2110 Routing and Monitor System

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Vidtrans 2019

Overall architecture of our facility.

- Two completely diverse video routers
  - Every source is fed to both router either directly or via a DA
- We replaced one router with a new larger baseband router in 2015
- The original plan was to replace the other with a baseband router.
- As the 2110 standard was maturing we decided to go with an IP based 2110 router

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Why IP vs Baseband?

- Risk was low due to our diverse router systems.
- Route individual components of a source
- Monitoring Capabilities
- Network DA capability
- Wiring density
- Distribution of ports closer to equipment
- Elimination of significant amount of coax
- TBD

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IP Video Router Requirements

- 2110 based
- Control with existing facility Control Panels
- 2022-7 Hitless
- Gateways support IP-IP, IP-SDI, SDI-IP
- Ease of Monitoring
  - Legacy Monitoring infrastructure is significant
- 1152x1152 SDI Gateway Ports
- SD support is not a requirement

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Router Network Architecture

- 2110 IP Router Network
- IP-IP connections

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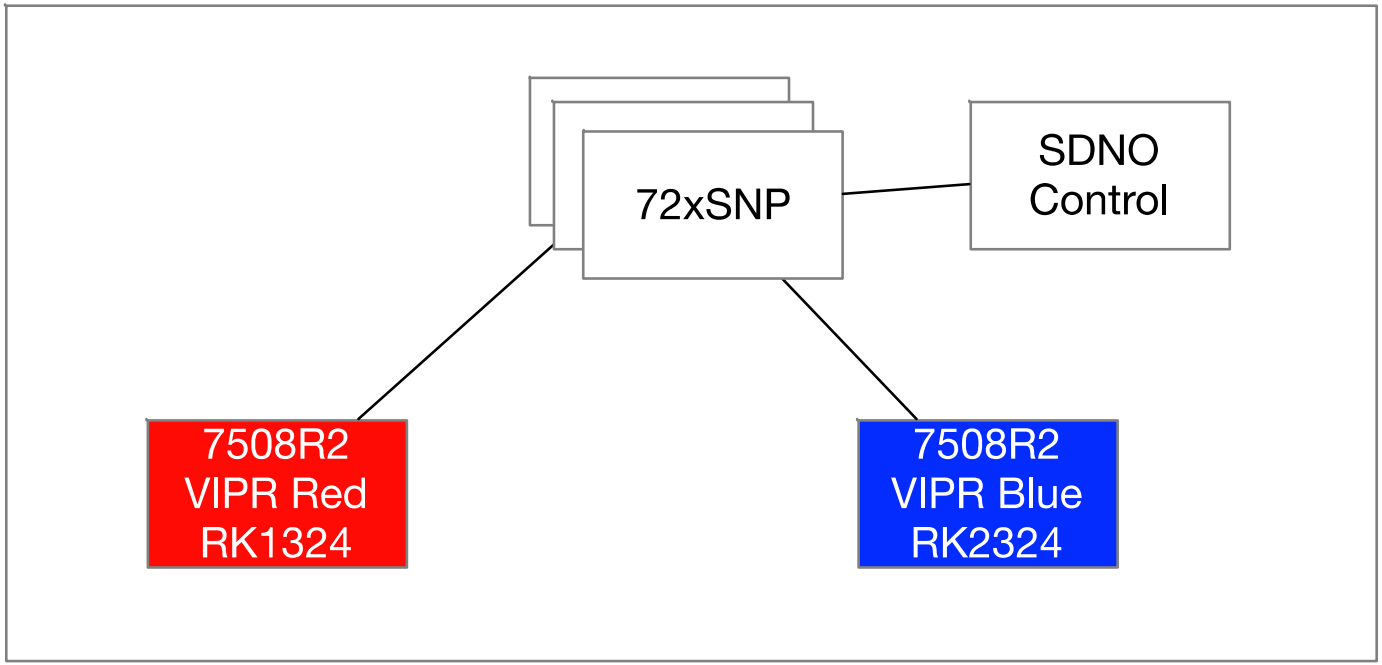
2110 IP Router Network



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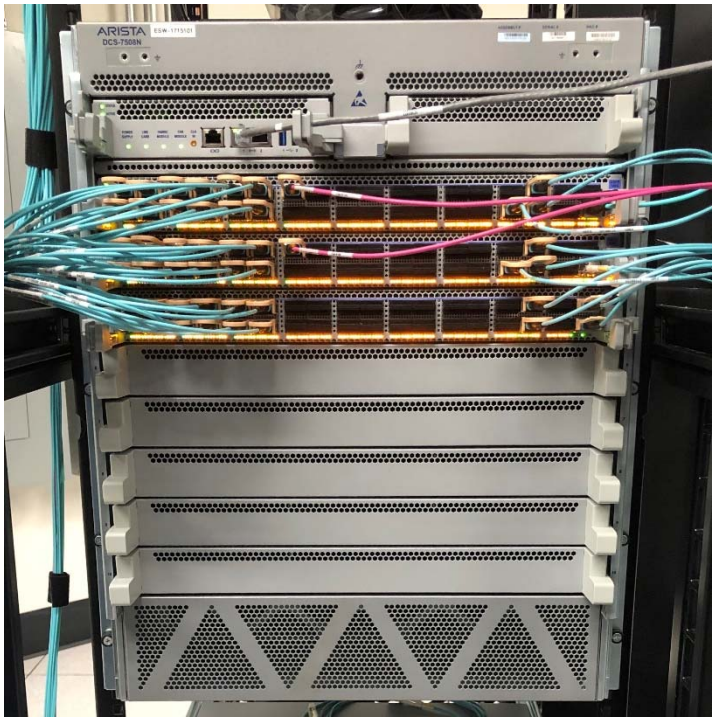
2110 IP Router Network



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2110 IP Router Gateway

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2110 IP Router Gateway

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IP-IP Connections

- Some number of gateways will be dedicated to IP only.
- Using separate VLANs for the outside connection and the core connection to keep traffic and interactions separate on the same physical interface.
- Monitor point
- Simplifies control of third party devices
- Allows for additional transformations in the future (eg Frame Sync, Up/Down Cross etc)

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Timing

- Delay somewhere less than a frame, but we expect it will have to be an entire frame every time we pass through the router.
- PTP Architecture
  - Dedicated PTP distribution switches
  - Disable Layer2 on all ports
  - Change default domain

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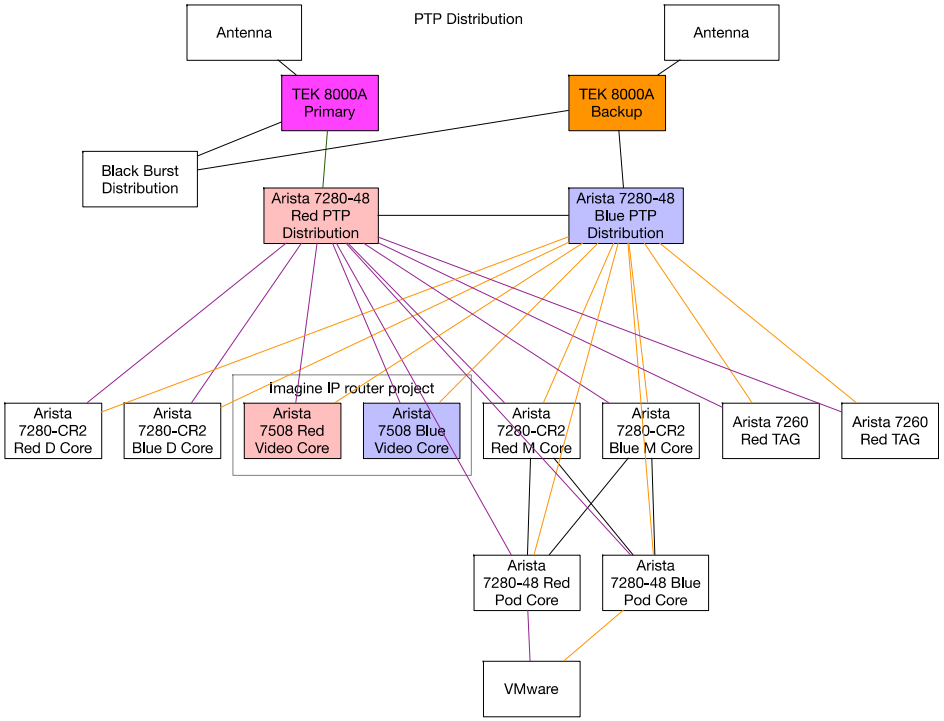
PTP Architecture



Future 2110 Connections

- CC Encoders
- AFD
- SCTE
- TBD

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Router Control Architecture

- Integrate with existing workflows and systems
- Levels
- Sources and Destinations
- Virtual Sources and Destinations

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Router Levels

SNP98	577	SNP98 1	4609	SNP98 1A1	4610	SNP98 1A2	4611	SNP98 1A3	4612	SNP98 1A4	4613	SNP98 1A5	4614	SNP98 1A6	4615	SNP98 1A7	4616	SNP98 1A8
SNP98		----	4609	SNP98 1A1	4609	SNP98 1A1	4609	SNP98 1A1	4609	SNP98 1A1	4609	SNP98 1A1	4609	SNP98 1A1	4609	SNP98 1A1	4609	SNP98 1A1
SNP98		----	4610	SNP98 1A2	4610	SNP98 1A2	4610	SNP98 1A2	4610	SNP98 1A2	4610	SNP98 1A2	4610	SNP98 1A2	4610	SNP98 1A2	4610	SNP98 1A2
SNP98		----	4611	SNP98 1A3	4611	SNP98 1A3	4611	SNP98 1A3	4611	SNP98 1A3	4611	SNP98 1A3	4611	SNP98 1A3	4611	SNP98 1A3	4611	SNP98 1A3
SNP98		----	4612	SNP98 1A4	4612	SNP98 1A4	4612	SNP98 1A4	4612	SNP98 1A4	4612	SNP98 1A4	4612	SNP98 1A4	4612	SNP98 1A4	4612	SNP98 1A4
SNP98		----	4613	SNP98 1A5	4613	SNP98 1A5	4613	SNP98 1A5	4613	SNP98 1A5	4613	SNP98 1A5	4613	SNP98 1A5	4613	SNP98 1A5	4613	SNP98 1A5
SNP98		----	4614	SNP98 1A6	4614	SNP98 1A6	4614	SNP98 1A6	4614	SNP98 1A6	4614	SNP98 1A6	4614	SNP98 1A6	4614	SNP98 1A6	4614	SNP98 1A6
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SNP98		----	4616	SNP98 1A8	4616	SNP98 1A8	4616	SNP98 1A8	4616	SNP98 1A8	4616	SNP98 1A8	4616	SNP98 1A8	4616	SNP98 1A8	4616	SNP98 1A8

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Sources and Destinations

	Name	Type	Inputs	Outputs	Level
☐	VIPR-AUDIO1	3RD-PARTY-RO	9216	1152	A
☐	VIPR-AUDIO2	3RD-PARTY-RO	9216	1152	B
☐	VIPR-AUDIO3	3RD-PARTY-RO	9216	1152	C
☐	VIPR-AUDIO4	3RD-PARTY-RO	9216	1152	D
☐	VIPR-AUDIO5	3RD-PARTY-RO	9216	1152	E
☐	VIPR-AUDIO6	3RD-PARTY-RO	9216	1152	F
☐	VIPR-AUDIO7	3RD-PARTY-RO	9216	1152	G
☐	VIPR-AUDIO8	3RD-PARTY-RO	9216	1152	H
☐	VIPR-DATA1-SC	3RD-PARTY-RO	1152	1152	I
☐	VIPR-DATA2-CC	3RD-PARTY-RO	1152	1152	J
☐	VIPR-DATA3-AF	3RD-PARTY-RO	1152	1152	K
☐	VIPR-VIDEO	3RD-PARTY-RO	1152	1152	V

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Virtual Sources and Destinations

#	Name	Video	A1	A2	A3	A4
1	SNP01-SRC01	SNP01-SRC01-V1	SNP01-SRC01-A1-L1	SNP01-SRC01-A2-L2	SNP01-SRC01-A3-L3	SNP01-SRC01-A4-L4
2	SNP01-SRC02	SNP01-SRC02-V1	SNP01-SRC02-A1-L1	SNP01-SRC02-A2-L2	SNP01-SRC02-A3-L3	SNP01-SRC02-A4-L4
3	SNP01-SRC03	SNP01-SRC03-V1	SNP01-SRC03-A1-L1	SNP01-SRC03-A2-L2	SNP01-SRC03-A3-L3	SNP01-SRC03-A4-L4
4	SNP01-SRC04	SNP01-SRC04-V1	SNP01-SRC04-A1-L1	SNP01-SRC04-A2-L2	SNP01-SRC04-A3-L3	SNP01-SRC04-A4-L4
5	SNP01-SRC05	SNP01-SRC05-V1	SNP01-SRC05-A1-L1	SNP01-SRC05-A2-L2	SNP01-SRC05-A3-L3	SNP01-SRC05-A4-L4
6	SNP01-SRC06	SNP01-SRC06-V1	SNP01-SRC06-A1-L1	SNP01-SRC06-A2-L2	SNP01-SRC06-A3-L3	SNP01-SRC06-A4-L4
7	SNP01-SRC07	SNP01-SRC07-V1	SNP01-SRC07-A1-L1	SNP01-SRC07-A2-L2	SNP01-SRC07-A3-L3	SNP01-SRC07-A4-L4
8	SNP01-SRC08	SNP01-SRC08-V1	SNP01-SRC08-A1-L1	SNP01-SRC08-A2-L2	SNP01-SRC08-A3-L3	SNP01-SRC08-A4-L4
9	SNP01-SRC09	SNP01-SRC09-V1	SNP01-SRC09-A1-L1	SNP01-SRC09-A2-L2	SNP01-SRC09-A3-L3	SNP01-SRC09-A4-L4
10	SNP01-SRC10	SNP01-SRC10-V1	SNP01-SRC10-A1-L1	SNP01-SRC10-A2-L2	SNP01-SRC10-A3-L3	SNP01-SRC10-A4-L4
11	SNP01-SRC11	SNP01-SRC11-V1	SNP01-SRC11-A1-L1	SNP01-SRC11-A2-L2	SNP01-SRC11-A3-L3	SNP01-SRC11-A4-L4
12	SNP01-SRC12	SNP01-SRC12-V1	SNP01-SRC12-A1-L1	SNP01-SRC12-A2-L2	SNP01-SRC12-A3-L3	SNP01-SRC12-A4-L4
13	SNP01-SRC13	SNP01-SRC13-V1	SNP01-SRC13-A1-L1	SNP01-SRC13-A2-L2	SNP01-SRC13-A3-L3	SNP01-SRC13-A4-L4
14	SNP01-SRC14	SNP01-SRC14-V1	SNP01-SRC14-A1-L1	SNP01-SRC14-A2-L2	SNP01-SRC14-A3-L3	SNP01-SRC14-A4-L4

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Monitor Requirements

- Requirements
  - Source types
    - 2110 Video, Audio, Ancillary(SCTE, AFD, CC)
    - 2022-6
    - H.264, MPEG2, J2K
    - DVI/HDMI
  - Destination types
    - 2110
    - H.264
  - Visual output in addition to Alarm delivery.

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Monitoring Control

- 576 Uncompressed Sources
- 250 Compressed Sources
- For an event
  - H.264 of inbound transmission, Uncompressed Frame sync output, Uncompressed control room output, Compressed distribution all next to each other.
- How to automate the monitoring so you see what you want when you want.

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Monitoring Capabilities

- Monitoring streams
  - CC
  - SCTE
  - Audio
  - Video
  - IP Stream
  - Timing
- Recording the mosaics

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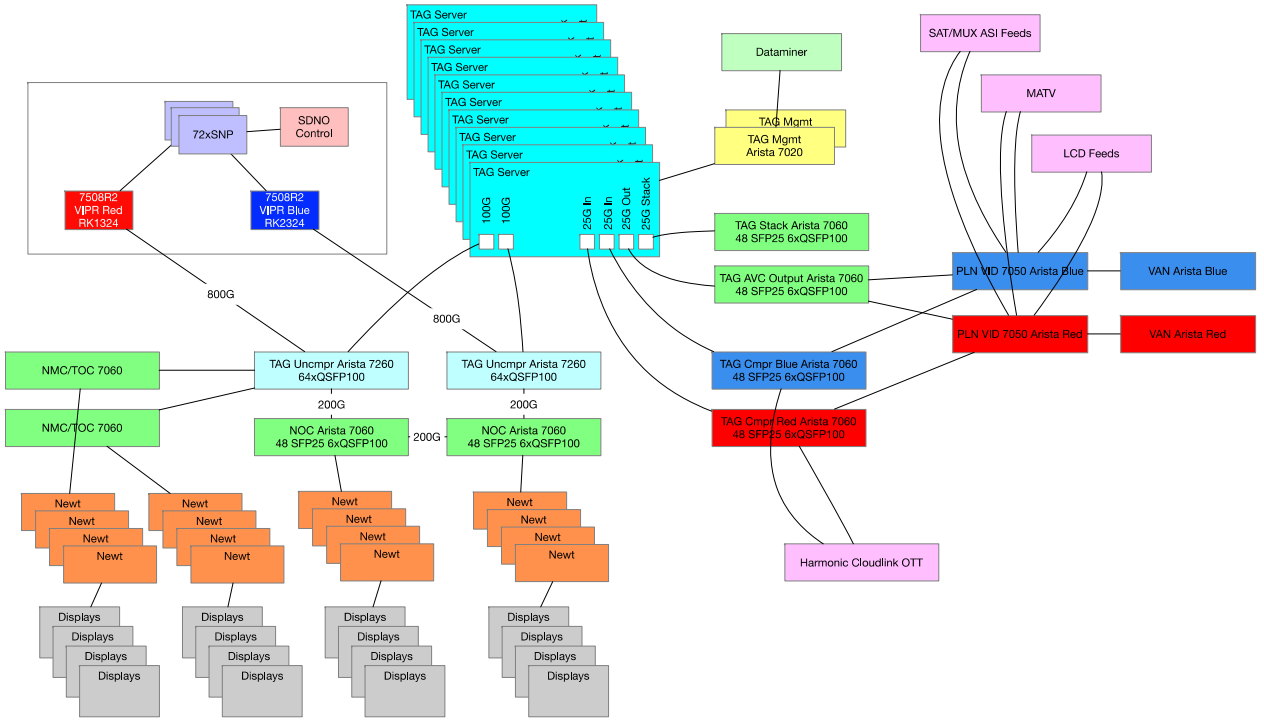
Monitoring Network



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Interconnect Monitor network with Router

- The core of the Video router is based on IGMP.
- The bigger an IGMP network gets, the more problems you can have.
- PIM adds additional complexities.
- Used static Joins for all sources to edge ports on TAG network.
- Interconnects on TAG switches to be routed interfaces to prevent IGMP or spanning tree interaction.

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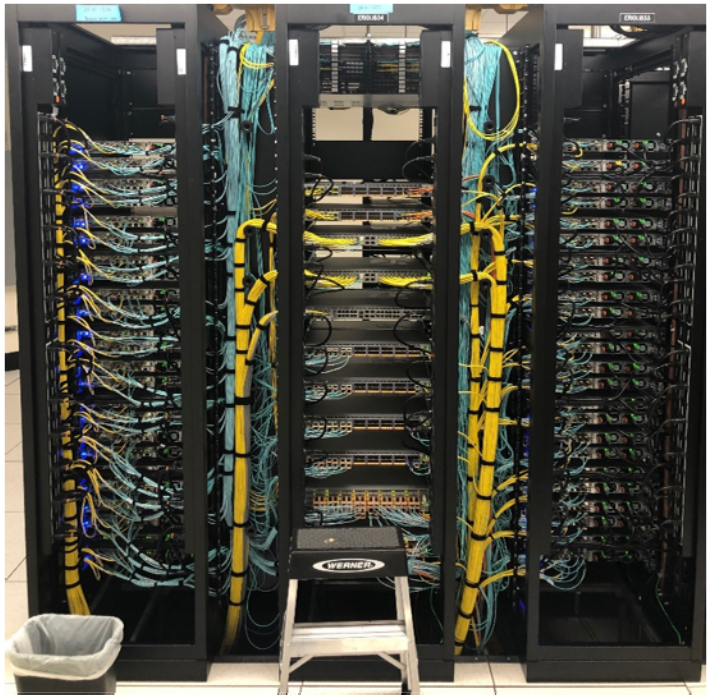
Monitor System



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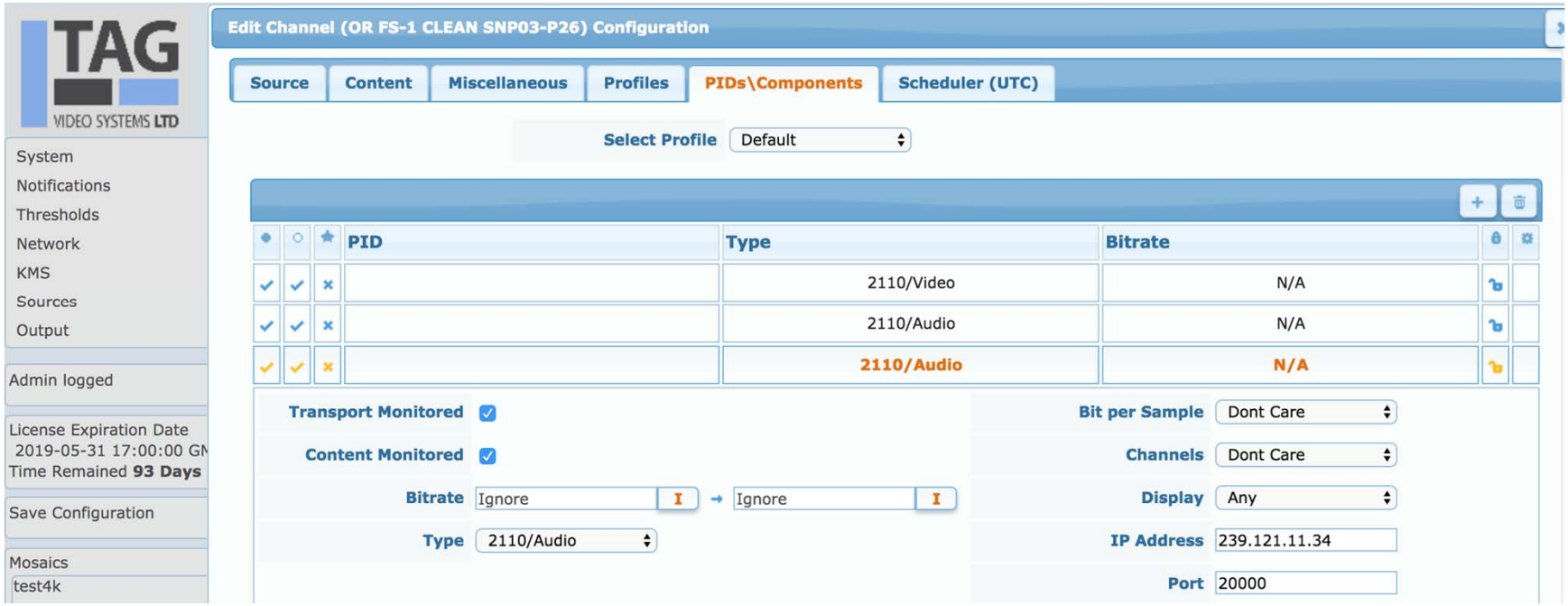

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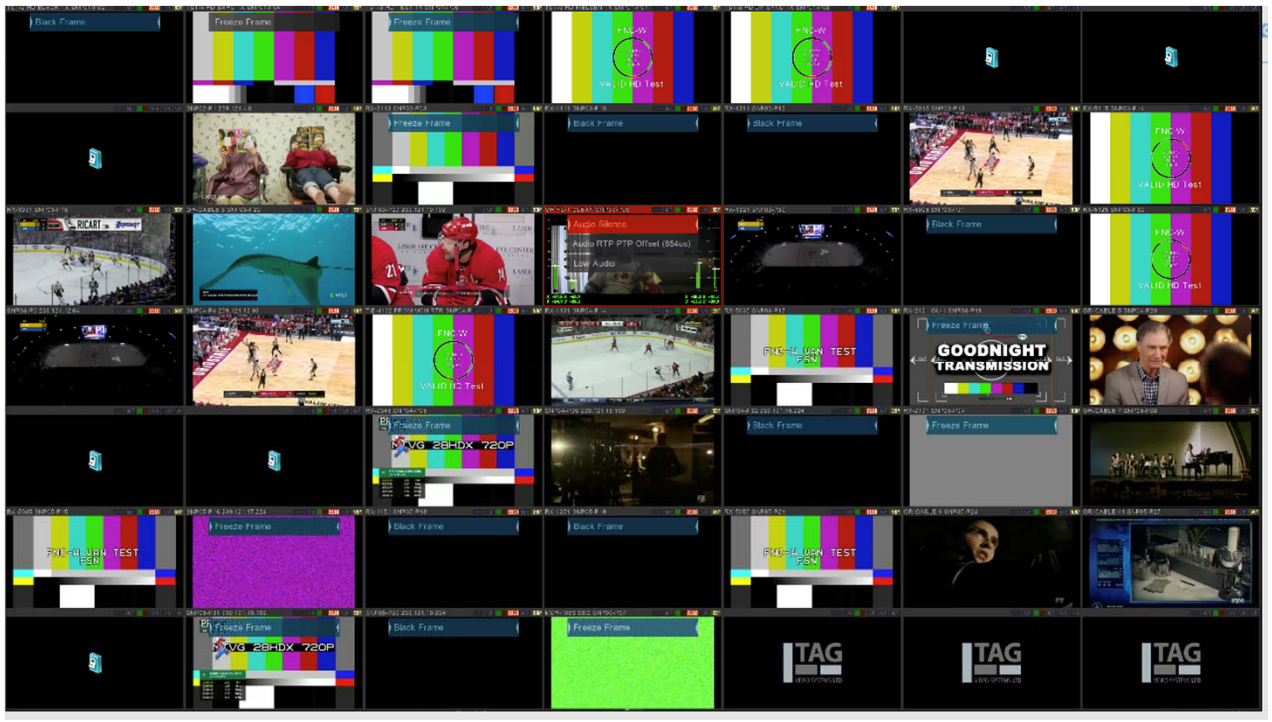
Monitor System



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Testing and Production

- Utilizing Dataminer for monitoring
- Verify telemetry of all equipment
- Monitor systems while building
- Monitor systems while causing failures

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Thank You


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