ME-7000
Converged Compression Platform

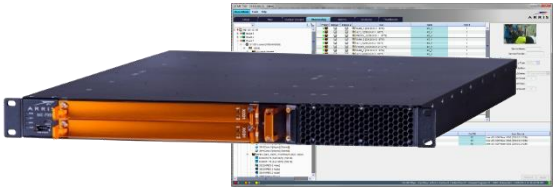
NA Channel Update
January 2018

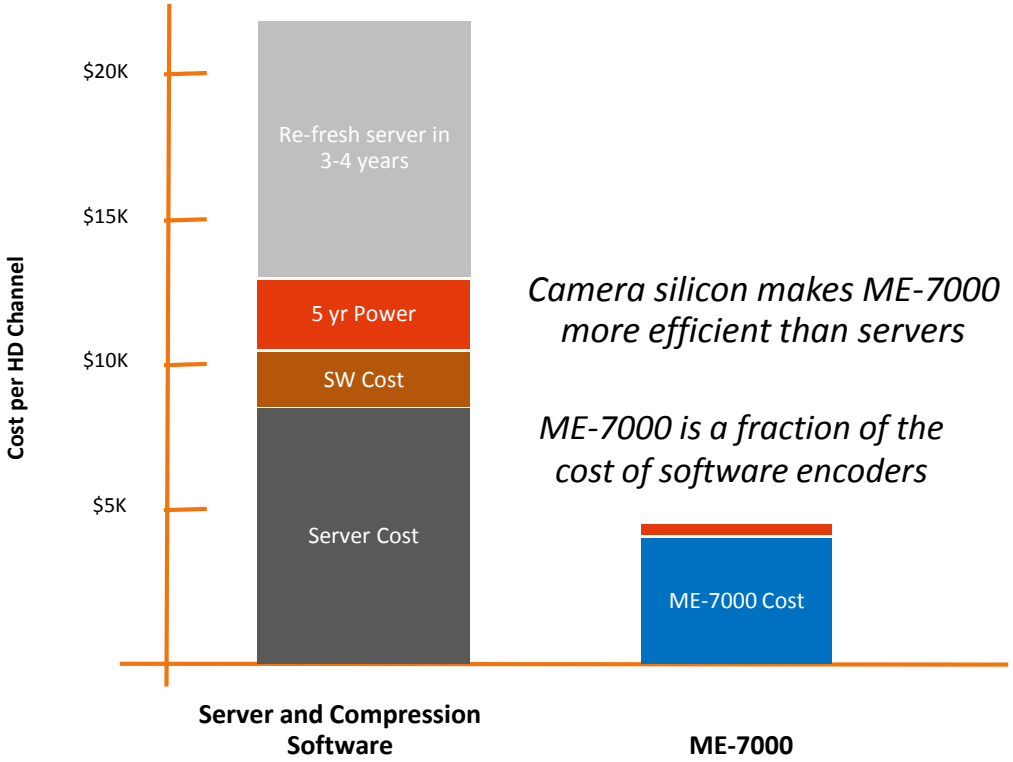
ME-7000 Converged Compression Platform: Optimized for All Live Linear Use Cases

- Best of hardware
  - Best TCO due to much higher density, lower power and longer field life
    - AVC: **70%** reduction in 5 year TCO with **10x** power/density improvement (ABR use case)
    - HEVC: **85%** reduction in 5 year TCO with **30x** power/density improvement (ABR use case)
  - Better VQ using the latest generation camera chips with special broadcast firmware
  - Lower facility costs due to space, power, industrial environment design
  - Green footprint savings of 5,000 to 10,000 metric tons of CO_2 in a typical system

- Best of software
  - Multi-function with simultaneous processing for PayTV and OTT
  - Rapid feature introduction through agile SW development methodology
  - Cloud friendly through easy integration with provisioning and management systems
  - General CPU processing with Intel Xeon and distributed ARM processors

ME-7000 TCO Comparison to COTS+SW





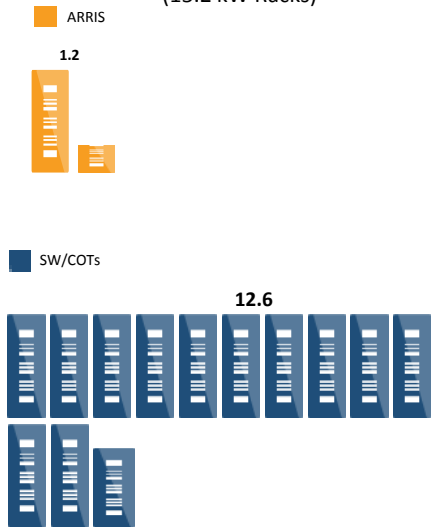
Camera silicon makes ME-7000 more efficient than servers

ME-7000 is a fraction of the cost of software encoders

ME-7000 Space Savings

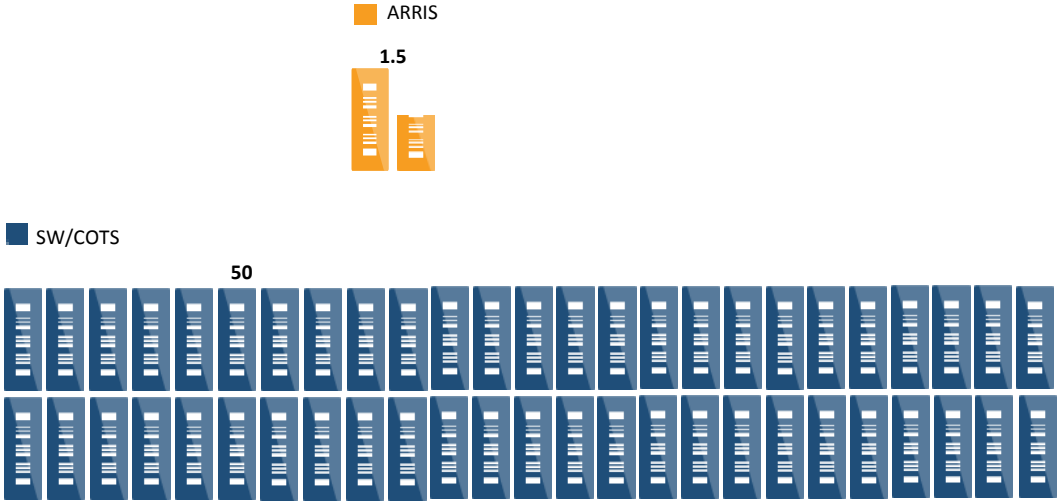
AVC

Racks – ABR 250HD/250SD Channels
(15.2 kW Racks)



HEVC

Racks – ABR 250HD/250 SD Channels
(15.2 kW Racks)



ME-7000 Differentiation

- Optimized Platform vs. Generic Servers
  - 10x (AVC) to 30x (HEVC) density/power advantages result in very large TCO savings
  - Ideal for space/power constrained environments
  - ME-7000 is “Greener”

- Appliance vs. Data Center
  - Appliance is self-contained, easy to maintain, long-life
  - Data Center causes Video Operations vs. IT battles, no single owner
    - IT groups typically don’t understand 24x7 live video

ME-7000 Target Market Segments: Live Linear

STAGE 1

CONTRIBUTION

- Studio-to-studio
- ENG/SNG, stadiums
- High bit rate encoding
- “lossless” compression
- 4:2:2 10-bit encoding

STAGE 2

PRIMARY DISTRIBUTION

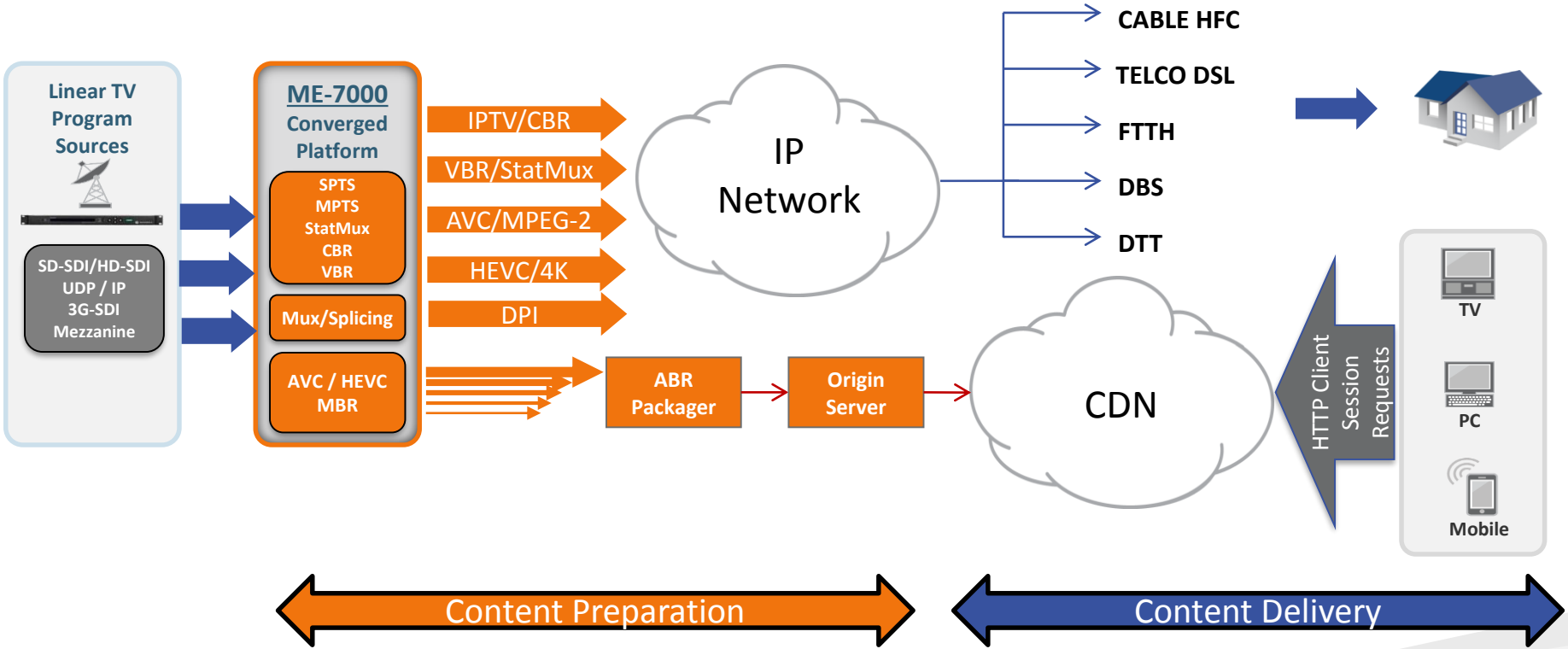
- Broadcaster/Programmer to MVPD
- Higher bit rate encoding
- 4:2:0 8-bit encoding (AVC)
- 4:2:0 10-bit encoding (HEVC)

STAGE 3

SECONDARY DISTRIBUTION

- MVPD to consumer
  - Cable, Telco, DBS, DTT
- Low bit rate encoding
- 4:2:0 8-bit encoding (AVC)
- 4:2:0 10-bit encoding (HEVC)

ME-7000
Network Flexibility – Converged Capability



ME-7000 Modular Compression Platform

Front

Compression Modules

Fan Trays

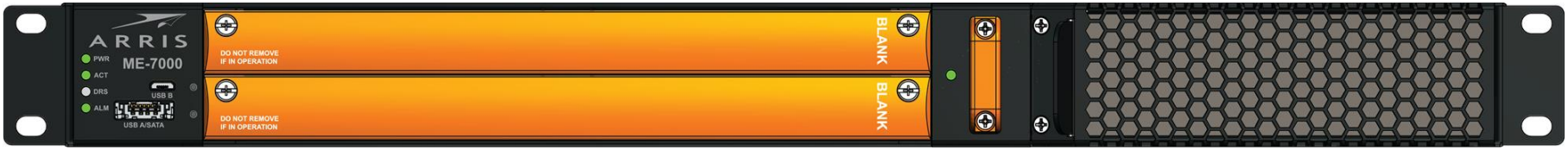
Hot Swappable Power Supplies

Compression Module

Rear

Host I/O Module (Muxing/Splicing)

ME-7000 Multiplexing/Splicing Configuration



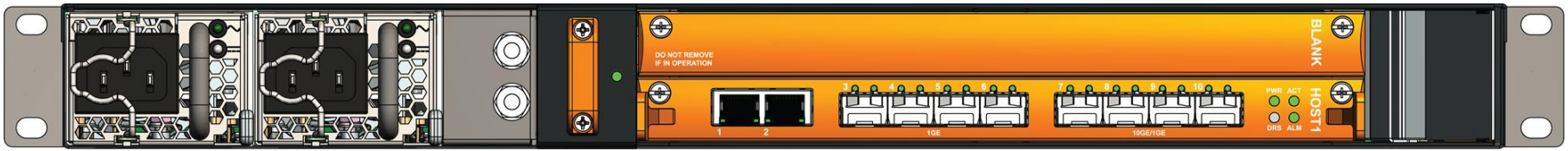
Front

Blank Panels

Fan Trays

Hot Swappable Power Supplies

Blank Panel



Rear

Host I/O Module (Muxing/Splicing)

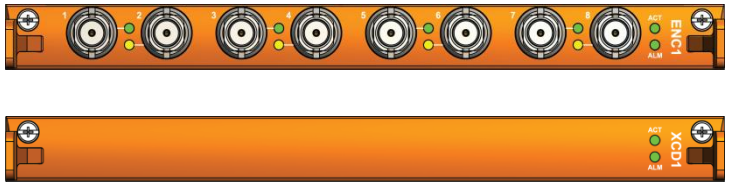
ME-7000 Overview
Live Linear Specifications

- Multi-Channel, Multi-Format Encoder/Transcoder for Distribution
  - MPEG-4 MPEG-2 HEVC UHD/4K
  - AVC/MPEG-2 High VQ multi-pass, Look-Ahead encode/transcode:
    - 24 HD + 24 SD Channels per 1RU (compressed IP inputs)
    - 96 SD Channels per 1RU (compressed IP inputs)
    - 72 HD-to-SD Down conversion Channels per 1RU (w/ compressed IP inputs)
    - 24 HD or 24 SD Channels with optional SDI inputs (uncompressed inputs)
    - Mix any combination of channels & input types within a chassis for flexibility
  - Single bit rate (IPTV), Statmux (MPTS) and multi bit rate (MBR) outputs
  - Full audio encoding/transcoding capabilities - DD+, MPEG1-L2, AC-3, HE-AAC, AAC-LC
  - Muxing/Grooming and Ad Splicing support for MPEG-2/MPEG-4/HEVC

ME-7000
AVC/MPEG-2 Encoder/Transcoder Module

- AVC/MPEG-2 Compression Module
  - Up to 3 modules per chassis (see types and configurations below)
  - Each module can support:
    - 8 HD channels (SDI) or
    - 8 HD + 8 SD channels (compressed) or
    - 32 SD channels (compressed) / 8 SD channels (SDI) or
    - 24 HD-to-SD down conversion channels (compressed) or
    - A combination of SD, HD and HD-to-SD Down conversion
  - Integrated HD-to-SD down conversion is included (No additional license required)
  - Support for multi-format, multi-bitrate with IDR alignment for MBR included

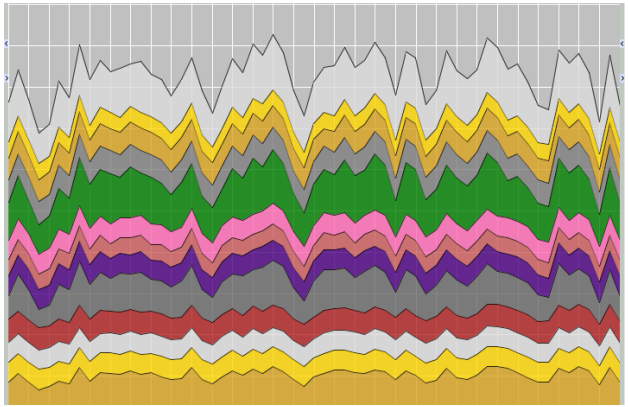
- 2 types of modules
  - (1) With Uncompressed inputs: eight(8) SDI/HD-SDI
    - Rear slot installation typical (front slot(s) also supported)
    - Can also be used with IP inputs
  - (2) Without SDI/HD-SDI inputs – IP input Only
  - Systems configured with 1, 2 or 3 modules



ME-7000
Statistical Multiplexing

- MPEG-2 and MPEG-4 Closed-Loop Statistical Multiplexing
  - Flexible options and combinations
  - Upgradable to HEVC

- Full Decode/Full Re-encode provides best video quality
  - Typical MPEG-2 pool sizes: 16:1 SD 5:1 HD
  - Typical MPEG-4 pool sizes: 25:1 SD 10:1 HD

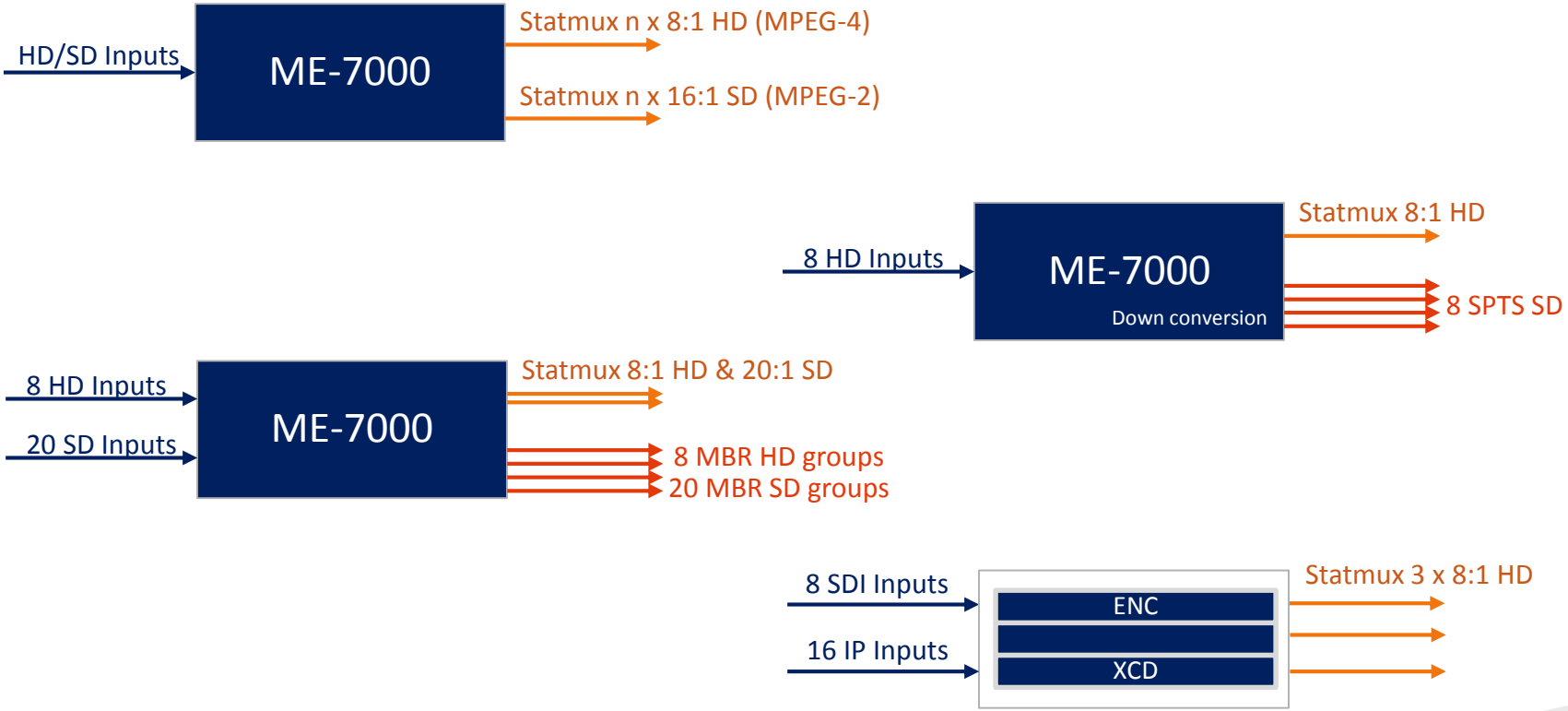


- Up to 8 statmux pools per system

- Simple setup via user friendly GUI

- Simultaneous output with CBR/IPTV and/or MBR

ME-7000
Statmux Examples



ME-7000 CBR+MBR Support Example #1

Example – Simultaneous AVC CBR single bit rate & AVC MBR profile outputs

- 16 HD IP Inputs (16:9 1080i)
  - 16 CBR HD IPTV Outputs – AVC
  - 4 MBR output profiles per input – AVC

H.264 Bit rates (kbps)	Output Video Resolution for HD Input		
	Tablet/PC /Phone	TV	Audio
128	384x216 @ 29.97/25 fps		HE-AAC 96K
384	512x288 @ 29.97/25 fps		HE-AAC 96K
1200	856x480 @ 29.97/25 fps		HE-AAC 96K
2500	1280x720 @ 29.97/25 fps		HE-AAC 96K
5000		1080i@full frame rate	AC-3 384K

ME-7000 MBR Support Example #2

Example – HD AVC MBR profile outputs

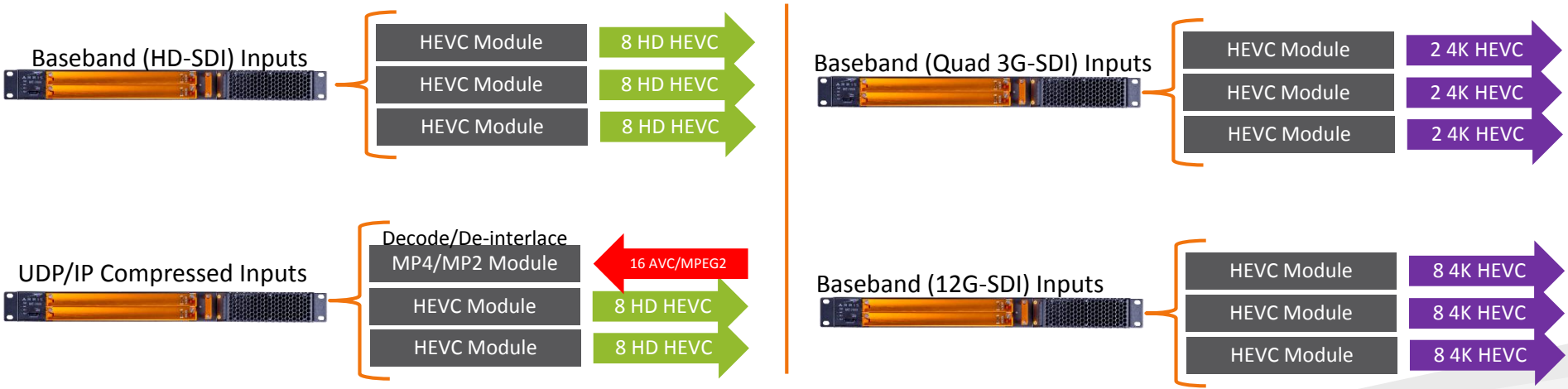
- 48 HD IP Inputs (16:9 1080i/720p)
  - 4 MBR output profiles per input – AVC

H.264 Bit rates (kbps)	Output Video Resolution for HD Input		
	Tablet/PC /Phone	TV	Audio
128	384x216 @ 29.97/25 fps		HE-AAC 96K
384	512x288 @ 29.97/25 fps		HE-AAC 96K
1200	856x480 @ 29.97/25 fps		HE-AAC 96K
2500	1280x720 @ 29.97/25 fps		HE-AAC 96K

  - Channel Density varies by number and resolution of profiles per MBR profile group

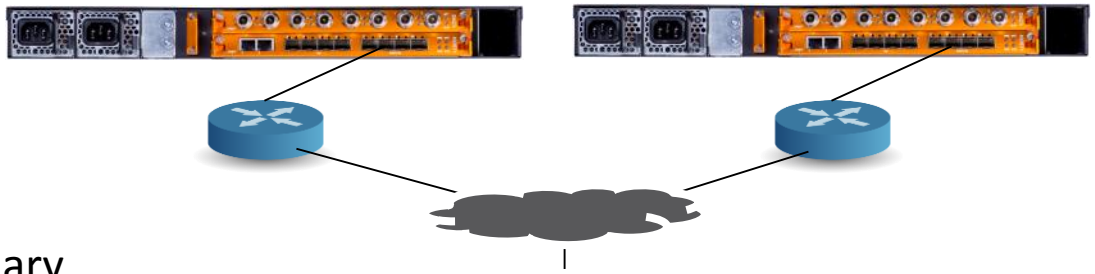
ME-7000
HEVC Compression Module

- Introduced in April 2017 at NAB / 24 channel 4K density announced at IBC (Sept 2017)
- Initial HEVC 4K/UHD release targeted for end of 1Q18
- Up to eight (8) HEVC 4K or HD/SD channels per module or 24 Channels per chassis
- Full 4Kp50/60, 10-bit support with HDR (HDR10, HLG, DolbyVision), WCG
- Low power consumption: < 17 Watts per HD or 4K channel



Complete System Level Redundancy

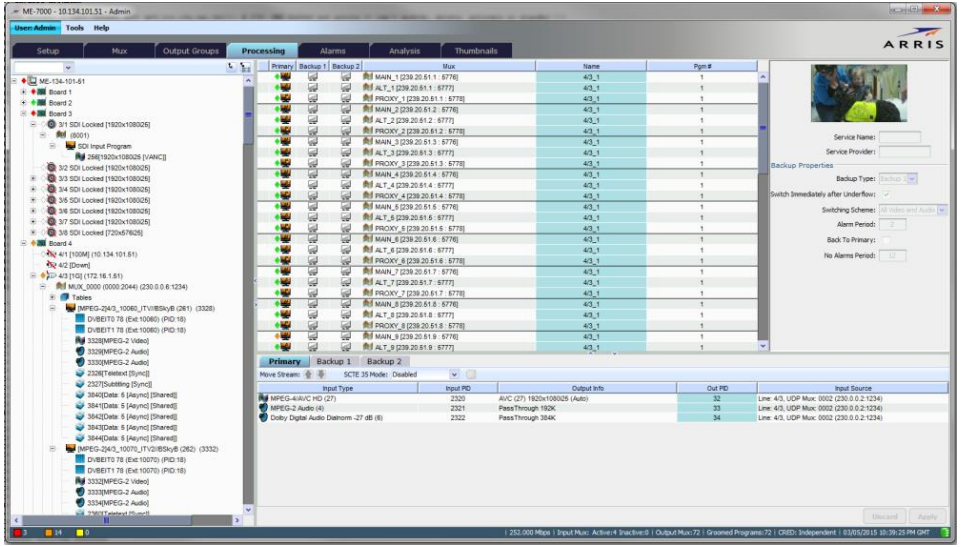
- Support for 1:1 or N:1 autonomous redundancy – Leveraged from CAP-1000
- Input Program Redundancy and Output port mirroring support
- 1:1 failover times are near instant
  - Backup in hot standby
  - Maintain uptime requirements



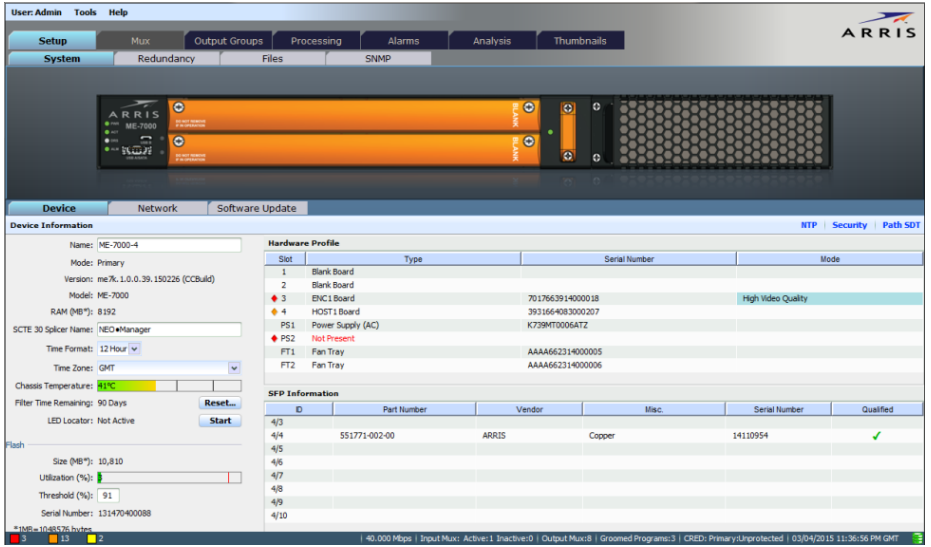
- Configuration
  - Licenses are loaded on the Primary
  - BACKUP monitors the Primary
  - BACKUP mirrors Primary config – *no manual set up required*
  - Revert to Primary is user selectable (auto or manual)

ME-7000 GUI
Powerful, Visual, Easy to Use

Simple Configuration and Maintenance



Bulk Operations
Drag and Drop

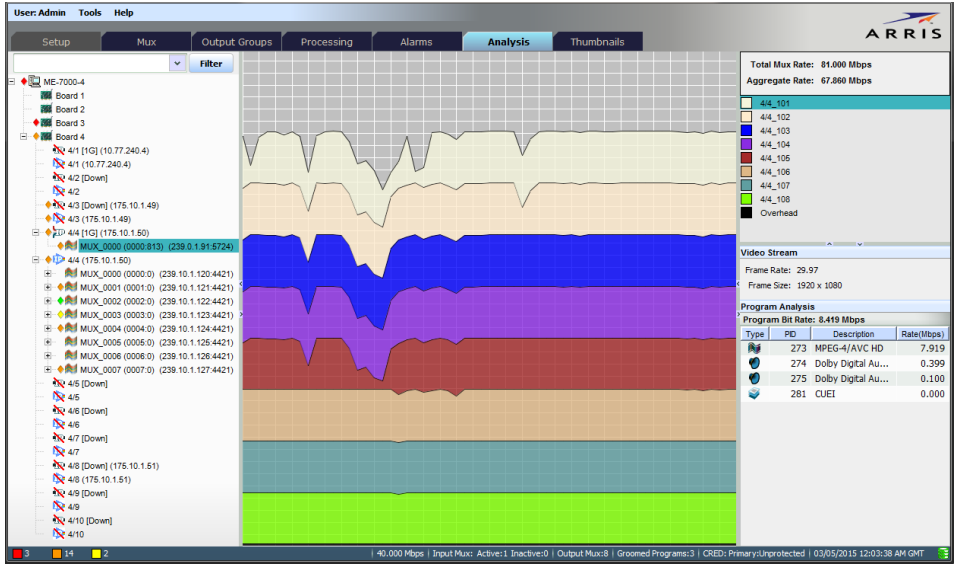


Visual Feedback

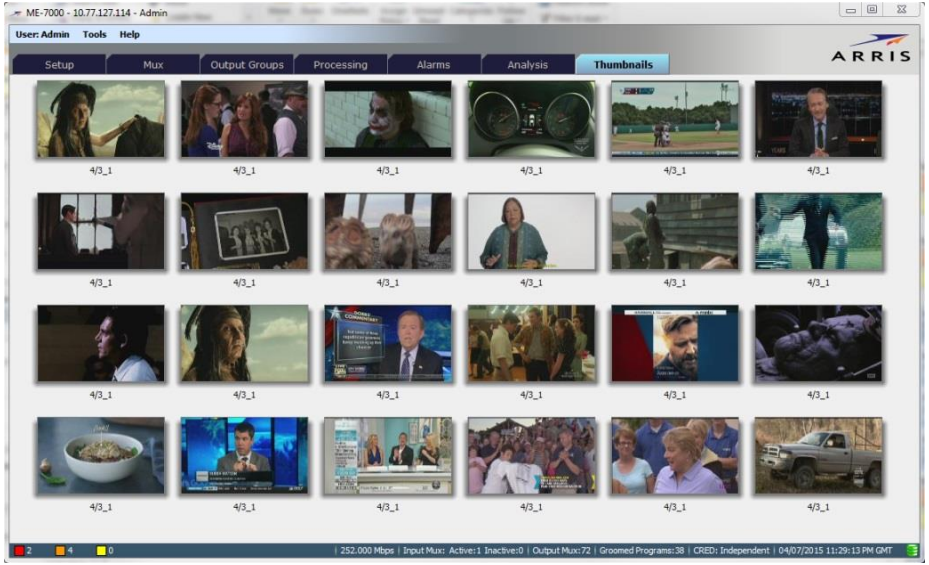
Leverages the CAP-1000 GUI design

ME-7000 GUI
Powerful, Visual, Easy to Use

Analysis and Input Thumbnails



Channel Analysis



Input Signal Validation

ME-7000 Licensing Model

- Utilizes the ARRIS Universal License System (ULS)
  - User friendly system – Easy to manage licenses from a common pool

License Types:

- Encode/Transcode Module Video License
  - One License per Module: includes AVC/MPEG2/MBR and HD-to-SD Down conversion
  - Use up to the maximum channels in any format or bitrate on a single license for that module capacity
  - Individual HEVC module license for HEVC module only & HEVC 4K licenses
- Audio Licenses – Per audio channel utilization
  - Order the total number and type of encodes or transcodes needed for site
  - Via ULS, user assigns audio licenses for each individual ME-7000 unit
- Ad Insertion/Mux licenses:
  - Stream/Groom License (bypass encoding) - one per stream groomed
  - Separate MPEG-2, MPEG-4 and HEVC splicing licenses - one per ad splice
- Other licenses:
  - Redundancy License – One needed for each primary unit. Back up units do not require any licenses.
  - Statmux License – One per chassis to enable Statistical Multiplexing of all channels within a single chassis

ME-7000 Typical Configurations

- 1- Compression Module Configuration
  - 1 module HW Bundle (ME-7000-1XCD-AC, ME-7000-1ENC-AC) DC version also available
    - Chassis, Host I/O Module, power supplies, fans & 1 Compression Module (ME7K-XCD-01, ME7K-ENC-01-SDI)
  - Add Module SW license and Audio transcode software licenses as required
  - Additional licenses for Redundancy, Statmux, etc, as needed

- 2- Compression Module Configuration
  - 2 module HW Bundle (ME-7000-2XCD-AC) DC version also available
    - Chassis, Host I/O Module, power supplies, fans & 2 Compression Modules (ME7K-XCD-01)
  - Add 2x Module SW licenses and Audio transcode software licenses as required
  - Additional licenses for Redundancy, Statmux, etc, as needed

- 3- Compression Module Configuration
  - 3 module HW Bundle (ME-7000-3XCD-AC) DC version also available
    - Chassis, Host I/O Module, power supplies, fans & 3 Compression Module (ME7K-XCD-01)
  - Add 3x Module SW licenses and Audio transcode software licenses as required
  - Additional licenses for Redundancy, Statmux, etc, as needed

Example BOM Configurations

ME-7000	72 CH HD MPEG-2 Statmux, Audio passthrough	
Part Number	**Description**	**Qty**
ME-7000-3XCD-AC	Hardware bundle includes 1x Base 1RU chassis with 3x ME7K-XCD-01 modules, dual hot-swappable DC PSU, dual hot-swappable fan trays, front rack mountings and rear support bracket. Includes one Host I/O module with 4 x 1GbE SFP ports, 4 x 1GbE SFP+ ports (2 x SFP copper SFP transceivers are included). 2 x 10/100 RJ45 electrical ports (bonded pair sharing a single gateway) SW Licenses are additional.	3
ME7K-ULS-MP4	High VQ Encode/Transcode License for MPEG-4/MPEG-2/MBR Module. One License per Application Module required.	9
ME7K-ULS-STATMUX	Statistical Multiplexing. One License required per Chassis to enable statistical multiplexing.	3

ME-7000	16 CH HD MPEG-4, SDI input, Audio encode	
Part Number	**Description**	**Qty**
ME-7000-1ENC-DC	Hardware bundle includes 1x Base 1RU chassis with 1x ME7K-ENC-01-SDI module, dual hot-swappable DC PSU, dual hot-swappable fan trays, front rack mountings and rear support bracket. Includes one HOST I/O module with 4 x 1GbE SFP ports, 4 x 1GbE SFP+ ports (2 x SFP copper SFP transceivers are included). 2 x 10/100 RJ45 electrical ports (bonded pair sharing a single gateway).	1
ME7K-ENC-01-SDI	MPEG-4/MPEG-2/MBR Encoder/Transcoder Module (ENC1) with 8 x SD/HD-SDI inputs (1-3 modules per chassis. Requires one ME7K-ULS-MP4 Software license per module).	1
ME7K-ULS-MP4	High VQ Encode/Transcode License for MPEG-4/MPEG-2/MBR Module. One License per Application Module required.	2
ME7K-ULS-DD2-E	2 Channel Dolby Digital (AC-3) Encode. One per output channel required.	16

Example BOM Configuration

ME-7000	48 CH HD MPEG-2, STATMXU, Audio passthrough	
Part Number	**Description**	**Qty**
ME-7000-3XCD-AC	Hardware bundle includes 1x Base 1RU chassis with 3x ME7K-XCD-01 modules, dual hot-swappable AC PSU, dual hot-swappable fan trays, front rack mountings and rear support bracket. Includes one HOST I/O module with 4 x 1GbE SFP ports, 4 x 1GbE SFP+ ports (2 x SFP copper SFP transceivers are included). 2 x 10/100 RJ45 electrical ports (bonded pair sharing a single gateway). SW Licenses are additional.	2
ME7K-ULS-MP4	High VQ Encode/Transcode License for MPEG-4/MPEG-2/MBR Module. One License per Application Module required.	6
ME7K-ULS-STATMUX	Statistical Multiplexing. One required per Chassis to enable statistical multiplexing.	2
ME7K-ULS-SLR	System (Chassis) Level Redundancy license for autonomous redundancy. One required for each Primary Chassis.	2

Redundancy (2:1)		
Part Number	**Description**	**Qty**
ME-7000-3XCD-AC	Hardware bundle includes 1x Base 1RU chassis with 3x ME7K-XCD-01 modules, dual hot-swappable DC PSU, dual hot-swappable fan trays, front rack mountings and rear support bracket. Includes one Host I/O module with 4 x 1GbE SFP ports, 4 x 1GbE SFP+ ports (2 x SFP copper SFP transceivers are included). 2 x 10/100 RJ45 electrical ports (bonded pair sharing a single gateway) SW Licenses are additional.	1

Questions

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