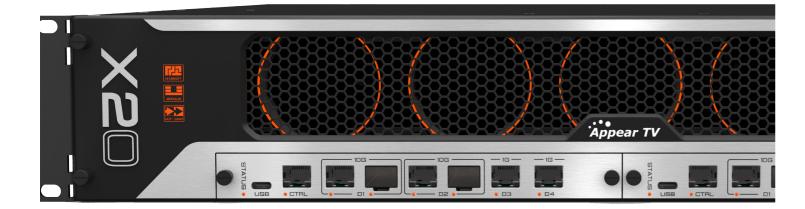


X 1 0 X 2 0





Advanced architecture designed to save space, energy and resources





CHASSIS

The X platform consists of a compact 1RU - X10 as well as a capacious 2RU - X20 option. Both chassis can be used independently, or in conjunction with Appear TV's widely deployed XC5000 and XC5100 chassis. Built around an in-house developed, high capacity bus architecture that connects all modules, the X platform operates with dual hot-swappable power supplies, dual front-mounted control modules and six or twelve rear-mounted option slots. A -48VDC power supply option is available.

Dual control modules can optionally be fitted to either model, and will operate in active / active redundancy mode with redundant backplanes to provide seamless recovery from many critical fault scenarios. All option modules are interchangeable between the X10 and X20.

The Control/Switch module and the Dual IP IO modules provide native 10G uni-directional and bi-directional port connectivity. The Control/Switch module for X20 has two additional 1G uni-directional ports. Seamless input and cloned output modes are supported. High data rate interfaces such as 25G, 40G and even 100G NICs will be added on selected future option modules when required (for example to support handling of uncompressed 4K and 8K services).

All modules are hot-swappable (including power supplies and fans). The new architecture provides freedom from system releases enabling different software versions to be used on modules: This allows new features to be delivered to customers sooner.

Service density can be defined up to 2,000 services in and out per module, while set-up and configuration is streamlined. By enabling the organization of services and multiplexes into several groups with a set of individually defined rules for each group, the operator can quickly apply changes to multiple services or multiplexes. Extensive search capabilities allow the operator to easily locate groups, services, etc.

FEATURES

2RU - X20

- Modular configuration with up to 12 option slot boards
- WEB based configuration, LED indicators on PS and modules
- Forced air-cooling (front to back)
- Dual redundant hot-swappable PS
- Hot-swappable modules
- 100-240 V AC, 50/60 Hz
- -48VDC

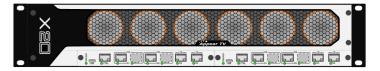
1RU - X10

- Modular configuration with up to 6 option slot boards
- WEB based configuration, LED indicators on PS and modules
- Forced air-cooling (front to back)
- Dual redundant hot-swappable PS
- Hot-swappable modules
- 100-240 V AC, 50/60 Hz

DIMENSIONS

2RU (X20)

 $19'' \times 2RU \times 540 \text{ mm} (440 \times 88 \times 540 \text{ mm}) (w \times h \times d \text{ mm})$

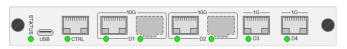


1RU (X10)

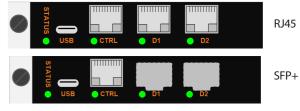
19"×1RU×540 mm (440×44×540 mm) (w×h×d mm)



The X20 and X10 use the same set of modules and same SW, although the Control/Switch module differs between the two.



The X20 Control/Switch module interface



The X10 Control/Switch module interface



HIGHLIGHTS

The X platform has been developed to exploit new opportunities driven by the increasing deployment of ultra-high speed IP networks within all areas of broadcasting. Designed to meet all challenges that a full IP-based infrastructure presents, the platform features:

HIGH SPEED

Multiple bi-directional 10G interfaces with the ability to route up to 140G of traffic internally.

DELAY

Low backplane latency (below 1ms) making overall contribution to delay negligible.

MPEG & NATIVE IP HANDLING

The ability to handle native IP, MPEG-2 TS with MPEG-DASH, MPEG-H MMT coming in future releases. Will also accommodate new standards not currently defined.

IP NETWORK SECURITY

A video centric, cost-effective, easy to deploy, high-capacity firewall feature that can monitor and regenerate traffic as required.

CAPACITY

Most modules support up to 4,000 (2,000 in and 2,000 out) streams / services per module and 10G of traffic.

MONITORING & CONTROL

A management system to control a potentially vast array of linear and on-demand service traffic effectively, as traditional IPTV / OTT worlds merge.

SDI TO IP

A high-density SDI input / output module supporting SMPTE 2022-6 and ASI with optional seamless TS packet switching.

ACCESS CONTROL

A new standard of access control, user management and IP security to secure access to critical network devices. A user account with four different access levels can be defined per user.

REDUNDANCY

Designed to be as reliable and failsafe as possible, even when used stand-alone. The uniquely efficient, built for purpose hardware design is engineered for high reliability and stability. Should an internal failure take place, a range of redundancy options can take effect to keep the chassis fully operational. Dual active - active control/switch module redundancy with internal seamless traffic switching can optionally be deployed within the chassis to make recovery from many critical errors totally seamless.

ENHANCED SECURITY

There are typically multiple locations within a modern broadcasting environment necessitating secure video interfaces between sites, especially when implemented using public networks. The high level of security needed must protect the different sites from outside attacks as well as protect the integrity of video transmission itself. Being a fully operational video firewall, the X platform maintains tight security on its control layer, supporting many advanced features encompassing Authentication, Authorisation and Audit. Security is assured by Appear TV's own FPGA based IP packet forwarding mechanism and proprietary internal network structure.

Video-centric features provided in the X series include:

- Multicast forwarding (IGMP join and forward)
- Inspect and forward MPEG-2TS packets (deep layer 5/6 packet inspection)
- De-multiplex MPEG-2 TS streams
- Encryption and decryption of video data
- Seamless network protection according to SMPTE 2022-7
- Encode and decode SMPTE 2022-1 supplementary FEC

OVERVIEW

- Modular
- Scalable
- Compact with multiple inputs/outputs per module
- · Advanced input analysis and status information

- Easy to configure from one common web GUI interface
- Hot swappable
- Wide range of input modules
- · Mix and match card types freely, and add as many as you need



MODULES

Control/Switch

Spec details per line card: Total capacity

: 80 Gbps full duplex : 10 Gbps routing between modules in a chassis Bitrate Interface : 2× 1/10G Base-T Ethernet or 1G SFP/10G SFP+ (Base-T or SFP must be selected at order) Protocols

: IPv4, IPv6, IGMP v2/v3, ICMP, ARP, 802.1Q (VLAN tag)

X20

Spec details per line card: Total capacity

: 140 Gbps full duplex Bitrate : 10 Gbps routing between modules in a chassis

Interface : 2× 1/10G Base-T Ethernet or SFP+ 2x 1G Base-T Ethernet

: IPv4, IPv6, IGMP v2/v3, ICMP, ARP, 802.1Q (VLAN tag) Protocols



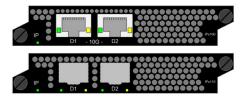


Dual 10G IP IO

Spec details per line card:

: 2× 1/10G Base-T Ethernet or 1G SFP/10G SFP+ (Base-T or SFP must be selected at order) : UDP, RTP, SMPTE 2022-6, SMPTE 2110 Protocols

VSF TR-03, VSF TR-04, AES67



12G SDI/ASI IO

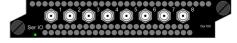
Spec details per line card:

: 8x HD BNC 75 Ohm (brakeout to BNC available) or 3x Video SFP+ (BNC or SFP must be selected at order)

: 12G-SDI (SMPTE ST-2082) – two inputs only Video Format

: 3G-SDI (SMPTE 424M) : HD-SDI (SMPTE 292M) : SD-SDI (SMPTE 259M)

Traffic type : SDI or ASI (configurable) Data flow : Input or output (configurable)



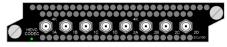
HEVC Codec

Spec details per line card: Video Input Connectors

: 8x HD BNC 75 Ohm (brakeout to BNC available)

: 12G-SDI (SMPTE ST-2082) – two inputs only : 3G-SDI (SMPTE 424M) : HD-SDI (SMPTE 292M) Video Input Format

: SD-SDI (SMPTE 259M)



Scrambler

Entropy reduction

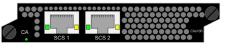
Spec details per line card: Scrambling algorithm

: DVB-CSA v1 (48-bit) : DVB-CSA v2 (64-bit)

: AES (128-bit)

: Yes for DVB-CSA v1 (Reduced to 48-bit)

No for AES





SPECIFICATIONS

X10 Control/Switch module

: 80 Gbps full duplex Total capacity

: 10 Gbps routing between modules in a chassis

: 2× 1/10G Base-T Ethernet or 1G SFP/10G SFP+

(Base-T or SFP must be selected at order)

: Seamless Input (SMPTE 2022-7)

: Configurable up to 400ms

802.1Q (VLAN tag)

X20 Control/Switch module

Total capacity : 140 Gbps full duplex

10 Gbps routing between modules in a chassis

: 2× 1/10G Base-T Ethernet, 1G SFP or SFP+

2x 1G Base-T Ethernet

: Seamless Input (SMPTE 2022-7)

Cloned Output (SMPTE 2022-7)

Seamless buffer size (network path

: IPv4, IPv6, IGMP v2/v3, ICMP, ARP,

: Configurable up to 400ms

802.1Q (VLAN tag)

Control/Switch module (common for X10 and X20)

MPEG TS traffic

: 10/100/1000 Base-T Ethernet

Built-in user interface

: IPv4, IPv6, HTTPS, SSH, ICMP, ARP

and status (TBD)

: UDP, RTP, SMPTE 2022-6, SMPTE 2110 Generic traffic

VSF TR-03, VSF TR-04, AES67

IP input de-jitter

: UDP, RTP

Multicast, Unicast

IP input de-jitter

Forward Error Correction

: Single program (SPTS) and multi program (MPTS)

MPEG TS processing capacity : 6Gbps input and 6Gbps output

Service filtering
Video format
Multiplexing (MPTS output) PCR regeneration

: MPEG PSI PAT, PMT SDT actual

PSI/SI Table Regeneration

Forward Error Correction (SMPTE 2022-1) - Later Release

Number of configured MPEG TS input streams OSFP output redundancy - Later Release

Dual 10G IP IO module

: 2× 1/10G Base-T Ethernet or 1G SFP/10G SFP+

Cloned Output (SMPTE 2022-7)

Seamless Input and Cloned Output (SMPTE

2022-7 Full Duplex)

: Configurable up to 400ms : IPv4, IPv6, IGMP v2/v3, ICMP, ARP,

802.1Q (VLAN tag)

Maximum input data rate per port

Generic traffic : UDP, RTP, SMPTE 2022-6, SMPTE 2110

IP input de-iitter

IP input de-jitter buffer size : Configurable up to 200ms

Maximum number of streams per port : 2000 input and 2000 output streams

MPEG TS traffic

Multicast, Unicast

IP input de-jitter

IP input de-jitter buffer size : Configurable up to 200ms

Maximum number of streams per port : 2000 input and 2000 output streams : SMPTE 2022-1 (licensed) - later release

MPEG TS processing capacity

: MPEG-2, H.264, HEVC (Transport Stream)

Multiplexing (MPTS output)

PCR regeneration

: MPEG PSI PAT, PMT

SDT actual

: Yes, based on input and operations performed

Licensed Features Forward Error Correction (SMPTE 2022-1) - Later Release

> Seamless Input (SMPTE 2022-7) MPEG TS multiplexing (MPTS output) Number of configured MPEG TS input streams

12G SDI/ASI IO module

: 8x HD BNC 75 Ohm (brakeout to BNC available) or

3x Video SFP+ (BNC or SFP must be selected at order)

: 12G-SDI (SMPTE ST-2082) – two inputs only

: 3G-SDI (SMPTE 424M) : HD-SDI (SMPTE 292M) : SD-SDI (SMPTE 259M)

: EN 50083-9 Annex B

: Input or output (configurable)

Key reference specification ASI In/Out

> Maximum input bit-rate per port : Up to 216 Mbit/s burst mode

> > Up to 72 Mbit/s spread mode

: Up to 216 Mbit/s burst mode Maximum output bit-rate per port

Up to 72 Mbit/s spread mode

Number of MPEG services

Input signal protection : Seamless switching between 2 input sources

Cloned ASI out

: Up to 2,000 services in and out per module

: Single program (SPTS) and multi program (MPTS)

Multiplexing (MPTS output)

PCR regeneration

: MPEG PSI PAT, PMT

Key reference specification : SMPTE 259M

Resolution / Frame rates

HD SDI In/Out

: SMPTE 292M

3G SDI In/Out Key reference specification : SMPTE 424M

: 1080p - 50 fps or 59.94 fps

: SMPTE 272M (SD), SMPTE 299M (HD/3G) Audio In/Out Key reference specification

: MPEG PSI -> PAT, PMT **Tables Supported**

DVB SI -> SDT actual

Licensed Features Number of ASI in/out

Number of 3G-SDI, HDSDI, SDI in/out

TICO og JPEG2000

HEVC Codec

8x HD BNC 75 Ohm (brakeout to BNC available)

2xUHD / 1xUHD + 4xFHD/HD/SD / 8x FHD/HD/SD

: 12G-SDI (SMPTE ST-2082) – two inputs only

: 3G-SDI (SMPTE 424M) : HD-SDI (SMPTE 292M) : SD-SDI (SMPTE 259M)

HEVC Profiles and Max Level : Main@Level 5.1 Video Compression

: Main10@Level 5.1 : Main422@Level 5.1

AVC Profiles and Max Level : Main@Level 4.2

> : High@Level 4.2 : High10@Level 4.2 : High422@Level 4.2

MPEG2 Profiles and Levels : MP@HL

: 3840x2160p60/59.94/50/29.94/25 (Quad 3G SDI or

12G SDI) : 1920x1080p60/59.94/50/29.94/25 : 1920x1080i59.94/50 : 1280x720p60/59.94/50/29.94/25 : 720x576i50 : 720x480i59.94

Video PreProcessing Video Encode Delay

Normal Delay Mode:

Horizontal Rescale : From 3840 to 2880 or 2560

: From 1920 to 1440, 1280 or 960 : From 1280 to 960 or 640 : From 720 to 960, 704, or 640 : From 2160 to 1080 or 540 : From 1080 to 540

: HLG / PQ

: ITU R BT.470 (SD), ITU R BT.709 (HD), ITU R BT.2020/ Color Gammut Signalling

SMPTE ST2036-1 (WCG)

: From 576 to 540

Up to 8x 2.0 per Video Input

: AAC-LC : HE-AACv1/v2 : Dolby Digital
: Dolby Digital Plus
: Dolby AC-4 (Density for AC-4 estimated to be up to 4 x
2.0 tracks per video input.)
: Dolby E
: MPEG H (xHE-AAC)

Audio Encode Density Up to 32x 2.0 Encodes per module, freely distributable

Audio Transcode Audio Passthru

Dolby Digital/Dolby Digital Plus/Dolby E/PCM : 7.1 to 5.1 **Audio Conversion**

: 7.1 to 2.0 : 5.1 to 2.0

Ancillary Data and VBI

Vertical Rescale

Scrambler

Licensed Features

Scrambling	Scrambling algorithm	: DVB-CSA v1 (48-bit) DVB-CSA v2 (64-bit) AES (128-bit)
	Entropy reduction	: Yes for DVB-CSA v1 (Reduced to 48-bit) No for AES
	AES mode of operation	: ATIS IIF Default Scrambling Algorithm (IDSA) DVB Common IPTV Software-oriented Scrambling Algorithm (CISSA) AES-ECB1 / AES-ECB2 / AES-CBC1 Irdeto AES-CBC1
	PVR support (trick mode)	: PES header in clear (leave a number of packets in clear after PES header)
	MPEG TS processing capacity	: 6Gbit/s
	Number of services per scrambler card	: 2000
	Video format	: MPEG-2, H.264, HEVC (Transport Stream)
	Interface towards CA System	: Simulcrypt interface
	Number of CA systems Maximum number ECM	: 4 (8 in future release)
	(sum all CA systems)	: 16000
	EMM insertion	: Yes
	EIS support	: Yes
	Tables Supported	: CAT generation

Number of CA systems PES header in clear (PVR trick mode)

Chassis

: 19" × 1RU × 540 mm (440 × 44 × 540 mm) : 19" × 2RU × 540 mm (440 × 88 × 540 mm)

Module slots

Number of switch modules (front) X10 Number of modules (rear) X20 Number of modules (rear) Hot swap support

Power rating X10 Power rating X20 Max Load : 750 W Power supply

: U NOM 100 - 240 VAC /50 - 60 Hz / 12 A

: U NOM 100 - 240 VAC /50 - 60 Hz / 15 A

1500 W @ 200 - 240 VAC / 800 W @ 100 - 200 VAC

: -48 to -60 VDC I max: 36.2 A

Max Load: 1200 W, x2

: Single fan tray with 6 fans : Single fan tray with 5 fans : Front to back : Yes, complete fan tray

X20 chassis
Airflow direction
Hot swap support

Environmental Conditions

Temperature Humidity

:0 to +40 °C :5–95% (non-condensing)

Temperature Humidity

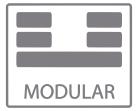
: 5–95% (non-condensing)

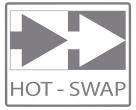
: IEC 60950-1

: EN 55032, EN55024, EN61000-3-2,

: Compliant : Compliant







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