

Sat**Expander**

FUSION

Next-Generation Broadcast and Delivery Solution

PRODUCT SHEET

The broadcast landscape is transforming. The influx of content, the growing audiences, and the rising consumer demands are driving the need for flexible and efficient delivery networks. SatExpander FUSION, a new take on processing and delivering today's media, innovates to provide the best experience to any device, anywhere, anytime.

DESIGNED FOR LIVE

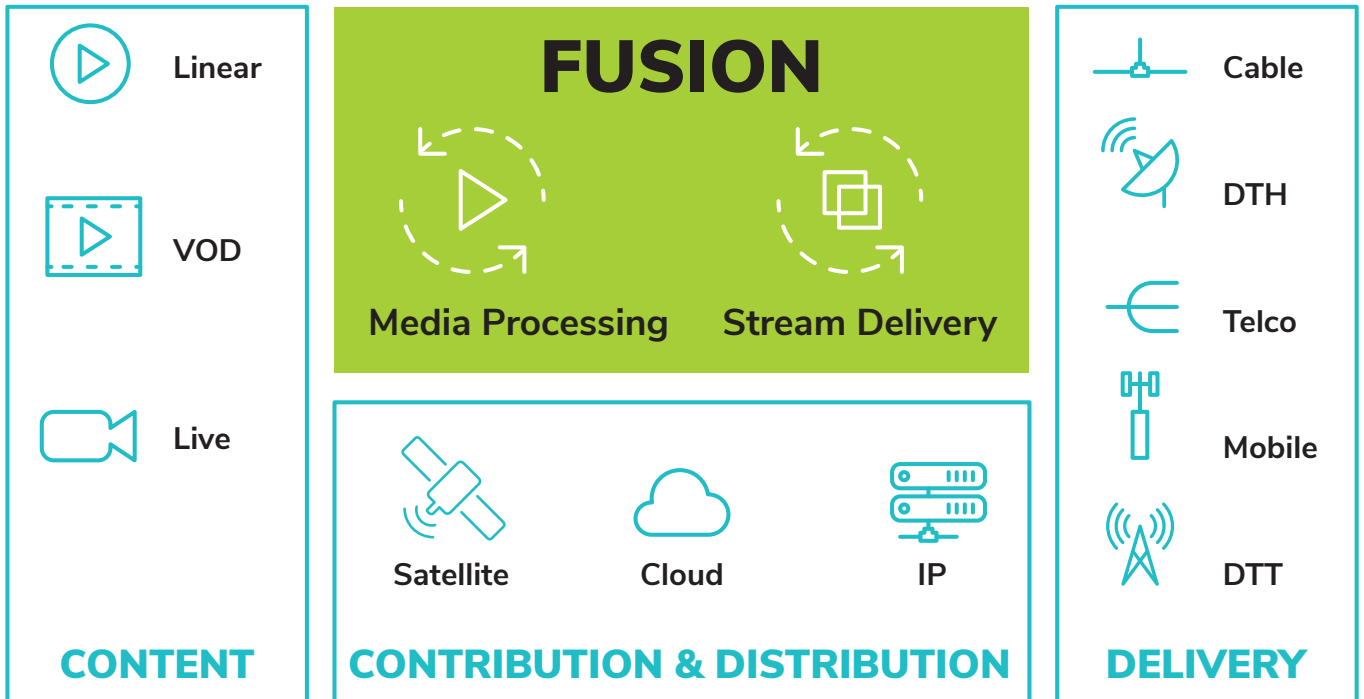
SatExpander FUSION is a powerful end-to-end live linear platform for broadcast and broadband content connectivity and delivery. Expanding flexibility and scalability, FUSION delivers optimal video processing, delivery, and security solutions by technology innovation across the media network. Facilitating holistic delivery across broadcast and broadband platforms, FUSION addresses a wide range of use cases and deployment scenarios.

READY FOR ANYTHING

SatExpander FUSION is primed and ready to handle the fast-evolving world of broadcast media. FUSION utilizes most advanced encoding, transmission, streaming and security technologies for comprehensive delivery across all digital and linear platforms, including live, on-demand, and OTT. Encompassing media delivery over managed and unmanaged networks, FUSION delivers a fully hybrid solution for broadcasters and content providers, combining traditional content production environments and multi-platform delivery networks towards cross platform end devices. Providing a seamless migration path to all IP workflows, FUSION ultimately enables broadcasters and operators to leverage the agility and flexibility of private or public cloud environments. An all-in-one solution that meets and exceeds emerging broadcasting trends and changing market requirements, FUSION is future-ready, today, to embrace the technologies of tomorrow.

REDEFINING MEDIA BROADCAST

A next-generation solution for contribution and primary distribution applications, SatExpander FUSION empowers content providers, broadcasters, operators, and service providers, by providing them comprehensive tools for acquiring, backhauling, processing, distributing and delivering high-quality content, over both satellite and IP networks, with unmatched security and reliability. Delivering any format to any screen, FUSION maximizes viewers' experience wherever they are, at the comfort of their home or on-the-go, distributing and delivering live high-quality HD and UHD content to any user device – from TV sets to smartphones.



ONE PLATFORM. MANY POSSIBILITIES.

A flexible and agile contribution and distribution solution, SatExpander FUSION provides broadcasters with all processing, transmission, delivery, and security options on a single platform, delivering any format to any screen with simultaneous transcoding and packaging. Built around a flexible, software-based system architecture, FUSION incorporates any-to-any video gateway, stream delivery to any screen, up to 4K encoding/ decoding/ transcoding, ultra-low latency, ABR encoding with embedded packager and origin, highest efficiency satellite transmission, public/private CDN connectivity as well as delivery over unmanaged networks, and embedded multi-layer content protection. Coupled with multiple high availability options, FUSION presents the most optimized solution for any workflow.



EMPOWER YOUR MEDIA DELIVERY

ULTIMATE TRANSMISSION EFFICIENCY

Broadcasters face increased demand for higher resolution video standards that require vastly more capacity. While satellite is the leading medium for video transmission and services worldwide, satellite spectrum comes at cost. SatExpander FUSION provides a unique integration of video processing and satellite transmission, offering new levels of satellite transmission efficiency, driving higher volumes of video content at lower bandwidth cost.

FUSION incorporates multiple satellite transmission technologies, supporting the most bandwidth-efficient waveform, SatExpander NS4™, as well as standard DVB-S, DVB-S2, and DVB-S2X. Integrating high efficiency video coding, FUSION enables to minimize the required bandwidth, and in turn, transmission cost. By combining both SatExpander NS4™ satellite waveform and HEVC encoding, FUSION minimizes transmission bandwidth and provides over 75% savings in bandwidth costs compared to DVB-S2/MPEG-4 solutions.

Incorporating powerful decoding/ transcoding, FUSION also enables to transmit only a single, highest quality, content profile, and generate all required profiles at the edge, yielding additional transmission efficiencies, for both satellite and terrestrial networks.

ULTRA-LOW LATENCY

End-to-end latency is an important factor that influences the video experience. When it comes to live content – like sports, news, reality shows, premieres or otherwise – latency is imperative for the user experience, especially when viewing multiple screens, engaging in sports-track betting, or syncing with real-time updates and notifications. Realizing latency is a business-critical consideration, SatExpander FUSION delivers low latency and ultra-low latency options for video delivery. FUSION employs advanced algorithms to lower the latency across the video processing chain – from video encoding and decoding, through network jitter management, to video delivery. Introducing an end-to-end solution, FUSION couples encoding and decoding at both sides of the connection, ensuring sub-second ultra-low latency for demanding contribution applications.

BEST-IN-INDUSTRY CONTENT PROTECTION

Piracy threats and unauthorized access to high value content have rapidly escalated in the last few years, impacting media providers' revenues and profitability, and undermining media business models. Heightening content protection and security, SatExpander FUSION utilizes extensive security algorithms and mechanisms to provide secured media delivery. Designed for multiple media delivery setups, FUSION implements multi-layer content protection, securing service, transport, and payload. Utilizing SatExpander DRM with AES-256 encryption and BISS2-CA compliant scrambler/ descrambler, together with a highly flexible entitlement management system and an automatic and dynamic key generation with over-the-air distribution, FUSION provides superior content protection.

CARRIER GRADE AVAILABILITY AND RELIABILITY

Delivering content, and especially premium content, to a large-scale audience requires a nearly perfect availability and reliability. As customer experience is crucial in today's competitive world, media service providers can't afford any glitches and must ensure content is available at all times. SatExpander FUSION features a modular design based on network needs, allowing for multiple connectivity and redundancy options. Supporting satellite, IP, and hybrid connectivity, FUSION adapts to any network architecture, optimizing redundancy schemes. FUSION also supports 1:1 and N:1 redundancy models, ensuring very high system availability and service continuity.

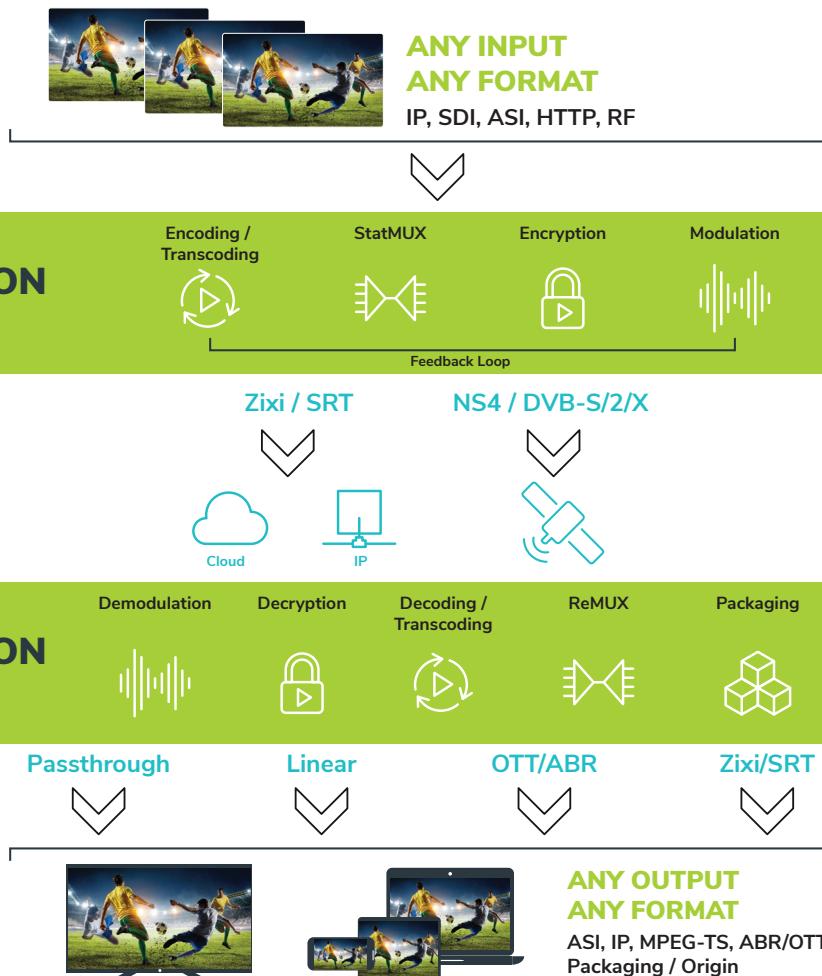
**VERSATILE
AND FUTURE
PROOF
DESIGN**

SatExpander FUSION presents a comprehensive set of capabilities and features, supporting multiple configurations and service options. Built on off-the-shelf servers with software-defined modular architecture and carrier grade management system, FUSION is designed to support and leverage additional software and applications, for expanding system capabilities both in terms of scale and new functionality. Utilizing flexible software design, based around micro-services architecture, FUSION can be deployed as an appliance solution, or on a public or private cloud environment. A highly versatile solution, FUSION delivers multiple industry solutions in one system, addressing a wide range of use cases and easing deployment and operation.

**POWERFUL
OPERATIONS
SUITE**

As video platforms become more sophisticated, enabling more diverse services, operators need powerful tools for simplifying operations, reducing costs, and improving end-users' experiences. Easy to install, configure, integrate, and operate, SatExpander FUSION includes a service-oriented element management system, enabling to rapidly introduce and modify services, as well as maintain and monitor connectivity. Media flow and connectivity grid dashboards provide an overarching centralized view for easy orientation and monitoring, while advanced media and interface configuration tools simplify setup and ongoing operations. Enriching system monitoring and analyses, visual graphs track system resources and activity, and problems are classified and flagged in real-time. A REST API is also available for interfacing with operators' management systems.

**FUSION
SYSTEM FUNCTIONALITY**



PROCESSING

SYSTEM PROCESSING

- Single and multiservice processing
- ETSI Pro MPEG complaint (for jitter / delay)

VIDEO COMPRESSION

- MPEG-2: Simple, Main, and 422P profile, up to high level
- MPEG-4/H.264: Baseline, Main, and High Profile, High 10, and High 422
- HEVC/H.265: Main, Main 10, Main 420 10, Main 422 10
- 10 and 8 bits

AUDIO COMPRESSION

- Multiple programs per channel
- MPEG-1 layer 2
- MPEG-2 layer 3 (mp3)
- MPEG2/MPEG-4, AAC-LC, AAC-HE
- Dolby Digital E, AC-3 and passthrough
- Sampling Frequency: 32, 44.1, 48 KHz

RESOLUTIONS AND FRAME RATES

- Flexible - QCIF to HD 1080p60
- Mix and match resolutions, frame rates and bit rates - very flexible output configurations
- Common Resolutions:
 - o 240p, 288p, 480p, 576p @ 10, 12.5, 15, 20, 23.976, 29.97, 30, 50 and 59.94 and 60 Hz
 - o 576i and 480i x 720, 544 and 352 pixels @ 23.976, 24, 25, 29.97 and 30 Hz
 - o 1080i x 1920, 1440, 1280 and 960 pixels @ 23.976, 24, 25, 29.97 and 30 Hz
 - o 720p x 1280, 960 and 640 pixels @ 23.976, 24,29.97,30, 50, 59.94, and 60 Hz
 - o 1080p x 1920, 1440, 1280, and 960 pixels @ 23.976, 24,29.97,30, 50, 59.94, and 60 Hz
 - o 2160p x 3840, 4096 pixels @ 23.976, 24,29.97, 30, 50, 59.94, and 60 Hz
- Programmable to arbitrary output resolutions and frame rates

TRANSCODING

- Full decode/full re-encode mode
- Scene Change Detection and I-frame insertion
- Fixed and Dynamic GOP Structures
- VBI passthrough
- Single stream or multi-rate ABR

RATE CONTROL

- CBR, VBR, Capped VBR
- Single and Multi-pass modes
- Low Latency Mode

OPTIONAL PROCESSING

- 4K modes for HEVC including HDR
- 4K HDR HLG BT-2020
- Format Conversion
- Cropping/Scaling (manual or AFD)
- Single in – multi-out
- MCTF Noise Filtering with strength options
- 0 to 24-hour delay inserter COPv3 FEC Decode
- Slate Insertion
- Progressive and Interlace
- GOP Structure: I only, IPPP, IBBB, hierarchical GOP (H.264, H.265)
- Fixed or Adaptive GOP with scene change detection
- Ultra-low latency mode HEVC
- SRT FEC Decode
- Logo Insertion
- Scrolling Text Insertion with Scheduling ability
- Audio Level Control
- Calm Processing
- Embedded VBI
- Multi-audio and audio slot mapping control

ADAPTIVE MULTI-STREAM TRANSPORT

- ABR encoding and transcoding
- DASH
- Apple – HTTP multi-rate streaming with TS or fMP4segmenting
- Microsoft Silverlight multi-rate streaming
- Synchronized native MPEG2-TS multi-rate streaming
- CMAF packaging
- Internal streaming server (option)
- Push to CDN

PASSTHROUGH

- PID remapping and table recreation option
- Simultaneous passthrough with transcode and/or decode

ANCILLARY DATA

- EIA608 & EIA708 closed captioning
- SCTE35 passthrough (with IP input)

BITSTREAM FORMATS

- MPEG-TS over UDP/IP or ASI
- RTP/UDP/IP
- MPEG2-TS/RTP/UDP/IP

CONTENT PROTECTION & SECURITY

- ES scrambling / descrambling
- BISS 1 / 2 / CA based on EBU TECH 3292-s1 standard
- DVB CAS Simulcrypt compliant
- AES-256 TS encryption / decryption
- SatExpander Managed DRM NMS
- Watermark Insertion

INTERFACES

IP INTERFACES

- GbE (input / output)
- Optional 10GbE SFP
- UDP / RTP, Unicast / Multicast support
- MPTS / SPTS
- VLAN support
- Service filtering
- MPEG-2 TS support
- HTTP traffic (input / output) support
- SRT and Zixi

ASI INTERFACES

- EN50083-9
- 4 independent ports
- SPTS / MPTS
- BNC (F) 75 Ohm
- 4 different Transport Streams

SATELLITE MODULATORS

- L-band Output
- SMA (F) 50 Ohm
- Frequency range: 950 – 2150MHz in 1Hz steps
- Power level: -30 to 0 dBm in 0.1 dB steps (± 0.5 db stability @ temperature)
- Return Loss: >12dB
- Spurious: <-55dBc
- 10Mhz reference (managed)
- Up to 80Msps / 425Mbps
- DVB-S / DVB-S2 / DVB-S2X / NS4™
- QPSK, 8PSK, 8APSK, 16APSK, 32APSK, 64APSK
- All FEC supported
- Frame Length: 64800, 16200
- ROF: 2%, 5%, 10%, 15%, 20%, 25%, 35%
- Monitor interface

SATELLITE DEMODULATORS

- SMA (F) 50 Ohm
- Frequency: 950 – 2450Mhz (20KHz Steps)
- Input Power level: -105/+10Log(F), F in Msps, -20dBm Max.
- Max input power: 0dbm
- Return loss: >12dB
- 10Mhz reference (Managed)
- DISEqC: 11.5V - 14V (Vert. Pol.), 16V – 19V (Horiz. Pol), 22Khz (± 4 Khz), 350mA
- Serial console via USB / UART
- Up to 80Msps
- DVB-S / DVB-S2 / DVB-S2X / NS4™
- QPSK, 8PSK, 8APSK, 16APSK, 32APSK, 64APSK
- All FEC supported
- Frame Length: 64800, 16200
- ROF: 2%, 5%, 10%, 15%, 20%, 25%, 35%
- Support for BBframe Raw Data with SNR indication

SYSTEM

REDUNDANCY

- Redundant ASI port
- Redundant GbE port
- Redundancy with main TS over ASI and back-up TS over IP input
- Stream and Source redundancy on TS over IP inputs
- Unit level redundancy

RESILIENCY

- Modulator / Demodulator: 1+1 / 1+N redundancy
- SRT and Zixi

MANAGEMENT

- SSH CLI
- Web Based EMS and NMS options
- User and Privilege support
- REST API
- SNMP traps for alerts
- Stream analysis and event logs
- User management
- Encryption/Scrambling module
- Monitor and alert notification of the system load
- Configuration channel
- SPTS and MPTS structures
- Configuration input and output profiles

PHYSICAL AND ENVIRONMENTAL

- COTS-based server
- 19" x 1RU / 2RU / XRU
- Management Interface
- 500W/800W/1600W power options
- Dual power supply
 - Active – Active
 - 100 – 240VAC
- Temperature
 - Operational: 10° to 35°C (50° to 95°F)
 - Storage: -30° to 60°C (-22° to 140°F)
- Humidity
 - Up to 90% non-condensing

CERTIFICATES

- CE, FCC, BIS, CCC
- Electrical safety EN60950-1, EN 62479
- Electromagnetic EN 55032, EN 55024
- ROHS compliant
- WEEE compliant