Appear TV

XC 5000
XC 5100

appeartv.com

SYSTEM OF CHOICE FOR PROFESSIONAL OPERATORS

AppearTV is dedicated to providing world class platforms that enable operators to deliver professional broadcast services at the highest possible quality. Our portfolio is built around modular platforms hosting a wide selection of interoperable modules that give unparalleled configuration possibilities. Through its clever and robust design, the integrated architecture offers superior reliability that can meet even the most demanding operator requirements.

A key feature of the products is the ability to accommodate customers preferred system architectures while reducing complexity. It is possible to build an entire broadcast system within a single chassis or distribute it between several discreet stages or distributed architectures. Appear TV's deep understanding of the market and close co-operation with operators in the design of products ensures the ability to provide optimal solutions for a wide array of fixed or wireless networks. Our philosophy greatly reduces the cost of ownership and ensures that operators can simultaneously handle legacy challenges and evolve through the introduction of brand new services.

Appear TV's XC5000 and XC5100 are our latest generation carrier grade platforms with 1RU and 4RU chassis options of unmatched power and versatility. There are no restrictions even for the most intensive processing requirement. Both units feature uprated dual-redundant and hot swappable power supplies, increased cooling, enhanced redundancy and a number of other features.

An advanced user friendly GUI offers an intuitive and comprehensive management of the many features of the system. The exhaustive multi-level alarm system, together with the easiness for integration to 3rd party management systems, enables full automatic control. The possibility of centralized monitoring simplifies deployment and streamlines maintenance.

Appear TV classifies its modules into different categories depending on the functionality. These include switching, input for content aggregation, compression, processing, output and decoding modules. All modules can be combined freely to provide the desired functionality. The latest innovations include the possibility to deliver and convert both analog and digital broadcast services, from point to point, or from point to multipoint and in any format to any screen.

All modules and functions are further described within the 'modules' section of this brochure.

Complete solutions for every major broadcast segment

Advanced architecture designed to save space, energy and resources

CHASSIS

Appear TV offers two different chassis: the 4RU XC5000 chassis which can hold 16 modules and the 1RU XC5100 chassis which can hold 6 modules. In addition, each of the chassis houses a switch and management module that can be equipped with dual IP I/Os. Both chassis variants have dual-redundant and hot swappable power supplies. Each unit with its hot swappable modules allows for various redundancy scenarios.

Any of the modules listed under the Input, Encoding/Transcoding, Processing, Output and Decoder sections can be combined into the same chassis. Only chassis space or total throughput will limit the number of modules that can be fitted. The chassis has been designed for a throughput of 850 Mbit/s of MPEG TS data and 250 services. In selected configurations, capacity can be increased to 1 700 Mbit/s and 500 services (please contact Appear TV for more information)

The 4RU chassis has four independent fan modules that operate and are monitored independently. The four fan modules are identical and support hot-swap. The 1RU chassis has one preassembled fan module consisting of 6 fans. The fan module is hot-swappable as one complete module. The internal temperature is monitored and if a fan fails, the remaining fans will compensate by increasing the speed.

FEATURES

4RU - XC5000

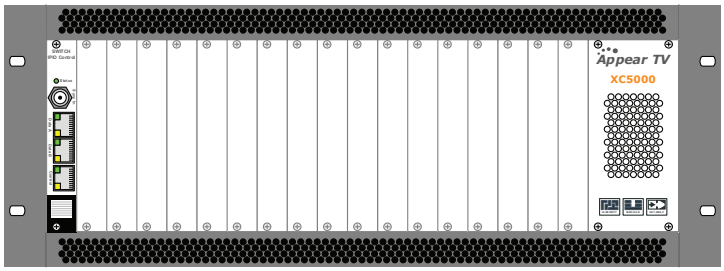
- Modular configuration with up to 16+2 board positions
- WEB based configuration, SNMP Alarms, SOAP/XML interface
- Forced air-cooling (front to back)
- Dual redundant hot-swappable power supply
- Remote reset of power
- 4 individually monitored hot-swappable fans
- Hot-swappable modules
- 100-240V AC power

1RU - XC5100

- Modular configuration with up to 6+1 board positions
- WEB based configuration, SNMP Alarms, SOAP/XML interface
- Forced air-cooling (front to back)
- Dual redundant hot-swappable power supply
- Remote reset of power
- Swappable fan module
- Hot-swappable modules
- 100-240V AC or -48V DC power

DIMENSIONS

4RU (XC5000)
440 ×177 ×400 (w × h × d mm)



1RU (XC5100)
440 ×44 ×480 (w × h × d mm)

The XC5000 and XC5100 use the same set of modules and same SW, but the front plates are different.

The modules can therefore not be interchanged between XC5000 and XC5100.

Module plate for XC5000

Module plate for XC5100

Hardware-managed
redundancy for unbeatable
speed and long-term reliability

SWITCH MODULES

The switch module is used to enable MPEG traffic distribution within the chassis and provides the Man Machine Interface (MMI), enabling configuration and management of the chassis.

The XC5000 chassis has dedicated positions for the switch module in slot 0 with an optional (for selected configurations) redundant switch module in slot 17. The switch module can be equipped with two independent IP IO ports as an option. The XC5100 chassis provides an integrated switch module in the front with IP IO as standard. The switch module for XC5100 is functionally identical to the switch module used in the larger XC5000 chassis, but has a different hardware layout.

At least one switch module is required in all chassis. In addition to being the active part of the internal backplane, the switch module provides the central control and management interface. When equipped with two IP IO data ports, reception or streaming of MPEG compliant transport streams over UDP/RTP is supported by the module. Each port operates independently and can be configured as either IP in or IP out supporting full 850 Mbit/s TS data rate and up to 250 MPEG services. The switch module can be provided with either RJ45 connectors or SFP connectors on the two data ports. When equipped with two data ports, the module also has a Gen Lock input port. The switch module is hot-swappable for easy maintenance.

The Switch IP IO MMI module can also be ordered to include a GPS receiver for terrestrial SFN applications. For the XC5000, this is a separate module that must be placed in slot 1, while for XC5100, it is an add-on module for the switch module. One SMA connector for connecting either a GPS antenna or a 1 PPS reference is then available. It is also possible to order without the GPS radio module so that it just provides a high stability oscillator providing locking to a 1 PPS or 10MHz reference signal.

SWITCH MODULES FOR XC5000

Switch Module with Management

- Gbit/s routing between modules in a chassis
- Enables WEB management
- 10/100/1000BaseT management port (RJ45)
- 1 slot wide

Clock Reference Module

- GPS antenna input
- 1 pps input reference
- 10 MHz test output
- 1 pps test output
- 1 slot wide

Switch Module with Management 2 × 10/100/1000 Base-T

- Gbit/s routing between modules in a chassis
- 2 × Gbit RJ45 input or output port for data
- Frame Synchronization input (genlock)
- Up to 850 Mbit/s TS rate per data port
- Supports UDP/RTP Multicast/Unicast
- Supports reception of MPTS and SPTS
- Supports streaming of MPTS and SPTS
- Supports seamless (hitless) input redundancy and cloned output
- Multiplexing on output with PSI/SI regeneration (license)
- Service filtering
- FEC encoding and decoding (license)
- Enables WEB management
- 10/100/1000 BaseT management port (RJ45)
- 1 slot wide

Switch Module with Management Dual SFP

- Gbit/s routing between modules in a chassis
- 2 × Gbit SFP input or output port for data
- Frame Synchronization input (genlock)
- Up to 850 Mbit/s TS rate per data port
- Supports UDP/RTP Multicast/Unicast
- Supports reception of MPTS and SPTS
- Supports streaming of MPTS and SPTS
- Supports seamless (hitless) input redundancy and cloned output
- Multiplexing on output with PSI/SI regeneration (license)
- Service filtering
- FEC encoding and decoding (license)
- Enables WEB management
- 10/100/1000 BaseT management port (RJ45)
- 1 slot wide

SWITCH MODULES FOR XC5100

Switch Module with Management 2 × 10/100/1000 Base-T

- Gbit/s routing between modules in a chassis
- 2 × Gbit RJ45 input or output port for data
- Frame Synchronization input (genlock)
- Up to 850 Mbit/s TS rate per data port
- Supports UDP/RTP Multicast/Unicast
- Supports reception of MPTS and SPTS
- Supports streaming of MPTS and SPTS
- Supports seamless (hitless) input redundancy and cloned output
- Multiplexing on output with PSI/SI regeneration (license)
- Service filtering
- FEC encoding and decoding (license)
- Enables WEB management
- 10/100/1000 BaseT management port (RJ45)

Switch Module with Management Dual SFP

- Gbit/s routing between modules in a chassis
- 2 × Gbit SFP input or output port for data
- Frame Synchronization input (genlock)
- Up to 850 Mbit/s TS rate per data port
- Supports UDP/RTP Multicast/Unicast
- Supports reception of MPTS and SPTS
- Supports streaming of MPTS and SPTS
- Supports seamless (hitless) input redundancy and cloned output
- Multiplexing on output with PSI/SI regeneration (license)
- Service filtering
- FEC encoding and decoding (license)
- Enables WEB management
- 10/100/1000 BaseT management port (RJ45)

MPEG INPUT MODULES

Appear TV has a wide range of input modules making it the most effective content aggregation solution on the market. An input module analyzes incoming transport streams and extracts selected MPEG services from the desired physical input interface (eg. ASI, IP, DVB-S/S2, DVB-C or DVB-T/T2). Each input module type is based on embedded hardware design offering high density and reliability. The ability to mix input types freely within a chassis enables multiple MPEG transport streams originating from a variety of sources to be received and processed in parallel. Received signals can be demodulated, de-multiplexed and distributed to other modules inside the chassis via the backplane.

A wide range of input modules are available including IP, ASI, DVB-S/S2, DVB-C and DVB-T/T2. The chassis supports any combination of input modules limited only by available slot space. Each input module is designed to receive up to 850Mbit/s of MPEG TS rate or 250 services. In re-multiplexing mode, all services are de-multiplexed by the input module before passed onto the backplane. Unused services are blocked by the input module to avoid propagating them further, which increases efficiency. The full content of an input port can be mapped transparently to an output port with the option to perform PID filtering or service filtering.

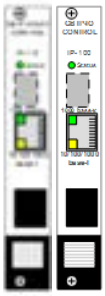
FEATURES

- Modular
- Scalable
- Compact with multiple inputs per module
- Advanced input analysis and status information
- Easy to configure from one common web GUI interface
- Hot swappable
- Wide range of input types
- Mix and match card types freely, and add as many as you need

INPUT MODULES

IP Input

- 10/100/1000BaseT (RJ45) or SFP input
- Supports UDP/RTP Multicast/Unicast reception
- Supports reception of MPTS and SPTS
- Service filtering
- Supports FEC (SMPTE 2022) (Ext HW + license)
- Input analysis
- 1 slot wide



Dual IP IO

- 2 × Gbit RJ45 or SFP input port for data (or 1×in and 1×out)
- Up to 850 Mbit/s TS rate per data port
- Supports UDP/RTP Multicast/Unicast
- Supports reception of MPTS and SPTS
- Supports seamless (hitless) input redundancy
- Service filtering
- Supports FEC (SMPTE 2022) (license)
- Input analysis
- 1 slot wide

DVB-C Input

- 4 × QAM inputs
- 1 × F connector
- 0.87–6.9 Ms/s
- Supports reception of MPTS and SPTS
- Service filtering
- ASI monitoring port
- Input analysis
- 1 slot wide

ASI Input

- 4 × ASI inputs
- 4 × BNC connectors
- 213 Mbit/s Burst mode or 72 Mbit/s Spread mode per input
- Supports reception of MPTS and SPTS
- Service filtering
- Input analysis
- 1 slot wide

DVB-S/S2 Input

- 4 × DVB-S/S2 inputs
- 4 × F connectors
- DVB-S, DVB-S2 QPSK and 8PSK modes
- 950 – 2150 MHz Frequency Range
- 1-45 MSym/s DVB-S (mode dependent)
- 5-30 MSym/s DVB-S2
- 1/2, 2/3, 3/4, 5/6, 7/8, 8/9, 9/10 FEC (mode dependent)
- Supports reception of MPTS and SPTS
- Service filtering
- ASI monitoring port
- Input analysis
- 2 slots wide

Enhanced DVB-S/S2 Input

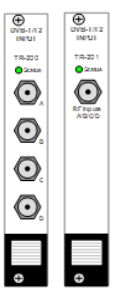
- 4 × DVB-S/S2 inputs
- 4 × F connectors
- DVB-S, DVB-S2 QPSK, 8PSK and 16APSK modes
- 950 – 2150 MHz Frequency Range
- 1-45 MSym/s
- DVB-S 1/2, 2/3, 3/4, 5/6, 7/8 FEC
- DVB-S/S2 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 FEC
- Supports reception of MPTS and SPTS
- Supports multistream reception
- Service filtering
- ASI monitoring port
- Input analysis
- 2 slots wide

DVB-T Input

- 4 × COFDM inputs
- 1 × F connector
- Frequency range 47-862MHz
- 1/2, 2/3, 3/4, 5/6, 7/8 FEC
- 2k and 8k carrier mode
- QPSK, 16QAM, 64QAM modulation
- Supports reception of MPTS and SPTS
- Service filtering
- ASI monitoring port
- Input analysis
- 1 slot wide

DVB-T/T2 Input

- 4 × DVB-T/T2 receivers per module.
- Input ports option:
  1 × F connector, signal is split and distributed internally
  4 × F connectors, one per demodulator
- Frequency range 47-862MHz
- Carrier mode:
  DVB-T: 2k, 8k
  DVB-T2: 1k, 2k, 4k, 8k, 16k, 32k
- Modulation:
  DVB-T: QPSK, 16QAM, 64QAM
  DVB-T2: QPSK, 16QAM, 64QAM, 128QAM, 256QAM
- Supports reception of MPTS and SPTS
- Service filtering on input
- Input analysis
- 1 slot wide



ENCODING/TRANSCODING MODULES

Broadcast encoders/transcoders

Appear TV's encoding and transcoding module utilizes the latest-generation compression technology to process large numbers of services efficiently and with exceptional quality. Appear TV's MPEG-2 and MPEG-4 AVC (also known as Part 10 or H.264) encoder solutions are able to encode digital video data in all common distribution profiles from SD to HD. Input is SDI/HDSDI with embedded audio (AES available as option) or composite video with balanced analog stereo. The transcoder solution is able to transcode digital video data in all common distribution profiles from SD to HD. The transcoder module is able to transcode AVC to MPEG-2, MPEG-2 to MPEG-2, MPEG-2 to AVC and AVC to AVC. Both the encoders and transcoders support statistical multiplexing to further optimize bandwidth utilization.

Multiscreen transcoders

Appear TV's multiscreen transcoding module (for OTT) is a fully integrated, hardware-based system capable of simultaneously preparing multiple profiles from any input source in any format for distribution to a mobile or fixed platform utilizing an unmanaged network (such as a wi-fi network or the internet) for content delivery. The target device could be a high definition television in the home, a high-resolution computer screen, a tablet or simple low-cost devices using lower-resolution web and mobile-based profiles. The system accommodates specific device formats at different bit rates optimized for each destination device while maintaining a high QoS and exceptional reliability. The latest evolution of the multiscreen transcoding module allows users to simultaneously transcode a higher number of HD and SD inputs with exceptional channel density. The hardware platform makes the transcoder ideally suited for today's shift towards increasing channel counts and more HD resolutions. The result is a vastly improved real-time compression performance and efficiency that only solutions architected in hardware can deliver.

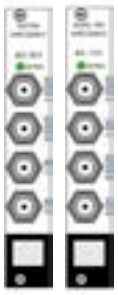
FEATURES

- Modular
- Exceptional video quality
- Compact HW based encoding/transcoding
- Supports MPEG-2 and MPEG-4 SD and HD
- Power and space efficient
- Scalable
- Segmentation agnostic: Can be used with customers having existing segmentation infrastructure
- Complete: Use with other modules to build a complete solution within a chassis
- Can be used to create hybrid broadcast / OTT capable platforms

ENCODING/TRANSCODING MODULES

HD/SD SDI Encoder

- Encodes up to 2 HD or 4 SD channels
- 2 HD-SDI or up to 4 SD-SDI inputs, BNC connectors
- Available variants:
  Dual HD Encoder with AES option
  Quad SD upgradable to Dual HD
- Operates in three different Encoder Rate control modes:
  Constant Bit Rate (CBR)
  Capped Variable Bit Rate (CVBR)
  Statistical Multiplexing
- MPEG-2/4 SD/HD encoding
- Picture in picture support
- Logo insertion
- 1 slot wide



SD/HD Transcoder

- Transcodes up to 2 HD or 4 SD channels
- Full decode and re-encode
- MPEG-2/4 SD/HD transcoding
- Operates in three different Encoder Rate control modes:
  Constant Bit Rate (CBR)
  Capped Variable Bit Rate (CVBR)
  Statistical Multiplexing (in future release)
- 1 slot wide

MS Transcoder (OTT)

- Transcodes up to four services into multiple profiles
- Transcodes single service into 4 HD or 28 sub SD profiles
- Profile range from 1920×1080p to 240×180p*
- Resolution conversion
- Frame rate reduction
- GOP alignment
- Audio transcoding
- 1 slot wide

*For complete list of available profiles, please contact Appear TV

Analogue Encoder

- Encodes up to 2 SD + PIP or 4 SD channels
- 4 mini BNC with composite video input
- 25 pin mini D-sub for audio:
  4 balanced analogue audio
  or 2 AES/EBU audio
- MPEG-2 and MPEG 4 SD encoding
- Constant bit-rate (CBR)
- Capped variable bit-rate (CVBR)
- Logo insertion
- 1 slot wide

PROCESSING MODULES

Descrambling and Scrambling

Appear TV provides two types of descramblers: CAM-based (DVB-Common Interface) and bulk descrambling. The CAM based descrambler module is integrated with professional CAM modules from vendors such as SMIT, SmarDTV, Aston etc. and supports descrambling of up to 10 services per CAM. The bulk descrambler is aimed at software-based CA systems or CA vendors open for an embedded integration. It is used for the descrambling of multiple services protected by one or more CA systems and offers very high descrambling density of up to 250 services per module, making it an efficient, space and energy saving solution. The scrambler module supports both DVB CSA and all common flavors of AES scrambling algorithms. The scrambler module is fully simulcrypt compliant and has been integrated with all major CA vendors.

EPG and audio leveling

The Electronic Program Guide (EPG) module allows a network operator to receive several channel bouquets from multiple sources and reuse the existing EPG information. The EPG will receive EIT tables from any available input automatically and filter out unused services and re-generate the EIT schedule to reflect the current channel lineup for the selected network. For channels without EPG information on air, the information can be imported via a dedicated IP interface using XMLTV format.

Appear TV's audio leveling simplifies the process of changing the audio levels of hundreds of channels by eliminating the need to decode and re-encode these TV and radio channels prior to transmitting them. The solution lets operators tune the audio level of up to 250 audio tracks individually, within the MPEG domain. The audio leveling module supports MPEG-1 layer 1 or 2 audio with an adjustment range of ±30dB.

FEATURES

- Modular
- Customizable to specific operator demands
- High density
- Provides integrated functionality normally requiring separate chassis or servers
- Powerful MPEG processing with high throughput

PROCESSING MODULES

Bulk Descrambler

- Descrambles up to 250 services (850 Mbit/s)
- Integrated with soft clients for ECM handling (no smart card required)
- Support for both DVB-CA and AES descrambling
- Integrated with Verimatrix and Latens
- BISS descrambling
- 1 slot wide

SIM Bulk Descrambler

- Descrambles up to 250 services (850 Mbit/s)
- Smart Card based descrambling (SIM)
- Support for both DVB-CA and AES descrambling
- Integrated with Conax
- BISS descrambling
- 2 slot wide

Scrambler

- DVB CA compliant scrambling (CSA) and AES compliant scrambling
- Scrambles up to 250 services, maximum 850 Mbit/s
- Supports scrambling of MPEG-2 and H264 in SD &HD
- DVB Simulcrypt compliant
- 10/100/1000BaseT IP interface towards CA system (RJ45)
- Handles up to 250 ECMs
- 1 slot wide

Descrambler

- 2 × DVB Common interface
- Descrambling of 10 services per CAM (depends on common interface)
- Support for all major CA systems and CAMs
- 1 slot wide

Digital Audio Leveling

- For equalisation of audio in TV and Radio services within a digital head-end
- Audio volume control in an MPEG domain
- Audio leveling of 250 channels
- Supports MPEG 1, layer 1 / 2 audio
- Adjustment range ± 30 dB
- 1 slot wide

Note: For Dynamic audio leveling (Interface options), please contact Appear TV.

EPG

- Re-generation of EIT schedule on selected output ports
- Gathers EIT information from all input ports
- EPG data is filtered and regenerated to reflect new channel plan
- Supports multiple of networks
- Configurable play out rate with prioritization
- Configurable period to be played out
- EPG synchronization between multiple ATV units
- 1 slot wide

MPEG OUTPUT MODULES

Appear TV offers a large number of different output modules that can be used in various applications. All output modules have powerful MPEG multiplexing and PSI/SI/PSIP capabilities to enable operators to maximize the potential of their network. Each output module has been designed to support 850 Mbit/s transport stream data-rate and 250 services.

IP and ASI output

The IP output module is a high capacity module with full multiplexing and PSI/SI regeneration targeted at linear broadcasting. The IP output modules support any combination of MPTS and SPTS as long as the total number of services is less than 250 and the total transport stream bit-rate is less than 850 Mbit/s. Each output port supports IPv4, IPv6, source specific multicast, generation of FEC according to SMPTE 2022 and Appear TV's unique IP output redundancy solution.

For legacy systems an ASI output module with 4 independent ASI outputs is available. Each ASI output supports up to 213 Mbit/s in burst mode or 72 Mbit/s in spread (byte) mode.

Modulated output

All Appear TV's modulated output modules are based on a full digital modulation and up-conversion architecture developed in house to provide the best possible output quality. Appear TV's leading edge DVB-T/T2 modulator is fully frequency agile for terrestrial transmitters, MMDS systems or for DVB-T/T2 modulation into cable networks. This high density modulator is capable of producing up to 4 DVB-T or 2 DVB-T2 modulated channels, offering more throughput and improved error resiliency. For terrestrial operation, the modulator supports SFN with either MIP TS or T2MI as input .

Appear TV's advanced DVB-S/S2 modulator is a fully frequency agile modulator aimed at modulating SD/HD services on to satellite. This high density modulator is capable of producing up to 2 DVB-S or DVB-S2 modulated channels. The solution offers broadcasters a higher rack density and lower power consumption, compared to alternative solutions and comes with advanced functionality like pre-compensation. The DVB-S/S2 modulator is available in two different output configurations: IF or L-band.

Appear TV's compact QAM solution generates 16 QAM frequencies for cable networks. The module support both full re-multiplexing and transparent mapping with optional NIT replacement and PID/Service blocking making it one of the most versatile QAM modulation solutions for linear broadcasting on the market. Appear TV's QAM solution is ideal for regional cable head-ends where additional processing are required like service filtering, local re-multiplexing, local encoding, SI regeneration, EPG regeneration, etc.

Terrestrial GW solutions

The gateway module transforms an Appear TV chassis into a complete solution for DVB-T and T2. It combines the MPEG multiplexing, PSI/SI generation and gateway roles into a single module. Combining this with modules to perform encoding, transcoding and scrambling enables a unique integrated head-end design eliminating the need for a traditional multiple box approach with the added complexity. The Appear TV gateway module supports DVB-T with MIP timestamp insertion or DVB-T2 T2MI encapsulation with SFN timestamps together with multi PLP support. The terrestrial gateway module is available with ASI or IP outputs and can support up to 4 separate gateways per module (2 on ASI out). Integrated redundancy schemes are available to go beyond what is commonly available today and provide seamless protection of the distribution chain as well as the SFN network.

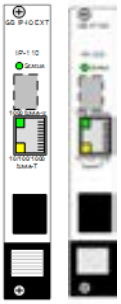
FEATURES

- Modular
- Integrated
- Scalable
- High density
- Flexible
- Seamless redundancy options
- Intelligent, automatic redundancy solutions
- Powerful multiplexing with high throughput
- Integrated multiplexing & PSI/SI re-generation

OUTPUT MODULES

IP Output

- 1 × Gbit output port for data
- 10/100/1000BaseT (RJ45) or SFP output
- Supports UDP/RTP Multicast/Unicast transmission
- Streaming of up to 850 Mbit/s
- Maximum 250 services
- Supports streaming of SPTS and MPTS
- Supports multiplexing and transparent pass-through
- PSI/SI/PSIP regeneration
- Supports FEC (SMPTE 2022) (Ext HW + license)
- 1 slot wide



Dual IP IO

- 2 × Gbit output port for data (or 1×in and 1×out)
- 10/100/1000BaseT (RJ45) or SFP output
- Up to 850 Mbit/s per data port TS
- Supports UDP/RTP Multicast/Unicast
- Supports streaming of MPTS and SPTS
- Supports cloned output
- Supports multiplexing and transparent pass-through
- PSI/SI/PSIP regeneration
- Supports FEC (SMPTE 2022) (license)
- 1 slot wide

ASI Output

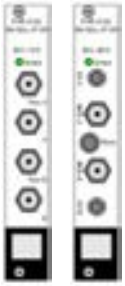
- 4 × ASI outputs
- 4 × BNC connectors
- 213 Mbit/s per output
- 4 different multiplexed outputs
- Supports multiplexing and transparent pass-through
- PSI/SI/PSIP regeneration
- 1 slot wide

QAM Modulator

- 16 QAM modulators, 4 and 4 paired
- 2 × 75 Ω RF output (EN/IEC 60728-5) - F connector
- Full digital modulation and up-conversion
- DOCSIS 3.0 RF compliant
- 32 / 64 / 128 / 256 QAM modulation
- Frequency range of 47 – 862 MHz
- Supports multiplexing and transparent pass-through
- PSI/SI/PSIP regeneration
- ITU-TJ83. Annex A/B/C
- 1 slot wide

DVB-S/S2 Modulator

- 2 DVB-S/S2 modulated carriers per module
- Connectors:
  IF › 1 × F connector + 1 × F for monitoring per output
  L-band › 1 × SMA connector + 1 × F for monitoring per output
- Based on ETSI EN 300 421 and ETSI EN 302 307 standards
- Output options:
  IF › 50-200 MHz
  L-band › 950-2150 MHz
- Modulation:
  DVB-S › QPSK
  DVB-S2 › QPSK, 8-PSK, 16-APSK, 32-APSK
- Symbol rate: 0.5-45 Mbaud
- Static precorrection (linear/non-linear)
- Supports multiplexing and transparent pass-through
- PSI/SI/PSIP regeneration
- 1 slot wide

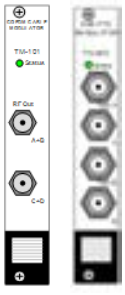


DVB-T/T2 Terrestrial Modulator (Exciter)

- 2 DVB-T2 or 2 DVB-T independent outputs
- 1 × BNC connector + 1 × BNC for monitoring per output
- Monitoring ports for each output
- VHF/UHF, 50 Ω BNC, 47-862 MHz
- Output levels: -15 to 0 dBm
- Based on ETSI EN 300 744 and ETSI EN 302 755 standards
- Supports multiplexing and transparent pass-through (mode A)
- Support for SFN (ETSI TS 102 733 T2-MI)
- Support for multiple PLPs
- Supports multiplexing and transparent
- PSI/SI regeneration
- 1 slot wide

DVB-T/T2 Cable Modulator

- 4 DVB-T modulators (ETSI EN 300744)
- 2 DVB-T2 modulators (ETSI EN 302 755)
- Connectors:
  COFDM › 1 × F connector + 1 × F for monitoring per module
  DVB-T2 › 1 × BNC connector + 1 × BNC for monitoring per output
- Full digital modulation and up-conversion
- 5, 6, 7, 8 MHz bandwidth
- Frequency range 47-862 MHz, fully agile
- Output levels: -12 to 2.2 dBm
- PSI/SI regeneration
- 1 slot wide



DVB-T/T2 GW

- IP or ASI out options:
  10/100/1000 BaseT (RJ45) or SFP output on IP
  2 × (1+1) ASI out
- Supports DVB-T MIP insertion and DVB-T2 T2MI generation
- 4 independent gateways per module (2 for T2MI on ASI out)
- Supports up to 240 PLPs
- Regionalization options
- PAPR and MISO support
- Full (Re-)multiplexing support (per PLP)
- PSI/SI regeneration
- Supports SMPTE 2022 FEC (license)
- 1 slot wide

DECODER

A key feature of Appear TV platforms is the ability to use a common hardware platform to deliver high quality analog and digital TV services simultaneously. The SDI/HDSDI outputs and optional AES/EBU audio outputs are ideal for downlink and rebroadcast, or for monitoring purposes.

Simulcasting

The high performance decoders with RF modulation are ideal for operators wanting to eliminate the need to distribute analog channels over the core network. Appear TV's decoder modules with RF output support PAL, SECAM and NTSC together with A2, NICAM and MTS stereo audio modulation. Based on a full digital-modulation and up-conversion architecture, the decoder with RF modulation gives the best RF performance possible.

Appear TV FM radio decoders offer cable operators a compact solution for the delivery of radio services. Each radio module decodes 8 MPEG stereo audio tracks and FM modulates the audio with RDS. The FM radio module can be combined with decoders and digital QAM modulator, making them a complete remote head-end for cable operators.

FEATURES

- Modular
- Scalable
- High density with up to 40 analogue RF modulated TV channels in 4RU
- Integrated analogue simulcast solution for video and FM radio
- MPEG-2/4 SD/HD decoding
- Digital RF modulation

DECODER MODULES

Dual MPEG-2/4 Decoder with SDI/HDSDI Output

- 2 decoders per module
- 2 × BNC with SDI/HDSDI outputs per decoder
- MPEG2 and MPEG4 (H264) SD and HD
- Frame Synchronization (Genlock) support (HW option)
- Dolby® Digital Plus (HW option)
  Dolby® Digital and Dolby® Digital Plus decoding, Downmix from 5.1 to 2.0 (Lo/Ro & Lt/Rt), Compression Modes (Line & RF)
  Conversion Dolby® Digital Plus to Dolby® Digital
- VBI re-insertion (WSS, WST/EBU Teletext, VPS, VITS)
- VANC re-insertion (WSS, Teletext, VPS, DPI, AFD, EBU Subtitles)
- DVB and EBU subtitling
- 1 slot wide

Dual MPEG-2/4 Decoder with SDI/HDSDI Output & AES Audio option

- 2 decoders per module
- 1 SD/HDSDI output per decoder
- 1 AES audio output per decoder
- MPEG2 and MPEG4 (H264) SD and HD video
- MPEG-1 Layer 1/2, MPEG-2 Layer 2, MPEG4 AAC-LC, MPEG4 AAC plus v.1/2 audio
- Dolby® Digital Plus (HW option)
  Dolby® Digital and Dolby® Digital Plus decoding, Downmix from 5.1 to 2.0 (Lo/Ro & Lt/Rt), Compression Modes (Line & RF)
  Conversion Dolby® Digital Plus to Dolby® Digital
- VBI re-insertion (WSS, WST/EBU Teletext, VPS, VITS)
- VANC re-insertion (WSS, Teletext, VPS, DPI, AFD, EBU Subtitles)
- DVB and EBU subtitling
- 1 slot wide

Dual MPEG 2/4 Decoder with Composite Output

- 2 decoders per module
- Composite PAL and NTSC Video output - BNC connectors
- Balanced Stereo Audio output – D-sub connector
- MPEG2 and MPEG4 (H264) SD and HD
- Dolby® Digital Plus (HW option)
  Dolby® Digital and Dolby® Digital Plus decoding, Downmix from 5.1 to 2.0 (Lo/Ro & Lt/Rt), Compression Modes (Line & RF)
- VBI re-insertion (WSS, WST/EBU Teletext, VPS, VITS)
- DVB and EBU subtitling
- 1 slot wide

FM Radio with RDS Output

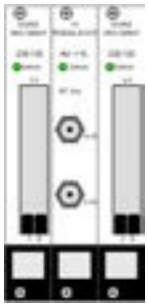
- 8 independent radio channels per module
- Decoding of MPEG-1,2 audio
- FM modulation and up-conversion to FM band
- Fully agile independent frequency setting for each channel
- RDS insertion - UECP SPB490 or static
- One RF output connector, F-type, with all 8 channels
- MPX test output
- 1 slot wide

Dual MPEG-2/4 Decoder with High Performance RF Modulation and Stereo Sound Output

- 2 outputs per decoder
- MPEG-2/4 (H264) SD and HD
- PAL › B/G, SECAM › D/K
- HD downconversion to SD
- Dolby® Digital Plus (HW option)
  Dolby® Digital and Dolby® Digital Plus decoding, Downmix from 5.1 to 2.0 (Lo/Ro & Lt/Rt), Compression Modes (Line & RF)
- VBI re-insertion (WSS, WST/EBU Teletext, VPS, VITS)
- DVB and EBU subtitling
- High performance RF modulation and up-conversion
- 47 - 862 MHz frequency range
- F connector output with both channels combined
- 2 DVB Common Interfaces. One per channel
- Dual stereo to dual mono conversion
- NICAM or A2 stereo audio (option)
- 2 slots wide

Quad Decoder with RF Output

- 4 or 8 decoders and RF modulators
- MPEG-2/4 (H264) SD and HD decoding (half can be HD)
- PAL› B/G, D/K, I
- SECAM › B/G, D/K
- NTSC › M
- HD downconversion to SD
- Dolby® Digital Plus (HW option)
  Dolby® Digital and Dolby® Digital Plus decoding, downmix from 5.1 to 2.0 (Lo/Ro & Lt/Rt), Compression modes (Line & RF)
- VBI re-insertion (WSS, WST/EBU Teletext, VPS, VITS)
- DVB and EBU subtitling
- RF modulation and up-conversion
- 47-862 MHz frequency range
- 2 F connector output ports, up to 4 channels per port
- 2 DVB Common Interfaces per decoder module
- 2 or 3 slots wide



REDUNDANCY

(AWARD WINNING)

Appear TV's intelligent redundancy software provides seamless integration between broadcast equipment and IP networks. It protects every stage and provides automatic backup in case of service stream failure at input, protection from internal failures, and intermittent or permanent data losses within distribution networks without requiring complex control software.

Appear TV's redundancy solution is unique in being the only solution in the IP television market to take a holistic view of operation and network management. Redundancy configuration is simplified and automated, and operational routines are significantly reduced. The integrated redundancy solutions offer operators compelling quality of service benefits and improved network reliability. The individual elements of this integrated solution are further described below. For more detailed information please contact Appear TV.

Input redundancy

The Appear TV system is equipped with an advanced input redundancy switching mechanism. Any output service can be configured to have a backup service from a different input TS regardless of input type. Input switching can also be performed on TS level using 'input port redundancy'.

Redundancy switching can be set to automatic or manual. In automatic mode it is possible to choose from the following switching modes: Once (switch and stop), Floating or Reverting.

Seamless IP input redundancy (License)

The Appear TV Seamless IP Switch module makes it possible to achieve seamless IP input redundancy switching between two distribution networks. The Seamless IP Switch combines an innovative alignment technique with a fast acting data switch making it possible to reconstruct a perfect outgoing stream even from two imperfect network feeds.

The Seamless IP Switch can regenerate the traffic received via two networks, so that both networks are used 100% of the time to back each other up. Using the data provided by both networks simultaneously, rather than just one, enables dramatic improvements in QoS

Internal Redundancy (4RU chassis feature)

By using Appear TV's Internal Redundancy feature, all critical single points of failure in the 4RU chassis are eliminated. This clever mechanism facilitates configurations with redundant switch modules, redundant backplanes, redundant IP inputs, redundant MMI (i.e. management & control) as well as redundant power supplies. In case of input, switch or MMI failure, all output modules or decoder modules will switch backplane and log into the other MMI where it will receive the services from the backup inputs and switch.

By having 1+1 redundancy on inputs and switch modules, all components of the chassis are backed up, except for the decoder and output modules which normally handle a subset of the available channels. In case of failure of decoder or output modules, they can easily be hot-swapped, and the affected services will be up and running in seconds.

N+M redundancy (4RU chassis feature) (License)

The Appear TV self-managed N+M redundancy for encoding and transcoding provides a powerful option for broadcasters needing the economies of N+M compression redundancy without the expense, complexity and long term reliability concerns of a conventional NMS. Rather than relying on external PC hardware, Appear TV have integrated the redundancy control into the built in management system thus simplifying system configuration eliminating integration and operational issues between HW and management PC. It is the perfect method for creating the intelligent 'device islands' that are increasingly being favored by broadcasters when architecting new solutions.

The encoders and transcoders will be the only items within the chassis in N+M configuration. Everything else will be 1+1. This includes any input and output ports, all control and management functions, the backplane and the power supplies. Each 4RU chassis will be equipped with backup encoder or transcoder module(s) capable of providing module level replacement for any of the active encoders or transcoders within the chassis. Multiple redundancy groups of encoders and transcoders can be defined in the same chassis. For encoding, the redundant control modules can drive a (HD)SDI video router directly

IP Output redundancy (License)

The IP output redundancy system presents a network with multiple sources from which it is possible to obtain the same service. Should the service from one source be corrupted, the network can receive the service from another source. The redundancy solution is service based (multicast based) where the same service will be available for two or more sources. As long as all sources with the same channel have the same IP source address, the network will route just a single copy of the multicast stream forward to the receiver based on routing cost. In the event of a service issue within, or prior to, the Appear TV chassis, the IP output module exploits standard IP protocols to trigger external routers to switch to secondary sources.

Where full redundancy is not required, partial redundancy strategies can be implemented. Systems can be configured to provide full redundancy of only selected premium or 'must-carry' services. Operators can then choose not to replicate the input and descrambling functions of lower priority services, but still equip the chassis with multiple IP output modules to provide limited fault tolerance.

SWITCH MODULE SPECIFICATIONS

Switch Module	Bitrate	: Gbit/s routing between modules in a chassis
	Placement	: 1 slot wide (4RU switch module must be placed in slot 0; redundant module in slot 17)
	IP Input/Output	
	Interface	: 2 × 10/100/1000 Base-T Ethernet or SFP
		: Optical SFP (class 1 laser product)
	Maximum data rate per port	: Up to 850 MBit/s per port TS rate
	Maximum number of services per port	: 250
	Data format	: UDP/RTP Multicast/Unicast
	Transport stream	: SPTS and MPTS
	Service filtering	: Yes
	Video format	: Transport stream, MPEG-2 SD/HD and MPEG-4 SD/HD
	IP Input	
	IP de-jittering	: PCR or CBR
	Forward Error Correction	: SMPTE 2022-1 250 input streams per data port (licensed)
	IP Output	
	Multiplexing	: Yes (licensed)
	Forward Error Correction	: SMPTE 2022-1 250 output streams per data port (licensed)
	Tables Supported	
	- PSI	: PAT, PMT, CAT
	- SI	: SDT, NIT, EIT pf , TOT, TDT, BAT, AIT
	- PSIP	: MGT, TVCT, CVCT
	Frame Synchronization Input	
	Interface	: Accepts black burst and Tri-Level reference signal.*
	Management	
	Interface	: 10/100/1000 Base-T Ethernet
	Built-in user interface	: Web
	External interface	: SNMP for alarms, SOAP for configuration and status

* If SDI reference signal support is needed, contact your sales representative.

Clock Reference	**GPS reference input**	
	Antenna connector	: SMA female
	Impedance	: 50 Ω
	1pps timing accuracy	: < 100 ns RMS
	Active Antenna Voltage output	: 0V, 3.3V(default) or 5V
	Internal reference hold-over	: ≤1us in 4 hrs @ΔT= 0˚C
	1pps reference input	
	Number of input ports	: 1
	Input connector type	: BNC female
	Impedance	: TTL or 50 Ω
	Input level 1pps (1Hz)	: TTL
	Internal reference hold-over	: ≤1us in 4 hrs @ΔT= 0˚C

INPUT INTERFACE SPECIFICATIONS

IP Input	Interface	: 10/100/1000 Base-T Ethernet and SFP interface
		: Optical SFP (class 1 laser product)
	Maximum data rate	: Up to 850 MBit/s
	Data format	: UDP Multicast/Unicast, RTP
	Transport stream	: SPTS and MPTS
	Network de-jittering using PCR	: Yes
	FEC (SMPTE 2022-1)	: 125 services
Dual IP IO	**IP Input/Output**	
	Interface	: 2×10/100/1000 Base-T Ethernet and SFP
	Operational mode	: The module can be configured to; - 1 input and 1 output - Seamless (Hitless) IP in - Cloned IP out - Dual IP in

		- Dual IP out
	Maximum data rate per port	: Up to 850 Mbit/s per port in Seamless (Hitless) in, cloned out or 1×IPIN + 1×IPOUT
		: Up to 850 Mbit/s sum of both ports in Dual IP in or Dual IP out mode
	Maximum number of services per port	: 250
	Data format	: UDP/RTP Multicast/Unicast
	Transport stream	: SPTS and MPTS
	Service filtering	: Yes
	Video format	: Transport stream, MPEG-2/4 (H264) SD/HD
	IP Input	
	IP de-jittering	: Yes, based on PCR or CBR
	Forward Error Correction	: SMPTE 2022-1
		250 input streams per data port (licensed)
	IP Output	
	Multiplexing	: Yes (licensed)
	Forward Error Correction	: SMPTE 2022-1
		250 output streams per data port (licensed)
ASI Input	Key reference specification	: EN 50083-9
	Connector	: BNC female, 75Ω
	Number of inputs per module	: 4
	Maximum bit-rate per port	: Up to 213.7Mbit/s (burst)
DVB-S/S2 Input	Key reference specifications	: EN 300 421, EN 302 307
	Connector	: F female, 75Ω
	Number of inputs per module	: 4
	Decoding	: LDPC and BCH
	DVB-S Constellation	: QPSK
	DVB-S2 Constellation	: QPSK, 8-PSK
	DVB-S2 Constellation (Enhanced version)	: QPSK, 8-PSK, 16-APSK
	Symbol rate DVB-S	: 1–45 MSym/s
	Symbol rate DVB-S2	: 5–30 MSym/s
	Symbol rate DVB-S2 (Enhanced version)	: 1–45 MSym/s
	FEC DVB-S	: 1/2, 2/3, 3/4, 5/6, 7/8
	FEC DVB-S2 QPSK	: 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
	FEC DVB-S2 8PSK	: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10
	FEC DVB-S2 (Enhanced version)	: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
	DVB-S2 FEC frames	: Normal frames
	DVB-S2 FEC frames (Enhanced version)	: Short and Normal frames
	Input level	: -70 to -25 dBm
	Input level (Enhanced version)	: -70 to -20 dBm (16 APSK, 9/10 code rate)
	Frequency range	: 950–2150 MHz
	LNB voltage	: 0/13/18 Volt
	Maximum LNB supply current	: 400 mA
	LNB signaling	: LNB voltage + 22kHz continuous tone
	Multiple streams (Enhanced version)	: Yes, 1 per input port
DVB-T input	Key reference specification	: ETSI EN 300744
	Connector	: F female, 75Ω
	Number of inputs per module	: 4 demodulators (one connector)
	Input level	: -30 to -75 dBm (at 8MHz, 3/4, 64-QAM, gaussian channel)
	Frequency range	: 47 – 862 MHz
	Channel bandwidth	: 7 and 8 MHz
	Guard interval	: 1/4, 1/8, 1/16, 1/32
	Carrier mode	: 2k, 8k
	Hierarchy stream	: High and low priority
	Hierarchy mode	: All
	Carrier modulation	: QPSK, 16QAM, 64QAM
	FEC code rate	: 1/2, 2/3, 3/4, 5/6, 7/8
	Spectral inversion	: Automatic
DVB-T/T2 input	Number of DVB-T/T2 inputs per module	: 4
	Input connector	: F-female, 75 Ω
	Input connector configurations	: 1 F connector internally split or

		4 F connectors
	Input frequency range	: 47–862 MHz
	Input level range	: - 80 to -10 dBm (at T2, 8MHz, 256 QAM, 3/5, gaussian channel)
	Minimum return loss	: 10 dB
	DVB-T	
	Key reference specification	: ETSI EN 300744, Nordig 2.0
	FFT Size	: 2k, 8k
	Guard Intervals	: 1/4, 1/8, 1/16, 1/32
	FEC code rate	: 1/2, 2/3, 3/4, 5/6, 7/8
	Constellation	: QPSK, 16-QAM, 64-QAM
	Channel bandwidth	: 6, 7, or 8 MHz
	Hierarchy stream	: High and Low priority
	Hierarchy mode	: All
	Spectral inversion	: Automatic
	DVB-T2	
	Key reference specification	: ETSI EN 302755, Nordig 2.1
	FFT Size	: 1k, 2k, 4k, 8k, 8k extended, 16k, 16k extended, 32k, 32k extended
	Guard Interval	: 1/4, 19/128, 1/8, 19/256, 1/16, 1/32, 1/128
	FEC frame	: Normal (64k), Short (16k)
	FEC code rate (PLP)	: 1/2, 3/5, 2/3, 3/4, 4/5, 5/6
	Constellation (PLP)	: QPSK, 16-QAM, 64-QAM, 256-QAM
	Channel bandwidth	: 5, 6, 7 or 8 MHz
	Pilot pattern	: P1–P8
	SISO and MISO transmission	: Yes
	Single and Multiple-PLPs	: Yes
	Spectral inversion	: Automatic
	Rotated constellation	: Automatic
DVB-C Input	Key reference specification	: EN 300 429, ITU-T J83 annex A, and C
	Connector	: F female, 75Ω
	Number of inputs per module	: 4 demodulators (one connector)
	Frequency range	: 47–862 MHz
	Channel bandwidth	: 6, 7 and 8 MHz
	QAM Mode	: 4, 16, 32, 64, 128, 256 QAM
	Symbol rate	: 0.87-7.2 Mbaud
	Spectrum inversion	: Automatic
	Input power level	: - 30 to -65 dBm (at 256 QAM, 6.9 Ms/s)

ENCODING/TRANSCODING SPECIFICATIONS

Encoder – SDI/HDSDI input	HW options	: Two HW options. - Dual HD/SD Encoder with separate AES/EBU input - Quad SD upgradable to Dual HD
	Input Port options	: 4 BNC 75 Ω configured as: - 2 SDI /HDSDI and 2 AES/EBU inputs, one per channel - 4 SDI or 2 HDSDI, one per channel
	Input Format	: SMPTE 292M (HD SDI), SMPTE 259M (SD SDI)
	Video Input	
	HD Resolutions	: 1080i - 30Hz, 29.97Hz or 25Hz : 720p – 60Hz, 59.94Hz or 50Hz
	SD Resolutions	: 480i – 30Hz, 29.97Hz : 576i – 25Hz
	Video Pre-processing	
	De-blocking Filter	: Adjustable
	Motion Compensated Temporal Filter (MCTF)	: Adjustable
	Horizontal Rescaling	: From 1920 to 1440, 1280 or 960 : From 1280 to 960 or 640 : From 720 to 704, 640, 544, 528, 480 or 352
	Inverse Telecine Detection	: Enable/Disable
	WSS Blanking	: Removal of line 23 WSS from active video

Logo Insertion

File Format	: PNG (8-bit RGBA) file per encoded channel
Position	: User defined (pixel resolution)
Maximum Size	: 192 × 128 (SD)
	: 360 × 180 (720p)
	: 480 × 270 (1080i)

Video Encoder

Number of channels per module	: Up to 2 HD or 4 SD channels
MPEG-2 profiles	: up to HP@HL (HD)
	: up to HP@ML (SD)
H.264/AVC profiles	: up to HP@L4.1 (HD)
	: up to HP@L3.0 (SD)
Rate Control Modes	: Constant Bit Rate (CBR)
	: Capped VBR (CVBR) with QP target
	: Statistical Multiplexing
CBR Rate Range	: From 250kbps to limit by profile/level (max 38Mbps)
GOP control	: Fixed or Dynamic with Scene Change Detection and adaptive GOP structure
Encoder Clock	: Locked to SDI/HDSDI input
Picture-In-Picture	: 416×240, 352×288, 352×240, 192×192, 128×128, 128×96 or 96×96
Aspect Ratio Control	: Manual, WSS or Video Index

Ancillary Data and VBI

VANC processing	: Closed Captioning (EIA 708)
	: AFD (SMPTE 2016)
	: Teletext (Extracted from VBI, OP47 or SMPTE-2031)
	: VPS (Extracted from SMPTE-2031)
	: WSS (Extracted from VBI, OP47 or SMPTE-2031)
	: DPI (SCTE 104 VANC extraction and SCTE 35 Private Data generation)

Audio Input

Embedded Audio	: According to SMPTE 272M (SD), SMPTE 299M (HD)
AES 3	: 75 Ω BNC (Dual HD version only)

Audio Encoder

CODECs	: MPEG-1 Layer 2
	: AAC-LC
	: HE-AAC v1
	: HE-AAC v2
	: Dolby® Digital pass-through
AAC Data Encapsulation	: ADTS or LATM selectable per encoded channel
Channel Modes	: Stereo/Dual Mono/Mono
Stereo pairs per video	: 2 pairs for Dual HD/SD version from any codec above
	: 1 pair for Quad SD version
	: Additional 4 AAC-LC or 12 MPEG1 Layer 2 per module shared between video ch (capacity reduced to half in statmux mode)
Injection of Private Data into service	: Teletext and DVB Subtitling PIDs can be mapped from TS input to output service.

ENCODER – CVCBS input

Number of channels	: 4 SD or 2 SD+PIP
Input Port	: 4 Mini BNC 75 Ω, one per channel
	25 Pin Compact D-sub for audio:
	- 4 balanced analogue audio inputs
	- 2 AES/EBU inputs
Video Input	: PAL B/G/I/D/K
	: SECAM D/K
	: PAL Nc
	: PAL M
	: NTSC M

Video Encoder

	Number of channels per module	: 4 SD or 2 SD w/PiP (2SD mode gives improved VQ)
	MPEG-2 profiles	: up to HP@ML
	MPEG-4 AVC profiles	: up to HP@L3.0
	Rate Control Modes	: Constant Bit Rate (CBR)
		: Capped VBR (CVBR) with QP target
	Rate Range	: From 250kbps to limit by profile/level (max 38Mbps)
	GOP control	: Fixed or Dynamic with Scene Change Detection and adaptive GOP structure
	Aspect Ratio Control	: Manual, WSS or Video Index
	Picture-In-Picture	: 416×240, 352×288, 352×240, 192×192, 128×128, 128×96 or 96×96
	Video Pre-processing	
	Inverse Telecine Detection	: Yes
	De-blocking Filter	: Adjustable
	Motion Compensated Temporal Filter (MCTF)	: Adjustable
	Horizontal Rescaling	: From 720 to 704, 640, 544, 528, 480 or 352
	WSS Blanking	: Removal of line 23 WSS from active video
	Logo Insertion	
	File Format	: PNG (8-bit RGBA) file per encoded channel
	Position	: User defined (pixel resolution)
	Maximum Size	: 192 × 128 (SD)
	Ancillary Data and VBI	
	VBI Extraction and processing	: Closed Captioning (EIA 708)
		: Teletext, WSS, VPS
	Audio Encoder	
	Audio CODECs	: MPEG-1 Layer 2
		: AAC-LC
		: HE-AAC v1
		: HE-AAC v2
		: Dolby® Digital pass-through (from AES input)
	AAC Data Encapsulation	: ADTS or LATM selectable per encoded channel
	Channel Modes	: Stereo/Dual Mono/Mono
	Encoded stereo pairs per video	: 2 pairs for 2SD+PIP configuration and 1 pair for 4 × SD configuration
Transcoder	Number of channels	: Up to 2 HD or 4 SD channels
	Video Decoder	
	MPEG-2 profiles	: Ranging from MP@ML (SD) to MP@HL (HD)
	H.264/AVC profiles	: Ranging from MP@L3.0, HP@L3.0 (SD) to MP@L4.0, HP@L4.0 (HD)
	Audio Decoder	
	Input format	: MPEG-1 Layer 2
		: AAC-LC
		: HE-AAC v1/2
	Video Pre-processing	
	Inverse Telecine Detection	: Yes
	De-blocking Filter	: Adjustable
	Motion Compensated Temporal Filter (MCTF)	: Adjustable
	Horizontal Rescaling	: From 1920 to 1440, 1280 or 960
		: From 1280 to 960 or 640
		: From 720 to 704, 640, 544, 528, 480 or 35
	Rescaling	: Downconversion HD to SD (requires SD license)
	Video Encoder	
	MPEG-2 profiles	: MP@HL (HD)
		: MP@ML (SD)
	H.264/AVC profiles	: MP@L4.1, HP@L4.1 (HD)
		: MP@L3.0, HP@L3.0 (SD)
	Rate Control Modes	: Constant Bit Rate (CBR)
		: Capped VBR (CVBR) with QP target
		: Statistical Multiplexing

	CBR Rate Range	: From 250kbps to limit by profile/level (max 19Mbps)
	GOP structure	: Automatic or Manual
	Clock Modes	: Locked to input
	Picture-In-Picture	: 416×240, 352×288, 352×240, 192×192, 128×128, 128×96 or 96×96
	Audio Encoder	
	MPEG-1 Layer 2	: Up to 8 stereo pairs per module (4 in statmux mode)
	ACC-LC	: Up to 4 stereo pairs per module (2 in statmux mode)
	AAC Data Encapsulation	: ADTS or LATM selectable per encoded channel
	Channel Modes	: Stereo/Dual Mono/Mono
	Pass-through	: MPEG1 Layer II
		: AAC-LC
		: HE-AACv1/2
		: Dolby® Digital (AC-3)
		: Dolby® Digital Plus (E-AC-3)
	Private Data	: Synchronization (Teletext, DVB Subtitling etc) is maintained through transcoder.
MS Transcoder	Number of input channels	: Up to 4 HD channels*
	Video Decoder	
	MPEG-2 profiles	: Ranging from MP@ML (SD) to MP@HL (HD)
	MPEG-4 AVC profiles	: up to HP@L4.2 (1080p60)
		up to MP@L4.2 (1080p60)
		up to BP@L4.1 (1080i60)
	Audio Decoder	
	Input format	: MPEG-1 Layer 2. Modes: 1.0 (mono), 2.0 (stereo)
		: AAC-LC. Modes: 2.0, 5.1 (downmixed to 2.0)
		: HE-AAC v1/2. Modes: 2.0, 5.1 (downmixed to 2.0)
		: Dolby® Digital (AC-3) : Modes: 2.0, 5.1 (downmixed to 2.0)**
		: Dolby® Digital Plus (E-AC-3): Modes: 2.0, 5.1, 7.1 (downmixed to 2.0)**
	Pass-through	: MPEG1 Layer II
		: AAC-LC
		: HE-AACv1/2
		: Dolby® Digital (AC-3)
		: Dolby® Digital Plus (E-AC-3)
	Video Encode	
	MPEG-4 AVC Profiles	: up to HP@4.0
		: up to MP@4.0
		: up to BP@4.0
	Resolutions @ 59.94 fps or 50.00 fps	: 720p › 1280, 960, 854
	Resolutions @ 29.97 fps or 25.00 fps	: 1080p › 1920, 1440, 1280, 960, 720, 640
		720p › 1280, 960, 854
		640p › 960
		576p › 1024, 768, 720, 352***
		540p › 960
		480p › 854, 720, 640, 352
		432p › 768
		360p › 640, 480
		320p › 480
		288p › 512
		270p › 480, 360
		256p › 144
		240p › 320
		216p › 384
		180p › 320, 240
	Resolutions @ 14.99 fps or 12.50 fps	: 640p › 960
		576p › 1024, 768, 720, 352
		480p › 854, 720, 640, 352
		432p › 768

* Full HD (1080p) input restricts input density to 2 channels.
** Dolby® Digital and Dolby® Digital Plus decoding support pending approval.
*** 352 only available for 25 fps

360p › 640, 480
320p › 480
288p › 512
270p › 480, 360
256p › 144
240p › 320
216p › 384
180p › 320, 240

Frame rate conversion	: From 60/59.94 reduced to ½, ¼ or 24 fps
	: From 50 reduced to ½ or ¼
	: From 30/29.97 reduced to ½ or ⅓
	: From 24/23.98 reduced to ½
Number of profiles	: Ranging from 4 × HD to 28 × sub SD per module, depending on complexity of profiles
Key Frame Alignment	: Frame accurate key frame alignment across all profiles. Fixed IDR to IDR distance.
GOP control	: Dynamic GOP structure with Scene Change Detection.

Audio Encoder

Capacity	: Up to 8 per module
Output format	
	: AAC-LC. Modes: 2.0, Bit rates: 32–384kbps
	: HE-AAC v1. Modes: 2.0, Bit rates: 32–192kbps
	: HE-AAC v2. Modes: 2.0, Bit rates: 32–96kbps
Sample rates	: 32, 44.1, 48kHz

Reformatting/Rescaling

De-interlacing	: Interlaced to progressive conversion
Format conversion	: From HD to sub SD

Aspect Ratio Control

Aspect Ratio Modes	: Transparent Input to Output, Manual 4:3 or 16:9
AFD Modes	: Generated based on incoming AFD and format conversion.

VBI

Pass-through	: Components such as EBU Teletext and DVB Subtitling can be passed through. Synchronization to video will be maintained.
Closed Captioning	: EIA-608n and EIA-708 passed through.

Graphics

Subtitling Insertion (burn-in)	: DVB Subtitling

PROCESSING MODULES SPECIFICATIONS

Audio leveling	Number of audio tracks	: 250 stereo
	Pass-Through	: All components signaled in service
	Audio format	: MPEG-1 layer 2
	Adjustable range	: ±30 dB
	Step	: 2 dB
	Adjustment mode	: Static Integrated with 3rd party SW solutions for automatic adjustment
Bulk Descrambling	Interface	: SW based smart card
	CA system support	: Please contact Appear TV
	BISS support	: Mode 1
	Maximum data rate	: Up to 850 MBit/s
	Number of services per module	: 250
	Scrambling algorithms	: DVB-CA and AES
DVB Descrambling	Interface	: DVB Common Interface
	CA system support*	: BetaCrypt, Conax, Cryptoworks, Irdeto, Mediaguard, Viaccess, NDS Viasat, Nagra
	Number of services per CAM	: 10 (requires multi service CAM)
Scrambling	Scrambling algorithm	: DVB-CA and AES
	Maximum data rate	: Up to 850 MBit/s
	Number of services per scrambler card	: 250 (depending on SW license)
	Video format	: Transport stream, MPEG-2 SD/HD and MPEG-4 SD/HD
	Interface towards CA System	: Simulcrypt interface
	Number of CA systems	: 4 CA systems simultaneously
	EMM	: Yes
	Entropy reduction	: Yes for DVB No for AES
EPG (ETSI EN 300 458 V1.9.1)	Ingest	: EIT table from any port
	Output	: Re-generated EIT table

* Appear TV aims to integrate with all major CA providers. Please contact Appear TV for an updated list over integrated CA systems.

COMMON OUTPUT SPECIFICATIONS

All Output Modules	Key reference specification	: ETSI TR 101 211 V1.9.1, ISO IEC 13818-1
	Multiplexing	
	Video format	: Transport stream, MPEG-2 SD/HD and MPEG-4 SD/HD
	PCR regeneration	: Yes
	PSI/SI	
	Function	: PSI/SI regeneration based on input and operations performed on the signal
	of scrambled services	: Yes, on TS level. For SPTS output only
	PSI/SI handling	: Automatically regenerated
	Tables Supported:	
	PSI	: PAT, PMT, CAT
	SI	: SDT, NIT, EITpf ,TOT, TDT, BAT, AIT
	PSIP	
	Function	: PSIP input analysis
	Tables Supported:	
	PSI	: PAT, PMT, CAT
	PSIP	: MGT, TVCT,CVCT

OUTPUT MODULE SPECIFICATIONS

IP Output	Interface	: 10/100/1000 Base-T Ethernet output and SFP interface : Optical SFP (class 1 laser product)
	Maximum data rate	: Up to 850 MBit/s *
	Maximum number of services	: 250
	Data format	: UDP Multicast/Unicast, RTP
	Output mode	: CBR and VBR on SPTS
	Forward Error Correction	: SMPTE 2022-1 250 output streams per data port (licensed)
Dual IP IO	**IP Input/Output**	
	Interface	: 2×10/100/1000 Base-T Ethernet and SFP
	Operational mode	: The module can be configured to; - 1 input and 1 output - Seamless (Hitless) IP in - Cloned IP out - Dual IP in - Dual IP out
	Maximum data rate per port	: Up to 850 Mbit/s per port in Seamless (Hitless) in, cloned out or 1×IPIN+1×IPOUT : Up to 850 Mbit/s sum of both ports in Dual IP in or Dual IP out mode
	Maximum number of services per port	: 250
	Data format	: UDP/RTP Multicast/Unicast
	Transport stream	: SPTS and MPTS
	Service filtering	: Yes
	Video format	: Transport stream, MPEG-2/4 (H264) SD/HD
	IP Input	
	IP de-jittering	: Yes, based on PCR or CBR
	Forward Error Correction	: SMPTE 2022-1 250 input streams per data port (licensed)
	IP Output	
	Multiplexing	: Yes (licensed)
	Forward Error Correction	: SMPTE 2022-1 250 output streams per data port (licensed)
ASI Output	Key reference specification	: EN50083-9
	Connectors	: 4 BNC female, 75Ω
	Number of outputs per module	: 4 different Transport Streams
	Maximum bit-rate per port	: burst mode: 213.7Mbit/s spread mode: 72Mbit/s

	Transport stream output	: SPTS and MPTS
	Number of services per card	: 250 (sum of all 4 ports)
	Output format	: Constant bit-rate
QAM Output	Key reference specifications	: EN 300 429, ITU J.83.ABC
	Interface	: 2 × F connector female, 75 Ω
	Number of carriers	: 3 and 4 per group (adjacent channels)
	Number of QAM frequencies per module	: up to 16 carriers in 4 groups, 8 per port
	Modulation	: 32 / 64 / 128 / 256 - QAM
	Symbol rate	: 4.48 to 7.00 Mbaud (Annex A and C)
	Frequency range	: 47–862 MHz
	Spectrum inversion	: user selectable
	Test mode	: CW
	Channel spacing	: 5, 6, 7, 8 MHz (12 MHz available for 3 carrier groups)
	Frequency step size	: 1 Hz
	Frequency stability	: 2 ppm
	Output level	: -12 to +2.2dBm per carrier
	Output level stability	: ± 0.5 dB
	Output level adjustment step size (GUI)	: 0.1 dB
	MER	: > 42 dB
	Return loss	: >16 dB
	Spurious	: typ < -60 dBc
DVB-S/S2 Modulator, IF	Key reference specification	: EN 300 421 , EN 302 307
	Number of DVB-S/S2 outputs per module	: 2
	Monitoring ports	: 1 per output (30 dB attenuated)
	Output connector	: F-type female, 75 Ω (RF Out and Test out)
	Output frequency (center)	: 70–200 MHz
	Output level	: -15 to 0 dBm
	Output level stability	: ± 0.5 dB
	Frequency stability	: 2 ppm
	Return loss	: >16 dB
	Spurious	: typ < -60 dBc
	In-band flatness	: typ < ± 0.1 dB
	Spectrum inversion	: user selectable
	Precorrection	: Static. Linear and non-linear
	DVB-S Coding and Modulation	
	Constellation	: QPSK
	Modulation mode	: Constant
	FEC outer	: RS (188, 204)
	FEC inner	: Viterbi
	Code rates	: 1/2, 2/3, 3/4, 5/6, 7/8
	Symbol rate	: 0.5–45 Mbaud
	DVB-S2 Coding and Modulation	
	Constellation	: QPSK, 8-PSK, 16-APSK, 32-APSK
	Modulation mode	: CCM
	FEC	: BCH/LDPC
	Code rates	: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
	Frame length	: 16200 bits (short), 64800 bits (long)
	Symbol rate	: 0.5–45 Mbaud
	Roll off	: 0.20, 0.25, and 0.35
DVB-S/S2 Modulator, L Band	Key reference specification	: EN 300 421 , EN 302 307
	Number of DVB-S/S2 outputs per module	: 2
	Monitoring ports	: 1 per output (30 dB attenuated)
	Output connector	: SMA female, 50Ω (RF out)
		: F-type female, 75Ω (Test out)
	Output frequency	: 950–2150 MHz
	Output level	: -20 to 5 dBm
	Output level stability	: ± 0.5 dB
	Frequency accuracy	: 2 ppm
	Return loss	: >14 dB
	Spectrum inversion	: user selectable
	Spurious	: < -65 dBc/4kHz (@ symbol rate ≥ 256 kb/s)
	In-band flatness	: typ < ± 0.1 dB

	Precorrection	: Static. Linear and non-linear
	DVB-S Coding and Modulation	
	Constellation	: QPSK
	Modulation mode	: Constant
	FEC outer	: RS (188, 204)
	FEC inner	: Viterbi
	Code rates	: 1/2, 2/3, 3/4, 5/6, 7/8
	Symbol rate	: 0.5–45 Mbaud
	DVB-S2 Coding and Modulation	
	Constellation	: QPSK, 8-PSK, 16-APSK, 32-APSK
	Modulation mode	: CCM
	FEC	: BCH/LDPC
	Code rates	: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
	Frame length	: 16200 bits (short), 64800 bits (long)
	Symbol rate	: 0.5–45 Mbaud
	Roll off	: 0.20, 0.25, and 0.35
DVB-T Cable Modulator	Key reference specification	: ETSI EN 300744
	Number of carriers	: 4 independent carriers
	Number of output ports	: 2 (2 carriers per port)
	Output connector	: F-type
	Impedance	: 75 Ω
	Output frequency	: 47–862 MHz
	Frequency setting step size	: 1 Hz
	Output level	: -12 to 2.2 dBm
	Output level stability	: ± 0.5 dB
	Frequency accuracy	: 2 ppm
	Return loss	: >16 dB
	MER	: > 42 dB
	Test mode	: CW
	DVB-T Coding and Modulation	
	FFT size	: 2k, 8k
	Guard intervals	: 1/4, 1/8, 1/16, 1/32
	Code rates	: 1/2, 2/3, 3/4, 5/6, 7/8
	Constellation	: QPSK, 16-QAM, 64-QAM
	Channel bandwidth	: 5, 6, 7, 8 MHz
DVB-T2 Cable Modulator	Key reference specification	: ETSI EN 302755
	Number of carriers	: 2 independent carriers
	Number of output ports	: 2 (1 carrier per port)
	Output connector	: F-type
	Impedance	: 75 Ω
	Output frequency	: 47-862 MHz
	Frequency setting step size	: 1 Hz
	Output level	: -12 to 2.2 dBm (TBD)
	Output level stability	: ± 0.5 dB
	Frequency accuracy	: 2 ppm
	Return loss	: >16 dB
	MER	: > 42 dB
	Test mode	: CW
	DVB-T2 Coding and Modulation	
	FFT size	: 1k, 2k, 4k, 8k, 8k extended, 16k, 16k extended, 32k, 32k extended
	Guard intervals	: 1/4, 19/128, 1/8, 19/256, 1/16, 1/32, 1/128
	FEC frame	: Normal (64k), Short (16k)
	FEC code rate	: 1/2, 3/5, 2/3, 3/4, 4/5, 5/6
	Constellation (PLP)	: QPSK, 16-QAM, 64-QAM, 256-QAM
	Channel bandwidth	: 1.7, 5, 6, 7, 8, or 10 MHz
	Pilot pattern	: P1–P8
	Number of PLPs	: 1

DVB-T/T2 Modulator (Exciter)	Key reference specification	: ETSI EN 302755 , ETSI EN 300744
	Number of carriers	: 2 independent carriers
	Number of output ports	: 2 (1 carrier per port)
	Output connector	: BNC
	Impedance	: 50 Ω
	Output frequency	: 47-862 MHz
	Frequency setting step size	: 1 Hz
	Output level	: -15 to 0 dBm
	Output level stability	: ± 0.5 dB
	Frequency accuracy	: 2 ppm
	Return loss	: >16 dB
	MER	: > 42 dB
	Test mode	: CW
	DVB-T Coding and Modulation	
	Input	: TS with MIP (SFN) or remultiplexed TS
	FFT size	: 2k, 8k
	Guard intervals	: 1/4, 1/8, 1/16, 1/32
	Code rates	: 1/2, 2/3, 3/4, 5/6, 7/8
	Constellation	: QPSK, 16-QAM, 64-QAM
	Channel bandwidth	: 5, 6, 7, 8 MHz
	DVB-T2 Coding and Modulation	
	Input	: T2MI (SFN) or remultiplexed TS
	SFN	: Relative timestamps within 1000 ms
	T2 versions	: 1.1.1 and 1.2.1
	FFT size	: 1k, 2k, 4k, 8k, 8k extended, 16k, 16k extended, 32k, 32k extended
	Guard intervals	: 1/4, 19/128, 1/8, 19/256, 1/16, 1/32, 1/128
	FEC frame	: Normal (64k), Short (16k)
	FEC code rate	: 1/2, 3/5, 2/3, 3/4, 4/5, 5/6
	Constellation (PLP)	: QPSK, 16-QAM, 64-QAM, 256-QAM
	Channel bandwidth	: 1.7, 5, 6, 7, 8, or 10 MHz
	Pilot pattern	: P1–P8
	Number of PLPs	: up to 128
DVB-T/T2 Gateway ASI*	Connectors	: 4 x BNC 75Ω
	Number of MPTS's with MIP	: 4
	Number of T2MI streams	: 2
	Maximum ASI bit-rate per port	: Spread Mode: 72Mbit/s Burst Mode: 213Mbit/s
	Re-multiplexing	: See common output module specifications
	DVB-T MIP inserter	
	Key specification	: ETSI EN 300 744, ETSI TS 101 191
	Relative timestamps	: <1s
	DVB-T2 T2MI	
	Key reference specifications	: EN50083-9, ETSI EN 302 755, ETSI TS 102 773
	T2 version	: 1.1.1 and 1.2.1
	T2MI signaling	: T2MI is signaled in PSI/SI as a data service
	Clock modes	: Relative Timestamps <1s (SFN) and Null timestamps (MFN)
	PAPR	: TR and ACE (global on/off)
	MISO/SISO	: Yes
	Guard intervals	: 1/4, 19/128, 1/8, 19/256, 1/16, 1/32, 1/128
	FFT sizes	: 1k, 2k, 4k, 8k, 8k extended, 16k, 16k extended, 32k, 32k extended
	Pilot Patterns	: P1 – P8
	L1 Constellations	: QPSK, 16-QAM, 64-QAM, BPSK
	Bandwidth	: 1.7, 5, 6, 7, 8, 10MHz
	DVB-T2 PLP support	
	Number of PLPs	: 240 in total between all T2MI streams
	PLP mode	: HEM, constant bit-rate

	PLP types	: 1 and 2
	TI types	: Within a T2 frame and across multiple T2 frames
	Automatic calculation	: FEC blocks, TI blocks, TI frames and TI type
	FEC frame	: Normal (64k), Short (16k)
	FEC code rate	: 1/2, 3/5, 2/3, 3/4, 4/5, 5/6
	Constellations	: QPSK, 16-QAM, 64-QAM, 256-QAM
	Rotated constellations	: Yes
	ISSY supported	: Yes
DVB-T2 Gateway IP	Connectors	: 2 × 10/100/1000 Base-T Ethernet output or 2× Optical SFP (class 1 laser product)
	Number of MPTS's with MIP	: 4
	Number of T2MI streams	: 4
	Maximum data rate	: Up to 850 MBit/s
	Output mode	: CBR
	Data format	: UDP/RTP Multicast/Unicast
	Support for cloned output	: Yes
	Forward Error Correction	: SMPTE 2022-1 (Licensed)
	Re-multiplexing	: See common output module specifications
	DVB-T MIP inserter	
	Key specification	: ETSI EN 300 744, ETSI TS 101 191
	Relative timestamps	: <1s
	DVB-T2 T2MI	
	Key reference specifications	: EN50083-9, ETSI EN 302 755, ETSI TS 102 773
	T2 version	: 1.1.1 and 1.2.1
	System redundancy	: 1+1 protection on unit with T2MI frame (licensed) Output redundancy based on OSPF (licensed) Network level redundancy (licensed)
	Regionalization	: Yes. Please contact Appear TV for more information
	T2MI signaling	: T2MI is signaled in PSI/SI as a data service
	Clock modes	: Relative Timestamps <1s (SFN) and Null timestamps (MFN)
	PAPR	: TR and ACE (global on/off)
	MISO/SISO	: Yes
	Guard intervals	: 1/4, 19/128, 1/8, 19/256, 1/16, 1/32, 1/128
	FFT sizes	: 1k, 2k, 4k, 8k, 8k extended, 16k,16k extended, 32k, 32k extended
	Pilot Patterns	: P1 – P8
	L1 Constellations	: QPSK, 16-QAM, 64-QAM, BPSK
	Bandwidth	: 1.7, 5, 6, 7, 8, 10MHz
	DVB-T2 PLP support	
	Number of PLPs	: 240 in total between all T2MI streams
	PLP mode	: HEM, constant bit-rate
	PLP types	: 1 and 2
	TI types	: Within a T2 frame and across multiple T2 frames
	Automatic calculation	: FEC blocks, TI blocks, TI frames and TI type
	FEC frame	: Normal (64k), Short (16k)
	FEC code rate	: 1/2, 3/5, 2/3, 3/4, 4/5, 5/6
	Constellations	: QPSK, 16-QAM, 64-QAM, 256-QAM
	Rotated constellations	: Yes
	ISSY supported	: Yes

* DVB-T and DVB-T2 gateway run on different HW versions for ASI out.

DECODER SPECIFICATIONS

MPEG-2/4 Decoder with SDI/HDSDI out

Number of decoded channels	: 2 per module
Connector	: 2 SDI/HDSDI 75Ω BNC per channel
Output format	: SMPTE 292 (HD-SDI), 259M (SD-SDI)
Embedded audio	: SMPTE 272M (SD), 299M (HD)

Video Decoding

MPEG-2 profiles	: MP@HL (HD) MP@ML (SD)
MPEG-4 AVC profiles	: MP@L4, HP@L4 (HD) MP@L3, HP@L3 (SD)
Aspect Ratio Conversion	: Off, Letterbox, Panscan
Frame Synchronization (Genlock)	: Accepts PAL and NTSC black burst, 720p50/59.94/60 and 1080i50/59.94/60 tri-level reference signals. (HW option). If SDI reference signal support is needed, contact your sales representative.

Audio Decoding

Number of stereo pairs per video	: 2
Codecs	: MPEG-1 Layer 1 and 2 (Musicam) MPEG-2 Layer 2, MPEG4 AAC-LC MPEG4 AACplus (HE-AAC, AAC+SBR) v1 and v2 Dolby® Digital and Dolby® Digital Plus decoding, Down-mix from 5.1 to 2.0 (Lo/Ro & Lt/Rt), Compression Modes (Line & RF) (HW option) Conversion from Dolby® Digital Plus to Dolby® Digital at a fixed bitrate of 640 Kbit/s (HW option) Dolby® Digital pass-through

VBI/VANC/DVB sub Processing

DVB subtitling according to	: EN 300 743 v1.3.1
Wide Screen Signaling (WSS)	
Input	: EN 301 775 v1.2.1
Output	: EN 300 294/ SMPTE 2031 (Composite decoder ITU-R BT .653-3 system B only)
World standard teletext (WST/EBU)	
Input	: EN 301 775 v1.2.1
Output	: ITU-R BT .653-3 (System B only), SMPTE 2031
Video Programming System (VPS)	
Input	: EN 301 775 v1.2.1
Output	: EN 300 231, SMPTE 2031
Teletext Subtitling (OSD)	: Supported, OP-47
VITS (Vertical Interval Test Signal)	: ITU-T J.63 Sin(x)/x on line 281(525 lines) or 335 (625 lines)
Digital Program Insertion (DPI)	
Input	: SCTE 35
Output	: SCTE 104
Active Format Description (AFD)	
Input	: ETSI TS 101 154
Output	: SMPTE 2016-3-2009

MPEG-2/4 Decoder with SDI/HDSDI & AES Audio out

Number of decoded channels	: 2 per module
Connector	: 1 SDI/HDSDI 75Ω BNC and 1 AES/EBU 75Ω BNC per channel

Video Decoding

Please refer to "MPEG-2/4 Decoder with SDI/HDSDI out".

Audio Decoding

Please refer to "MPEG-2/4 Decoder with SDI/HDSDI out".

VBI/VANC/DVB Sub Processing

Please refer to "MPEG-2/4 Decoder with SDI/HDSDI out".

MPEG-2/4 Decoder with Composite Output

Number of decoded channels	: 2 per module
Connector for video	: 1 Composite 75Ω BNC per channel, unbalanced
Connector for audio	: 25 PIN min D-sub for audio (male) - 4 balanced audio, 2 per channel, balanced - 2 AES/EBU audio, 1 per channel (ch. 1)

Video Decoding
Please refer to "MPEG-2/4 Decoder with SDI/HDSDI out".

Audio Decoding
Please refer to "MPEG-2/4 Decoder with SDI/HDSDI out".

VBI/VANC/DVB Sub Processing
Please refer to "MPEG-2/4 Decoder with SDI/HDSDI out".

Analogue Video

Video standards	: PAL and NTSC
Conversion	: HD down conversion to SD
Signal to noise ratio	: >70dB Measured Acc. Rec 569
Luminance Non Linearity	: <1%
Sin x/x Gain	: ±0.3dB
Sin x/x Group Delay	: ±10ns
Bar Amplitude	: 700 mV ±1% (PAL), 100 ±1 IRE (NTSC)
Sync Amplitude	: 300 mV ±1% (PAL), 40 ±0.4 IRE (NTSC)
Burst Amplitude	: 300 mV ±3% (PAL), 40 ±1 IRE (NTSC)
Analogue Audio	
Linearity	: ±0.5dB (20-20kHz)
'THD+N	: typ 70dB (at 9dBu)

Quad Decoder with RF*

Number of channels	: 4 (max 2 HD) or 8 (max 4 HD) per module set.
Connector for RF mod video	: 2 F connector 75Ω with 2 or 4 channels per connector.

Video Decoding
Please refer to "MPEG-2/4 Decoder with SDI/HDSDI out".

Audio Decoding
Number stereo pairs per video : 1
Please refer to "MPEG-2/4 Decoder with SDI/HDSDI out" (except pass-through).
Dolby® Digital and Dolby® Digital Plus decoding support pending approval.

VBI/VANC/DVB Sub Processing
Please refer to "MPEG-2/4 Decoder with SDI/HDSDI out".

VHF/UHF Output

Analogue modulation	: PAL› B/G, D/K, I (5 MHz video BW) SECAM › B/G, D/K (5 MHz video BW) NTSC › M
RF output frequency range	: 47–862MHz
RF tuning step size	: 500 Hz
Channel setting flexibility	: 4 channel version fully agile. 8 channel version semi agile, two adjacent channels with 8, 16 or 24 MHz spacing
Output level (per carrier)	: 105-112 dBuV /ch (115 dBuV/ch for 4 ch version)
Output level adjustment step size (GUI)	: 0.2 dB
Return loss	: >16dB
Video carrier frequency stability	: ±3 ppm
Intermodulation distance, (4/8 Channel TV Modulator only)	: > 60 dB, Measured: @ 115 dBV per channel, 2 channels per port @ 112 dBV per channel, 4 channels per port
Carrier to noise, in-band	: > 66 dB @110 dBuV/ch
Carrier to noise, adjacent channel	: > 66 dB @110 dBuV/ch
Carrier to noise (40 channels combined)	: Typ. 61 dB @110 dBuV/ch
Carrier to spurious, full band (40 - 862 MHz)	: > 60 dB

Video (demodulated video)**

Differential gain	: <2 %
Differential phase	: <2°
Group delay variations	: <50 ns
Luminance non-linearity	: <1 %
2T K factor	: <1 %
Signal to noise ratio	: >60dB

Audio – Mono

Audio carrier output level (relative to video carrier)	: -13dB (default)
Audio carrier output level range	: -10 to - 20 dB, 0.5 dB steps

* All measurements are carried out in room temperature at 20°C
** Using R&S ETL as demodulator

	Audio inter carrier frequency stability	: < 1ppm
	Modulation	: FM
	Audio – NICAM Stereo	
	NICAM modulation	: According to ETSI EN 300 163 v1.2.1, Fully synchronous operation, Digital J17 pre-emphasis
	NICAM carrier level relative to vision carrier	: 20dB
	NICAM carrier output level range	: +3/-6 dB, 0.5 dB step
	Frequency accuracy (relative to video)	: ± 1 Hz
	Audio output modes	: Stereo/Dual Mono/Mono
	Output precision	: 10 bits
	Audio – A2 Stereo	
	Two sound-carrier FM system (A2)	: According to ITU-R BS.707, Annex 1
	Audio carrier levels relative to vision carrier	: f1= -13dB, f2= 20 dB
	Audio carrier output level range	: f1: -10 to -20 dB, f2: -17 to -27 dB, 0.5 dB steps
	Audio output modes	: Stereo/Dual Mono/Mono
	Modulation	: FM
	Audio-bandwidth	: 40 to - 15 000 Hz
	Audio – MTS Stereo	
	Two sound-carrier FM system (A2)	: FCC-OET60 and CEA -TVSB-5
	Audio carrier levels relative to vision carrier	: f1= -13dB
	Audio carrier output level range	: -10 to - 20 dB, 0.5 dB steps
	Audio output modes	: Stereo
Dual MPEG-2/4 Decoder with High Performance RF Modulation and	Number of channels	: 2 per module
	Connector for RF mod video	: 1 F connector 75Ω with both channels and 1 F connector test output with both channels.
Stereo Sound*	**Video Decoding**	
	Please refer to "MPEG-2/4 Decoder with SDI/HDSDI out".	
	Audio Decoding	
	Please refer to "MPEG-2/4 Decoder with SDI/HDSDI out" (except pass-through).	
	Dolby® Digital and Dolby® Digital Plus decoding support pending approval.	
	VBI/VANC/DVB Sub Processing	
	Please refer to "MPEG-2/4 Decoder with SDI/HDSDI out".	
	VHF/UHF Output	
	Analogue modulation	: PAL B/G, SECAM D/K
	RF output frequency range	: 47– 862MHz
	RF tuning step size	: 12.5 kHz
	Channel setting flexibility	: Fully agile
	Output level (per carrier)	: 105-115 dBuV /ch
	Output level adjustment step size (GUI)	: 0.2 dB
	Return loss	: >16dB
	Video carrier frequency stability	: ±3 ppm
	Carrier to noise, in-band	: > 66 dB @112 dBuV/ch
	Carrier to noise, adjacent channel	: > 68 dB @112 dBuV/ch
	Carrier to noise (40 channels combined)	: Typ. 65 dB @112dBuV/ch
	Carrier to spurious, full band (40 - 862 MHz)	: > 62 dB
	Video (demodulated video)	
	For "Video (demodulated video)", please refer to "Quad Decoder with RF"	
	Audio – Mono	
	For "Audio – Mono", please refer to "Quad Decoder with RF"	
	Audio – NICAM Stereo	
	For "Audio – NICAM Stereo", please refer to "Quad Decoder with RF"	
	Audio – A2 Stereo	
	For "Audio – A2 Stereo", please refer to "Quad Decoder with RF"	
	Audio – MTS Stereo	
	Not supported	
FM Radio	Number of channels per module	: Up to 8
	Output connector	: F-type female, 75Ω
	Decoding formats supported	: MPEG-1 layers 1 and 2 (Musicam)

	FM Output	
	Modulation	: FM
	RF output frequency range	: 87.5 - 108 MHz
	Output level 8 carriers combined	: 105 - 120 dBV
	Output level adjustment step size (GUI)	: 0.1 dB
	Return loss	: 18 dB
	Channel separation L/R	: > 46dB
	Carrier to spurious	: > 60dB
	RDS insertion	: UECP SPB490 or static
	MPX Output	
	MPX Output MPX Test output level	: 0 dBu
	MPX Test output load impedance	: 600Ω
	MPX Test output connector	: 1 BNC, service selectable from GUI

* Quad decoder is a combination of the decoder and TV modulator.

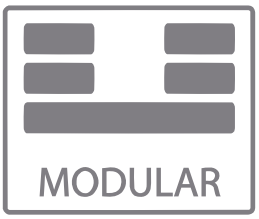
CHASSIS

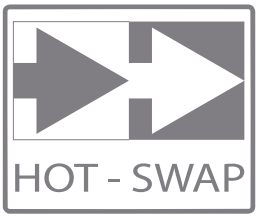
XC5000	Physical dimensions	: 19″× 4RU × 400mm (440 × 177 × 400 mm)
	Power supply	
	Power	: 800 Watt
	Input voltage	: 100-240 V AC, 50/60 Hz
	Redundancy	: Yes, dual hot swappable PS
	Monitoring	: Via WEB GUI and LED indicators on PS
	Cooling	
	Fans	: 4 fans
	Hot swap of fans	: Yes, fans are independently hot swappable
	Airflow direction	: Front to back
XC5100	Physical dimensions	: 19″× 1RU × 400mm (440 × 44 × 480 mm)
	Power supply	
	Power	: 400 Watt
	Input voltage	: 100-240 V AC, 50/60 Hz : optional: -48V DC
	Redundancy	: Yes, dual hot swappable PS
	Monitoring	: Via WEB GUI and LED indicators on PS
	Cooling	
	Fans	: 6 fans
	Hot swap of fans	: Yes, common fan module with all 6 fans
	Airflow direction	: Front to back

ENVIRONMENTAL CONDITIONS

Operational conditions	Temperature	: 0 to +40 °C
	Humidity	: 5–95% (non-condensing)
Storage	Temperature	: -20 to +70 °C
	Humidity	: 5 to 95% (non-condensing)
Electrical safety	IEC 60950-1	
EMC	EN 55022, EN55013, EN50083-2, EN55024, EN61000-3-2, EN61000-3-3, FCC CFR 47 Part 15	
RoHS	Compliant	
WEEE	Compliant	

This product must not be disposed of with other household waste. According to the WEEE-directive, everyone that sells electrical and electronic products shall ensure that the same products are disposed of in an environmentally sound manner. Appear TV is a member of Elretur AS, a Norwegian nationwide take-back company for the collection, recycling and environmentally sound processing of scrapped electrical and electronic equipment. In accordance with local requirements you may return this product to Appear TV AS, Lilleakerveien 2b, 0283 Oslo, Norway, and we will free of charge accept your waste equipment for recycling. You may also choose to return this product to a collection point for the recycling of waste electrical and electronic equipment in your municipality. If this product is purchased outside Norway, you may contact your local reseller to enquire about local collection points for recycling of this product, as applicable





MULTIPLEXING VERSION 010

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