



Perfect Video over Any Network

State-of-the-art Technology for Live Video Communications





Who We Are



- Established in 2004: 18 years Engineering Live Video / Internet
- Focus on the Professional Broadcast & Streaming Markets
 - Invented ARQ: 3 original patents, **Emmy® Award Winner**
 - Over 50 years of combined experience in **Broadcast** and **Enterprise** Video over Internet Protocol (IP) products
 - Proven 24/7 Mission-Critical Video Telecommunications
- Our Competitive Edge: **Best ARQ with Lowest Latency**
 - Unrivaled Internet video experience & customer support
 - Interoperable with all main streaming technologies
 - QVARQ, SRT, RIST, RTMP, HLS, RTSP, Zixi, IGMP, ...
 - Adaptable to any IP network, wireless and Internet

Reference Customers



CNN.com



NBC

The
WALT DISNEY
Company



OWN
OPRAH WINFREY NETWORK

SES
your satellite company



communications
GCS

indosat

Lifetime

mobility



CBS

NORTHROP GRUMMAN

Time Warner Cable | ENJOY BETTER

Raytheon



GENERAL ATOMICS
AND AFFILIATED COMPANIES

A MERRILL COMMUNICATIONS COMPANY

VITAC

comcast

TENNIS CHANNEL

Qvidium Digital Video

Our Products:



Selling Reliable Solutions that Work!

- QVCodec4K UHD/HEVC Live Stream Codec



- QVENC IP Broadcast Encoder



- QVDEC IP Broadcast Decoder

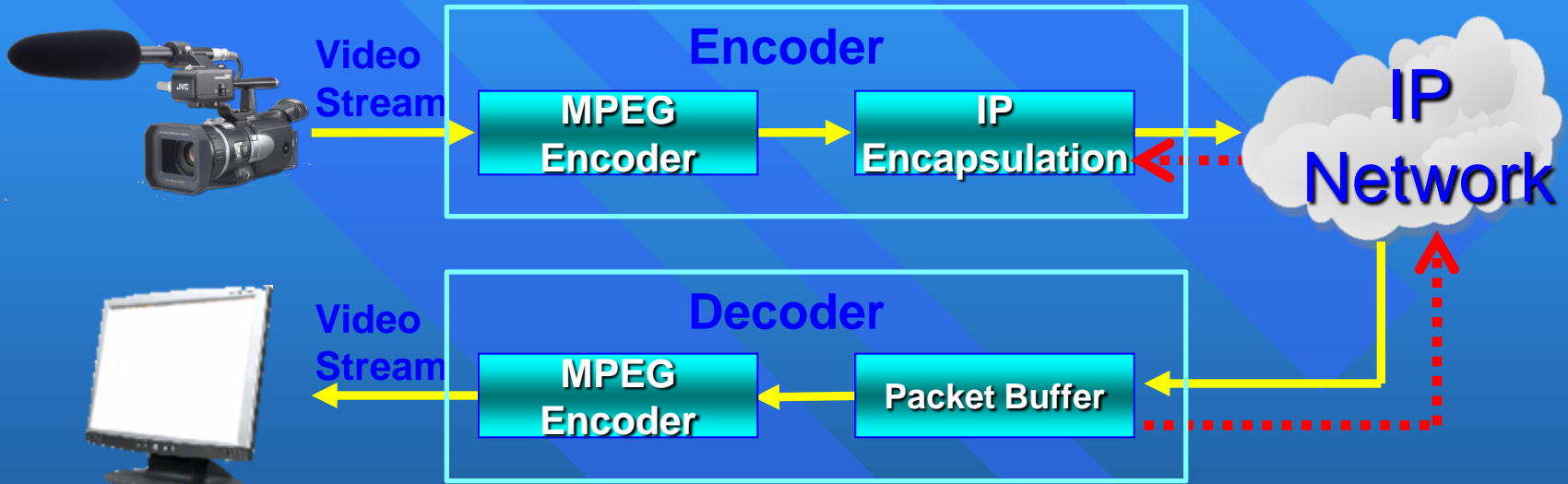


- ARQ Proxy Server (Qvidium ARQ and SRT)

Automatic Retransmission reQuest (ARQ)



IP Video Stream



Retransmit requests



QVidium ARQ vs. SRT vs. RIST



Similarities

- All send upstream retransmission requests to recover packets
- All can bypass firewalls and operate in push or pull mode
- All measure the link and automatically adjust parameters
- All use a single user parameter, latency, to adjust robustness

QVidium ARQ (QVARQ) Advantages

- QVARQ can simultaneously work in Push AND Pull modes
- QVARQ & RIST based on RTP protocol (SRT is non-standard):
 - QVARQ/RIST work w/ legacy equip. (w/o packet recovery)
- QVARQ & RIST resilient to much higher packet loss rates*
<12% for SRT, up to 50% for QVARQ & RIST

*see: https://www.elecard.com/page/article_rist_vs_srt

SRT Advantage

- More widely deployed than RIST or QVARQ

QVCodec4K Streaming Codec



- Ultra High Definition (UHD) Resolution: 3840x2160p60 w/HDR
- 12G-SDI BNC & SFP Video Interfaces. GigE & SFP Ethernet
- Contribution Quality HEVC (H.265) & AVC (H.264) 4:2:2/10-bit
- CEA-608 & CEA-708 Closed Captioning
- 8 Audio Channels (4 stereo pairs)
- Interop w/All Major Protocols: SRT, RIST, Zixi, RTMP/S, QVARQ
- Secure DTLS and AES Encryption
- Dynamic Bit Rate Control w/ Constant Frame Rate
- Video Down Scalar
- Very Low Latency (~117ms to Glass-to-Glass over LAN)
- Up to 80 Mbps Streaming
- Simultaneous 2-port:, Encode/Decode, 2x Encode, 2x Decode
- Quad I/O Card: 4 Independent 3G-SDI I/O (Encoders/decoders)

QVENC Broadcast Encoder



- SDI/HD-SDI/3G-SDI & ASI Digital Video Interfaces
- Composite and S-Video Analog Video Interfaces
- Up to 1080p50/60 Encoding
- CEA-608 & CEA-708 Closed Captioning
- 4 Audio Channels (2 stereo pairs)
- Interop w/ All Major ARQ: SRT, RIST, Zixi, Qvidium ARQ
- Secure DTLS and AES Encryption
- AC3 Pass-through
- Metadata insertion into Transport Stream
- Dynamic Bit Rate Control w/ Constant Frame Rate
- Video Down Scalar
- Low Latency (~300ms to QVDEC over LAN)
- Stream to Youtube (RTMP), Facebook (RTMPS), & HLS

QVDEC Broadcast Decoder



- SDI/HD-SDI/3G-SDI & HDMI Digital Video Outputs
- Up/Down Video Scalar and Frame-Rate Conversion
- Composite SD Monitor Video Output
- Up to 1080p50/60 Decoding
- CEA-608 & CEA-708 Closed Captioning
- 4 Audio Channels (2 stereo pairs)
- QVidium Patented ARQ Error Correction
- Optional AES Decryption & SMPTE 2022 ProMPEG FEC
- AC3 Pass-through
- Low Latency (300ms from QVENC over LAN)
- Webcam (RTSP), Quicktime (HLS), Flash (RTMP & RTMPS)

Product Offerings: All Hardware

- Built for 24/7 Reliability
 - Hardware watchdog
 - Multiple software watchdogs
- Internal Fan and AC/DC Power Supply
- Secondary 7 to 16 VDC failover power input
- High Temperature Rating (Tested to 55 C without fan)
- Rack-Mountable (mounts 1 or 2 units into 1-RU)
- Built-in Whitelist-based Firewall Software (Hacker proof)
- Configurable to bypass firewalls for streaming & control
- Push and Pull-modes of operation
- Network Management System Available
- Includes QVARQ Gateway License w/ HW Purchase

QVARQ Proxy Media Server – Gateway Software



- Internet Streaming Video QoS Media Proxy Server
 - Works with 3rd-party Encoders & Decoders
 - Can be combined with CDN Media Servers (eg., Wowza)
 - Live, Low-Latency Web Streaming, QVARQ & SRT
- Push & Pull (Caller & Listener) Support
- Linux & Windows Versions

Markets Addressed



- Cable Distribution
 - DVB-ASI / IP Encoding, Decoding, & Transcoding
- Broadcast & Production
- Education & Religious Distribution
- Corporate Communications
- Enterprise & IPTV

Streaming Video / IP Challenges



- Lost Packets
 - Network congestion
 - Poor connections
 - Overloaded routers & gateways
- Out-of-order packets
 - Dynamic routing
 - Small packet routing
 - Packet prioritization
- Stream Jitter
 - Queuing delay
 - Dynamic routing transport delay

Solutions



- FEC (SMPTE 2022 – ProMPEG FEC)
 - Adds additional packets to re-build lost data
- ARQ (**A**utomatic **R**etransmission **r**e**Q**uest)
 - Intelligent, rapid re-transmission of lost data
 - Similar to TCP/IP without the disadvantages
 - Uses UDP, no rate limiting, eliminates ACKs
 - Fixed, bounded delay
 - Can be used over satellites and long links
 - Maximizes Video Throughput
 - Optimized for low delay video
 - Automatic configuration

Qvidium QoS Technology Patents



- Automatic Retransmission reQuest
- 3 US Patents Granted:
 - #7,522,528 for ARQ error correction,
 - #7,551,647 for Internet Clock Synchronization, &
 - #7,539,187 for Advanced Video-Optimized FEC
- Intelligent & rapid re-send of data: like TCP
- Optimized for low delay video & audio
- Automatic configuration

Qvidium ARQ Advances over TCP



- TCP (RTMP, HLS, MSS, DASH)
 - Large Added Buffering
 - Designed for Data -> Not Video
 - Throughput limited by latency (bad for satellite & int'l. links)
- QVidium Patented ARQ
 - Negative Acknowledgement
 - No wasted bandwidth when no errors
 - Can operate at maximum network throughput
 - No need to wait for Acknowledgement
 - Does not freeze video waiting for ACK
 - Minimal Buffering (2 to 3 Round-Trip Times)

Qvidium ARQ Error Correction

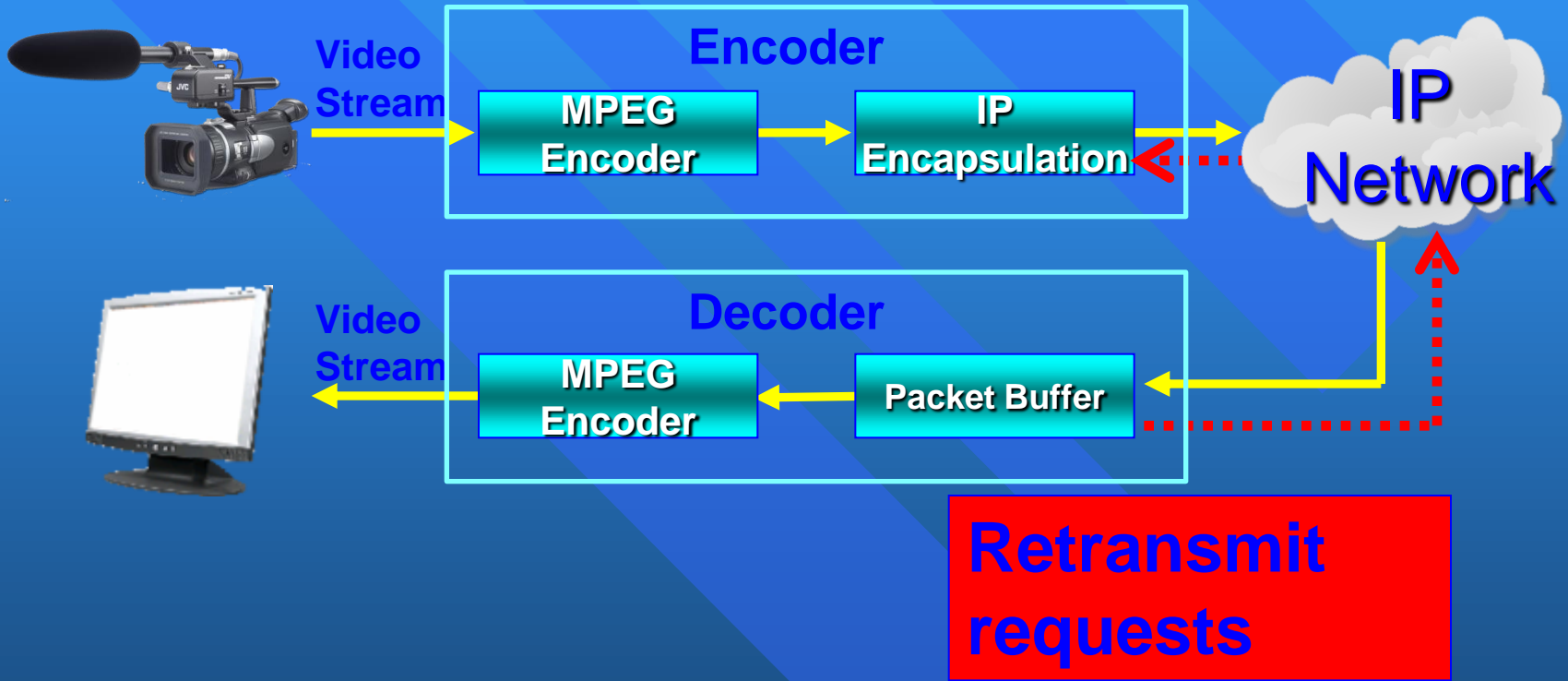


- Simple 2-step process:
 - Step 1: Transmit the DATA
 - Step 2: If there is trouble on the line re-transmit only the missing data
- Adds small fixed delay at receiver
 - Can repeat as time allows
 - Multiple retries → nearly zero loss
- Auto measurement & configuration
- Ideal for wireless connections & Internet

Automatic Retransmission reQuest (ARQ)



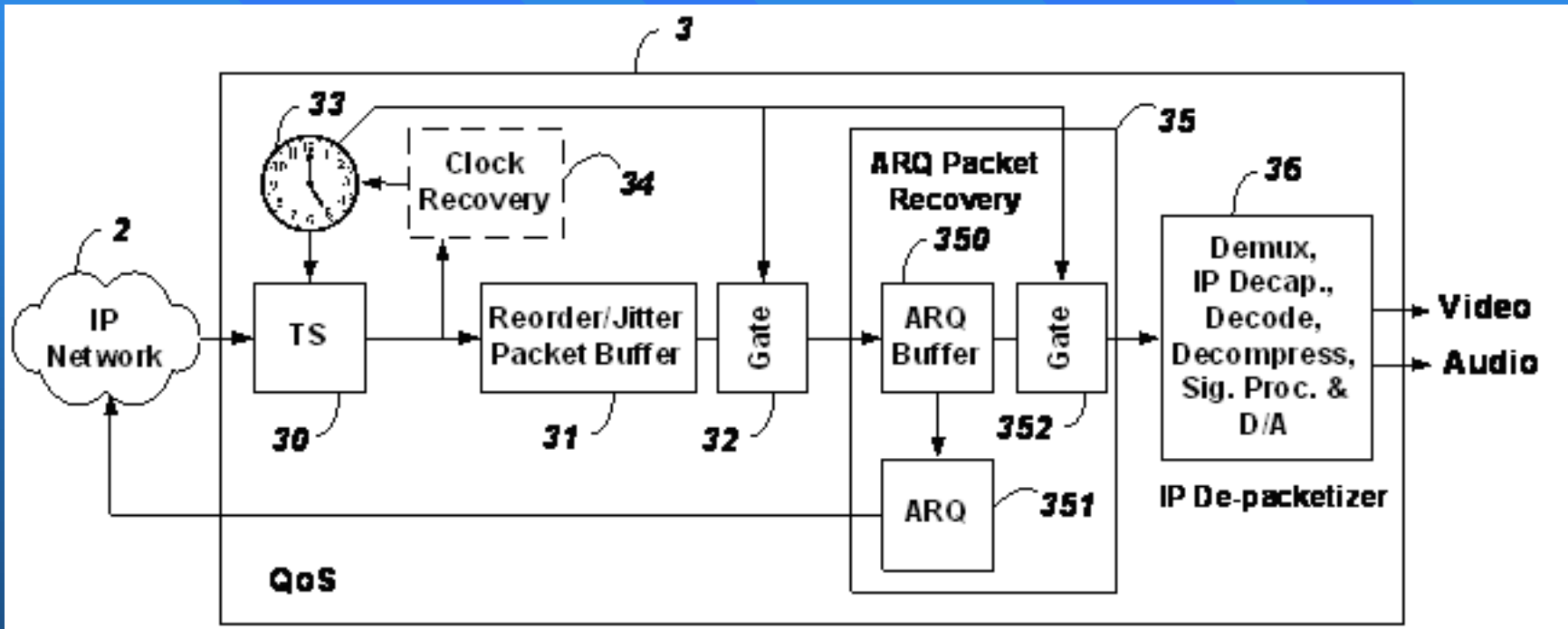
IP Video Stream



A Detailed Look at ARQ

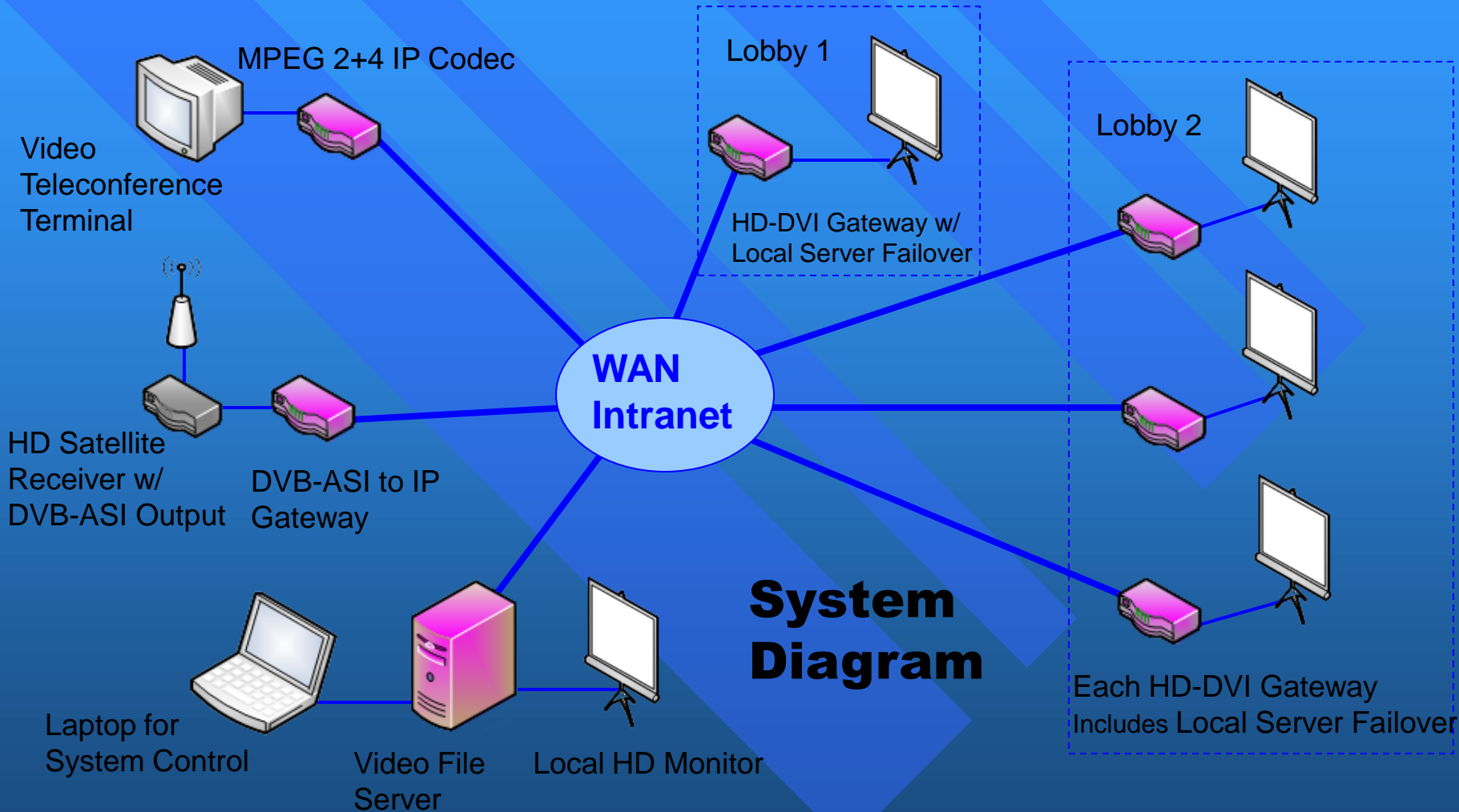


Patent for Low-Latency Automatic Repeat Request Packet Recovery Mechanism for Media Streams





Deployed Video / IP System Example



QVidium Advantages



- No Recurring Fees
- Free Technical Support
- Free Software Updates
- Customizable w/ APIs