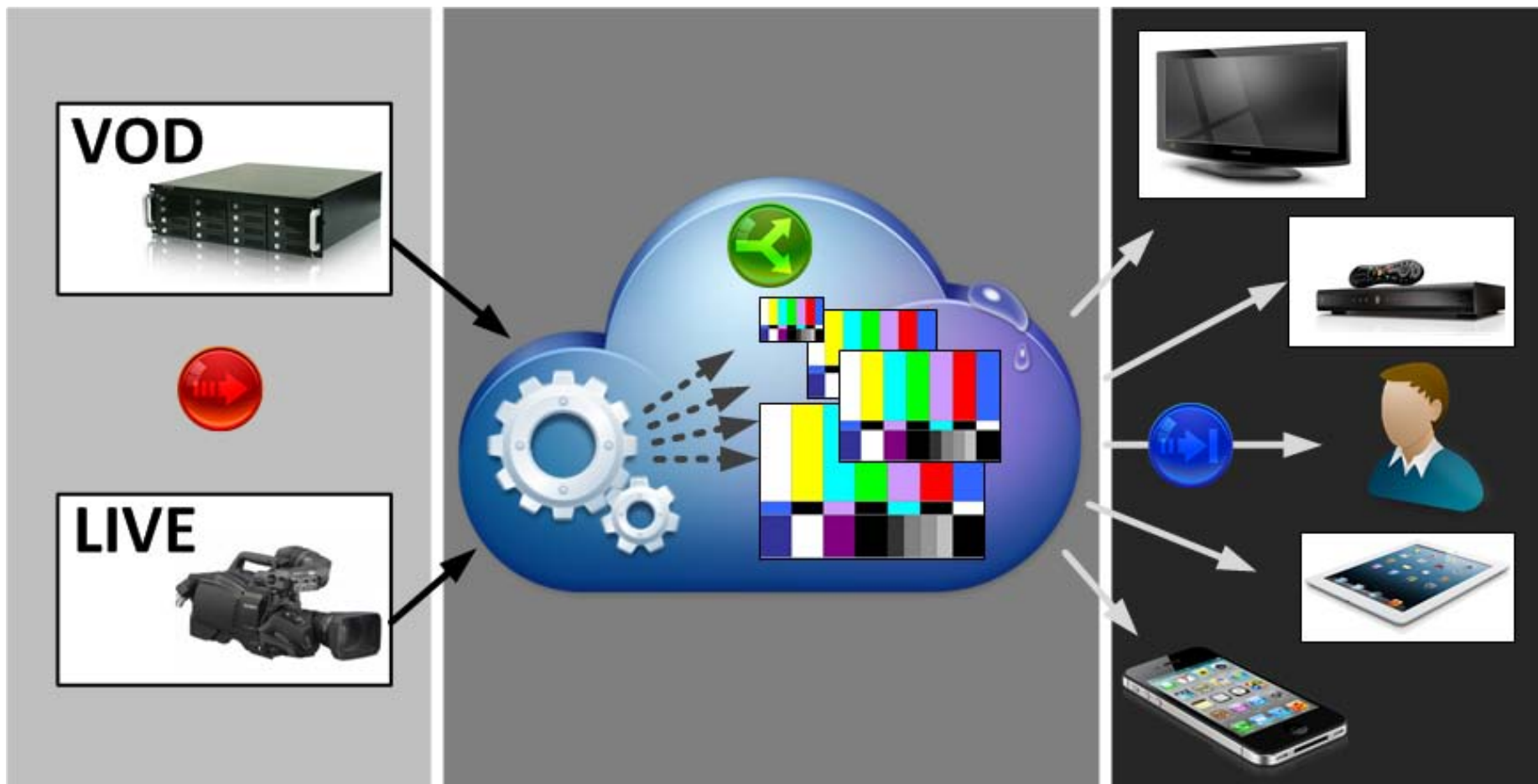


Zixi Use Case: News



Zixi Use Case: Live Sports

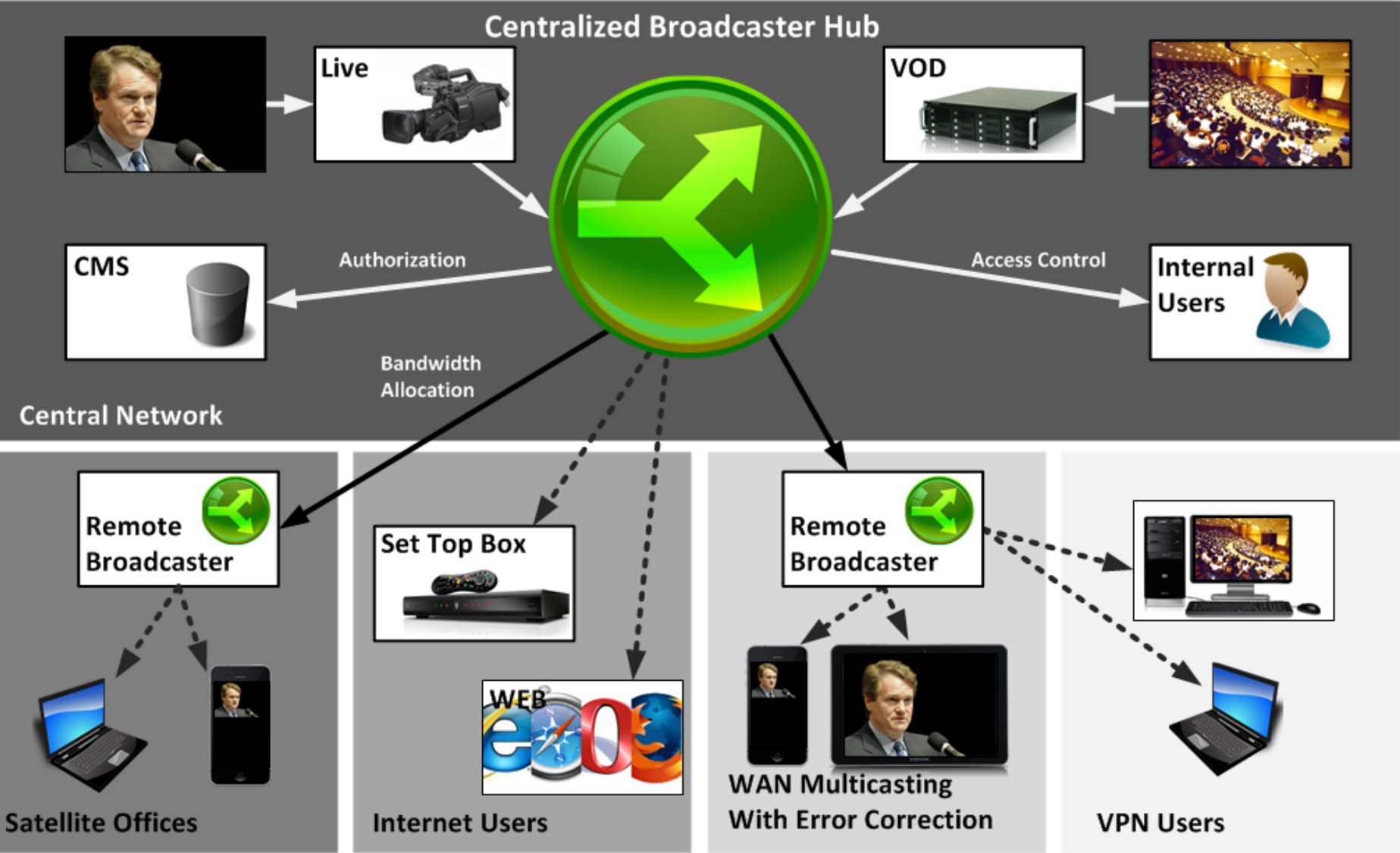




- Live Event and Live Linear Content
- Cloud Transcoding
- Adaptive Bitrate delivery

- Ad Insertion
- Nielsen Ratings
- PCs, Macs, Tablet, Mobile phones

Enterprise Live + VOD



Zixi Innovation Award at IBC 2014



Sky News Arabia (SNA) embarked on a cutting-edge project last year that was finally completed last month and will be rolled out to its bureaux this quarter with the intention of truly empowering its journalists to provide content anytime, from anywhere to the channel's viewers.

To enable this, SNA, headed by [redacted], engineered a full IP network that serves several channels, which is to provide the ability to access the internet or private

Streaming real-time HD video over the internet is not easy; it breaks up constantly due to dropped packets. We found a company called Zixi, which adds a management layer to transcend these unreliable networks. Testing this took a lot of R&D, but TCH has acted as a test bed and incubator for a lot of new technologies. We have since implemented what we learnt in Islamabad and Ramallah, instead of MPLS to deliver real-time high-res HD video (over 20mbps); we use

Partner integrations

ateme

harmonic

nano
COSMOS

Blonder
Tongue

ADTEC
Digital

ATX

JVC

TERADEK

VITEC
VIDEO INNOVATIONS

ELEMENTAL

NewTek

THOMSON
VIDEO NETWORKS

Wirecast
BY TELESTREAM

Sample customers



Contact:

Michael Poppler
Director of Global Channel Sales
Zixi LLC
+1-617-501-8718
Skype: mpoppler
mpoppler@zixi.com

For more information visit:

www.zixi.com