

Audio in an all-IP production facility

Andy Rayner, Chief Technologist, Nevion

arayner@nevion.com

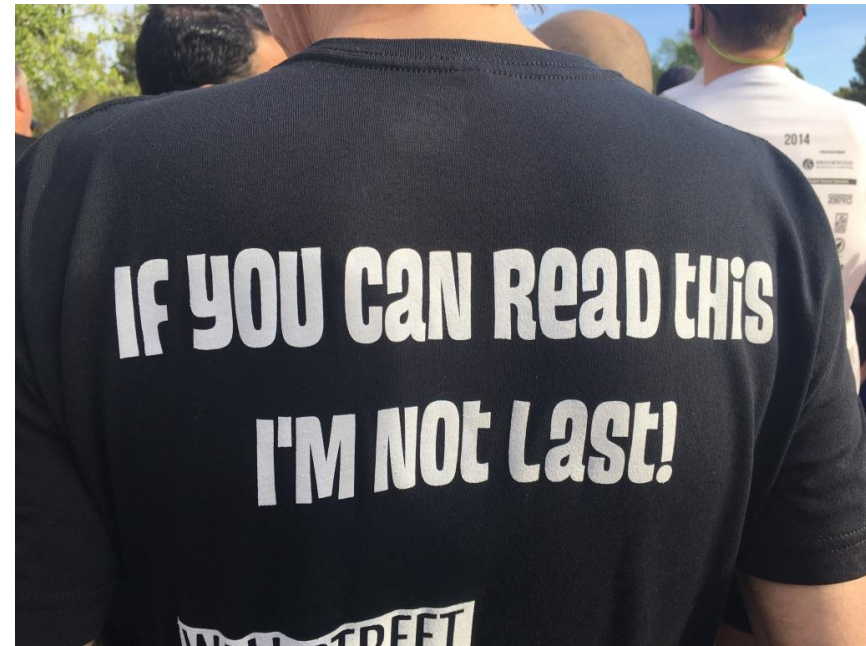
+44 7711 196609



About me!



neVION

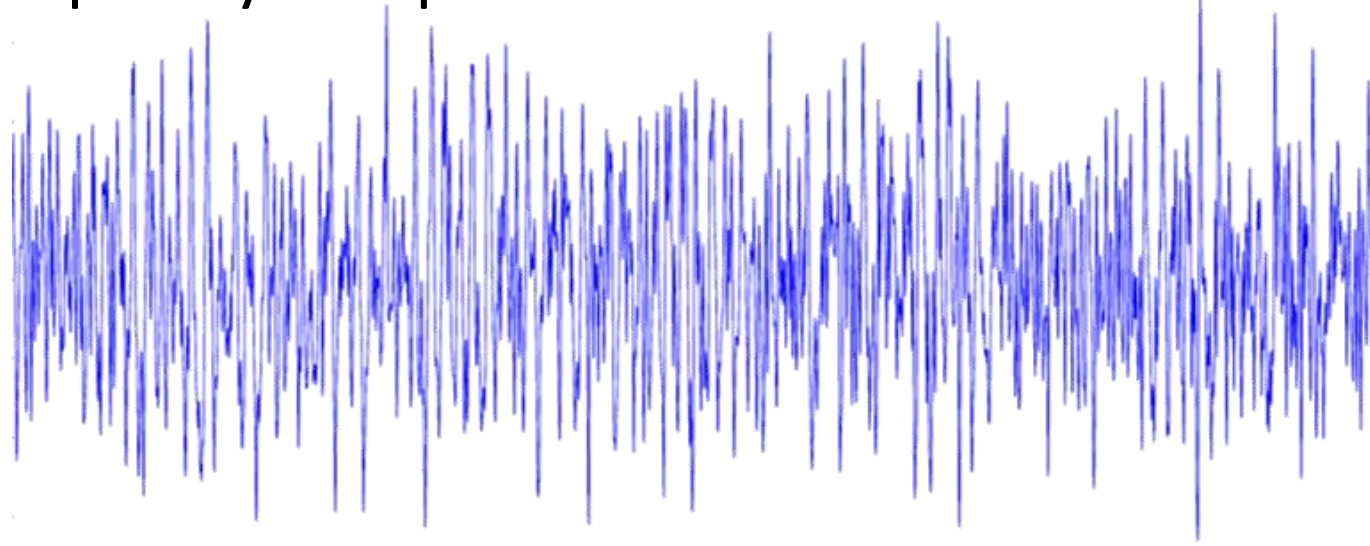


neVION



Audio – the most important bit!

‘Most of the complexity of a production environment is the audio’



The Audio folks did IP first!



Analogue

AES3

SDI embedded

IP 2022-6 embedded

IP - 3326

IP - AES67

AES10 MADI

AES50 AoE

Standardized Audio interfaces

EBU 3326

AES67

ST2110-30

Standardised IP formats

Livewire

DANTE

RAVENNA


WheatNet

Q-LAN

Proprietary IP formats

The expanding SMPTE ST2110 family

SYSTEM -10

A black icon of a network switch or patch panel with several ports on the top edge.


VIDEO -20

A black icon of a video camera.

AUDIO -30

A black icon of a speaker with sound waves emanating from it.

ANCILLARY
DATA -40

A black icon of a square box with a speech bubble inside, representing data or communication.

TIMING -21

A black icon of a clock face with a circular arrow around it, indicating timing or synchronization.

COMPRESSED
VIDEO -22

A black icon of a square box with a speech bubble inside, representing data or communication.

AES3-32 bit
AUDIO -31

A black icon of a speaker with sound waves emanating from it.


2022-8
COMPOSITE

A black icon of a video camera.

MULTI-PART
VIDEO -23

A black icon of a video camera.

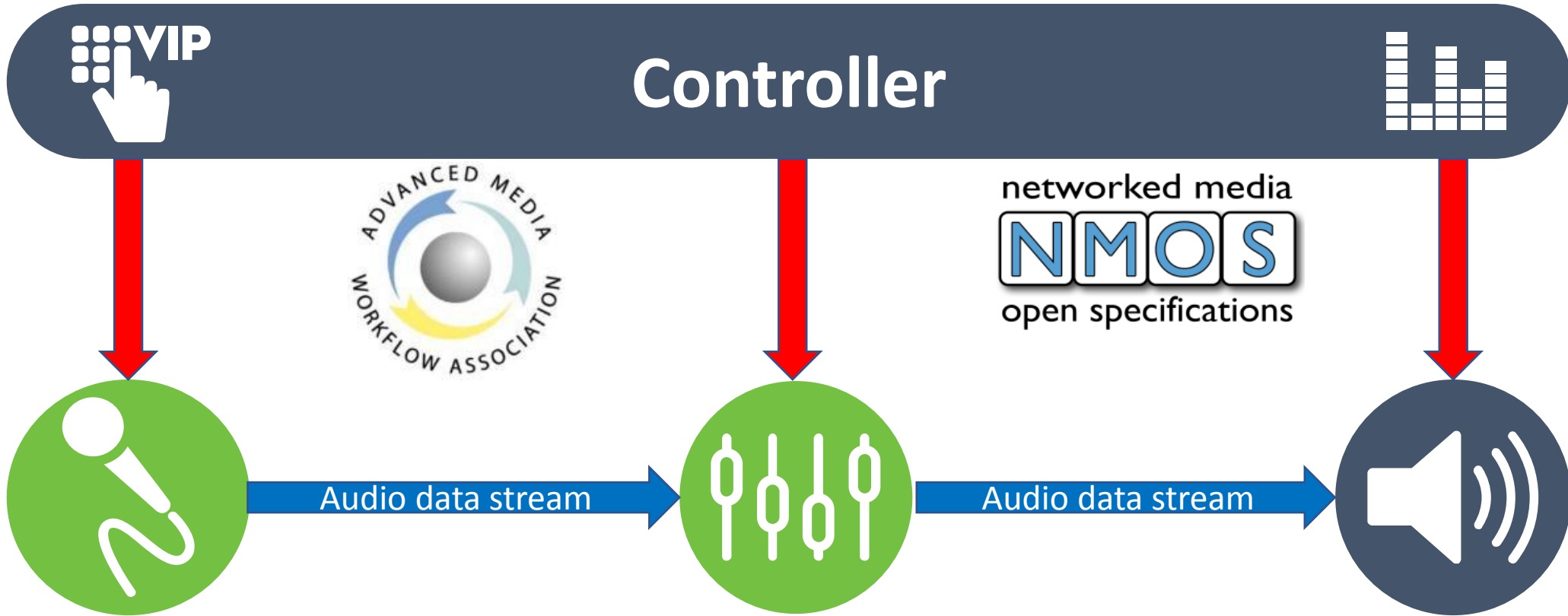
FUTURE: FAST
METADATA -41

A black icon of a square box with a speech bubble inside, representing data or communication.

FUTURE:
FMX -42

A black icon of a square box with a speech bubble inside, representing data or communication.

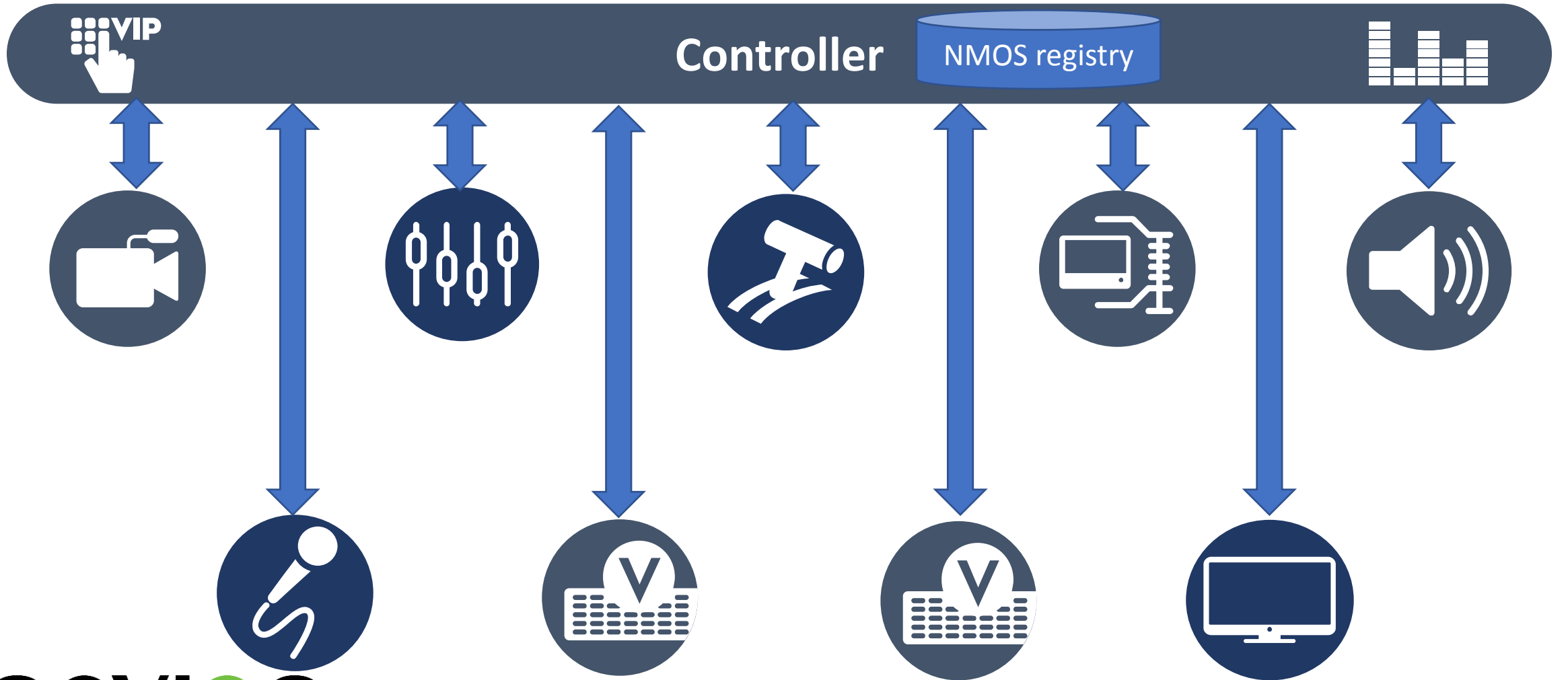
Standardized data plane mature,
control plane recently proven

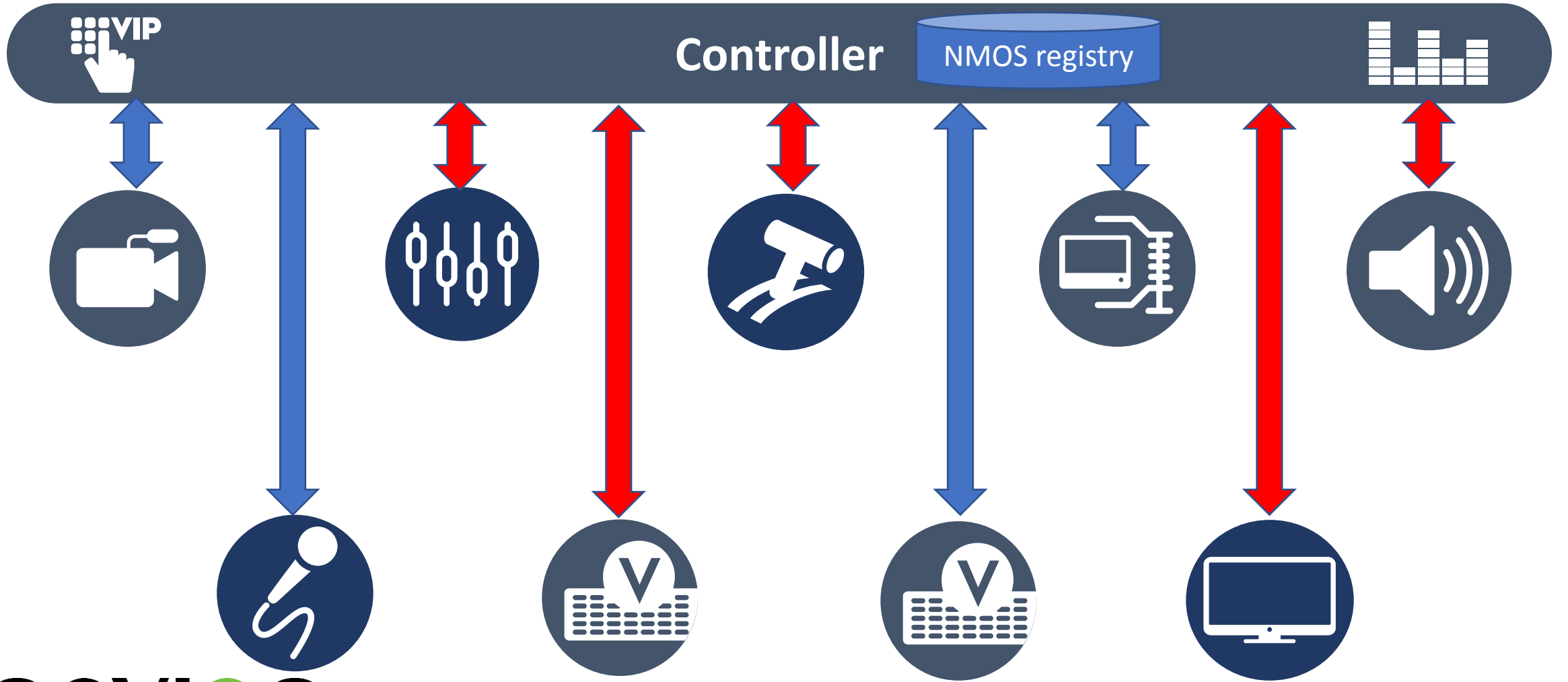




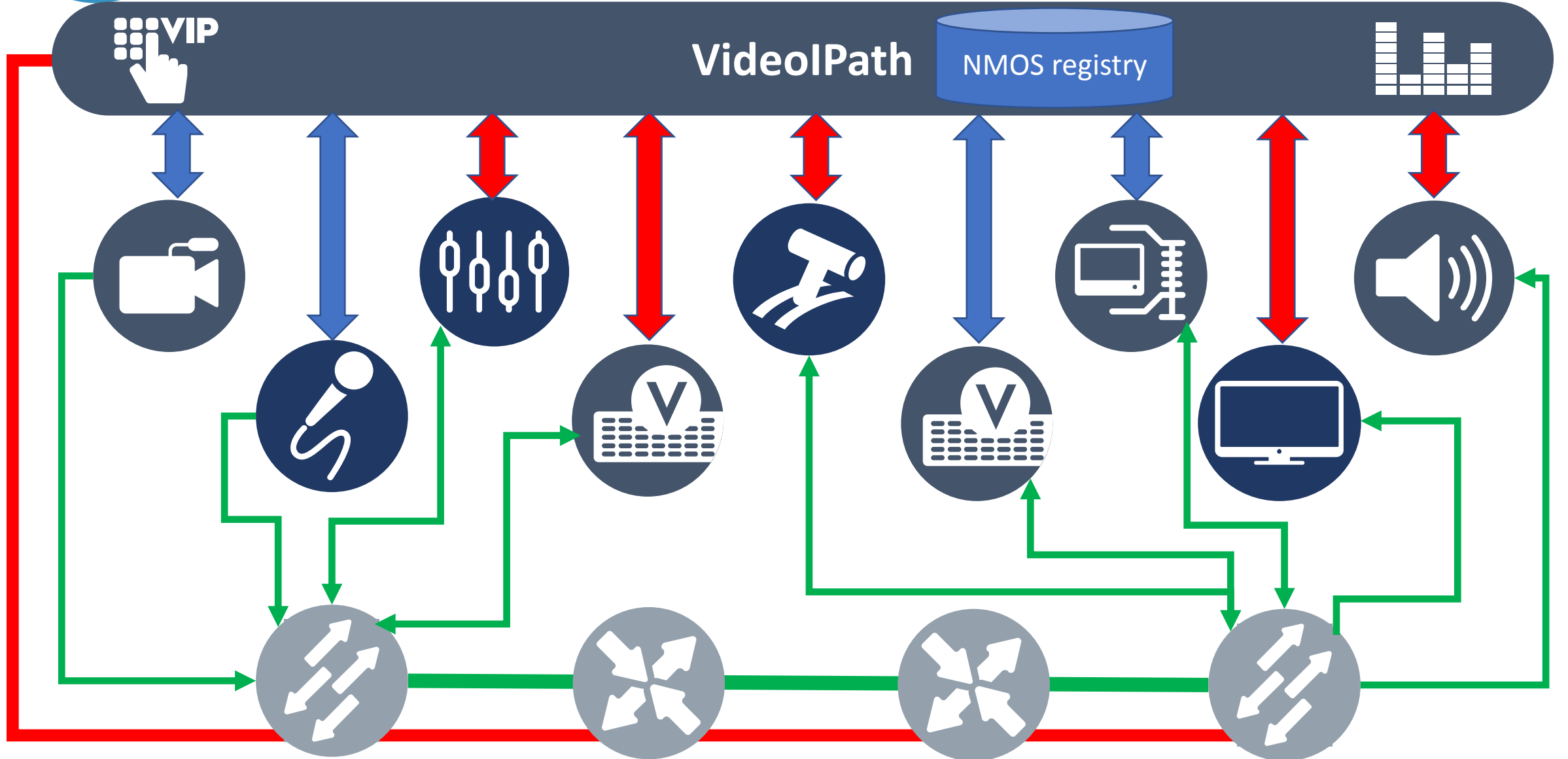
Audio manipulation requirements

- Keep it all-IP – don't go back to baseband!
- Gain and delay control still needed
- Asynchronous (external) sources timing reconciliation (SRC)
- Flexible ST2110-30 channel density (1 – 64 channels)
- Full (per mono channel) shuffling capability
- Fully Orchestration (e.g. VideoIPath) configurable
- NMOS compliant
- All-IP processing

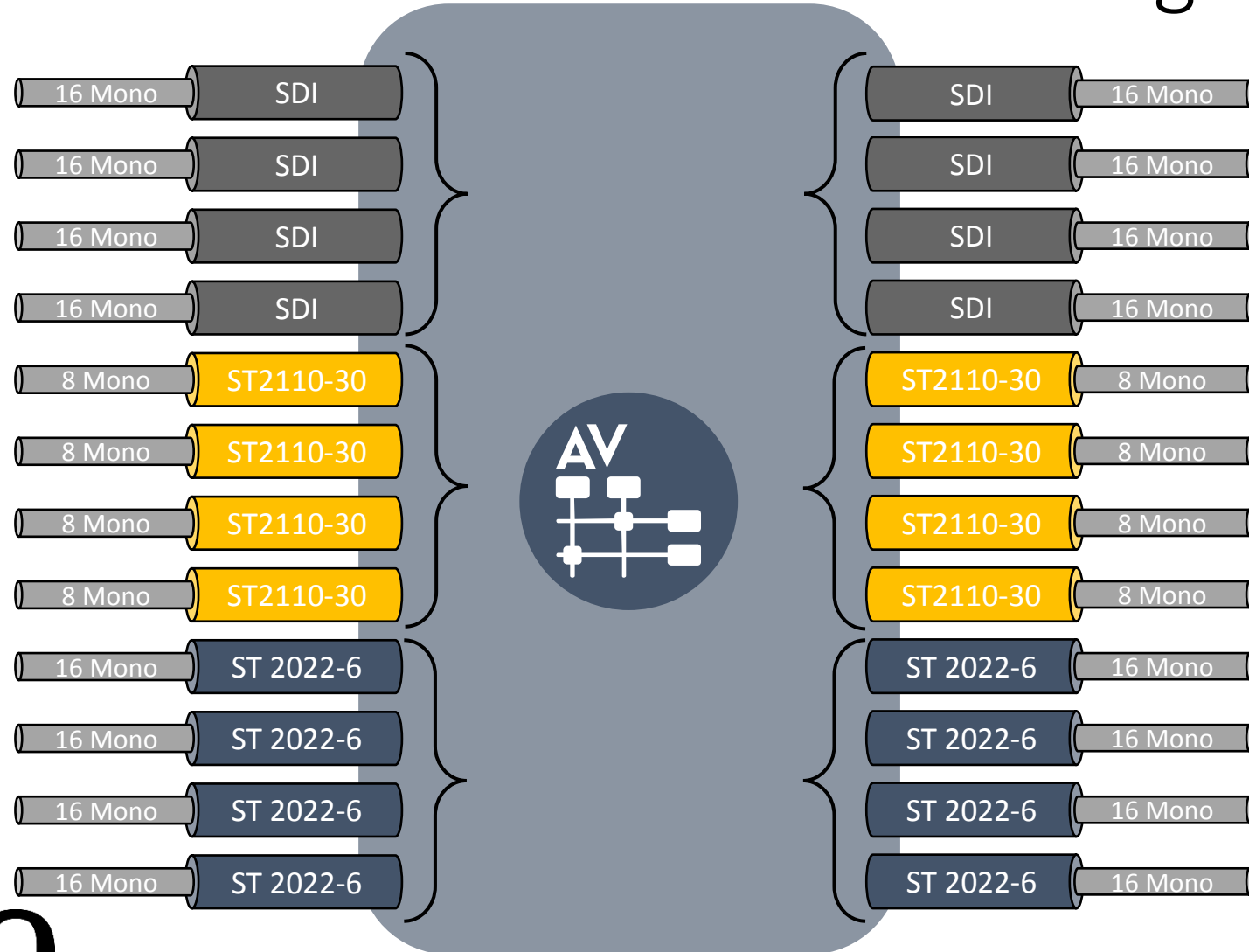




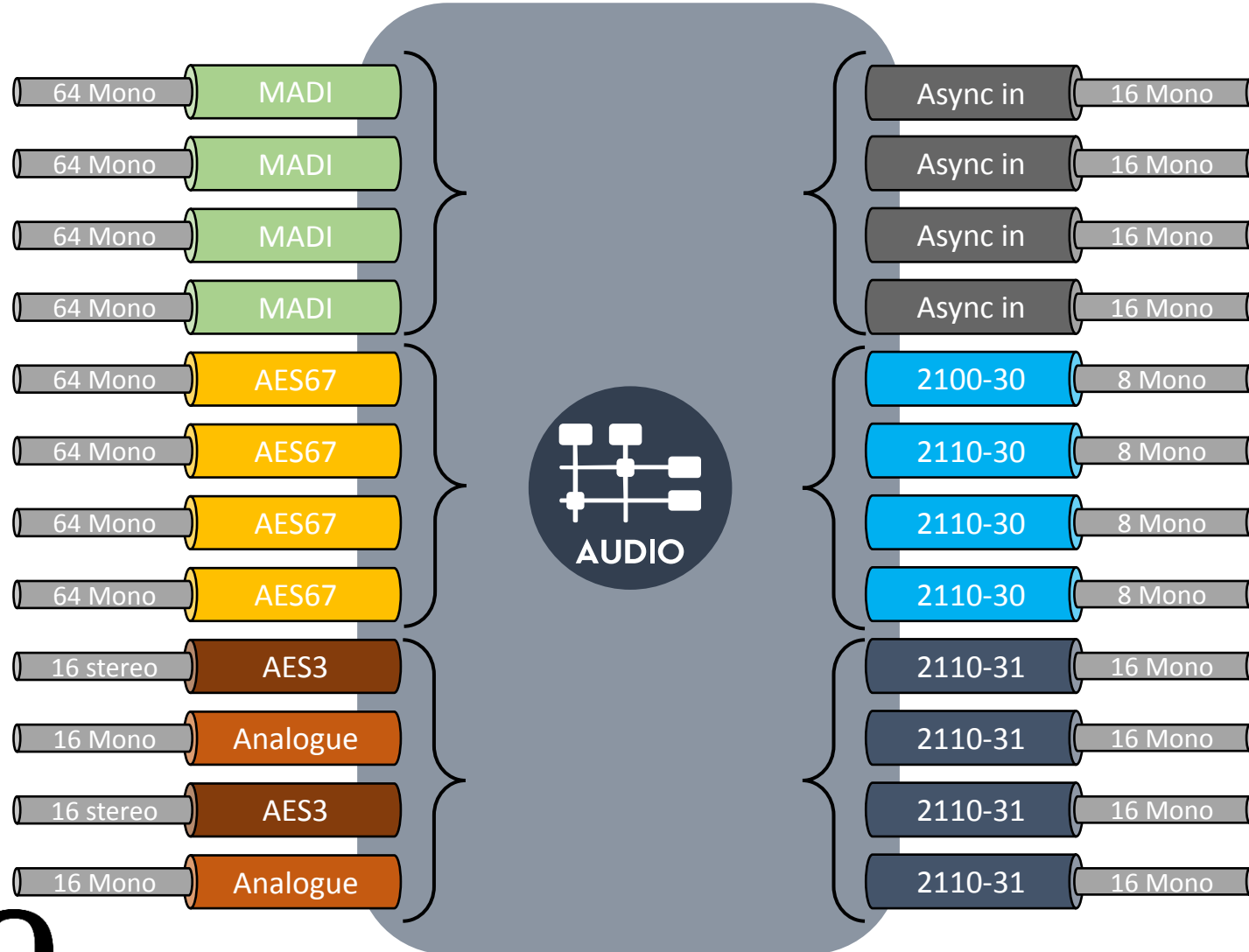
IP SHOWCASE™ THEATER



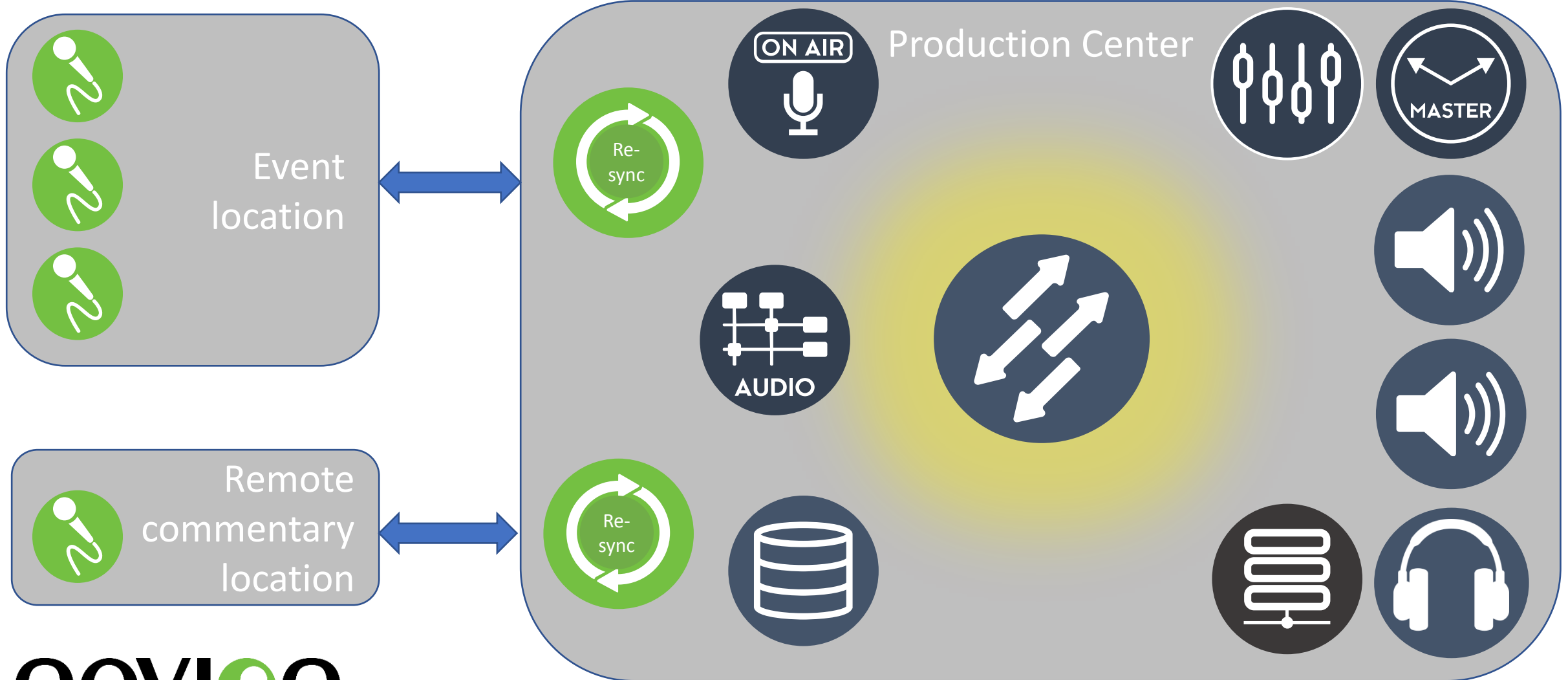
Video-associated audio format interfacing



Audio-only format interfacing



Audio facility interconnects

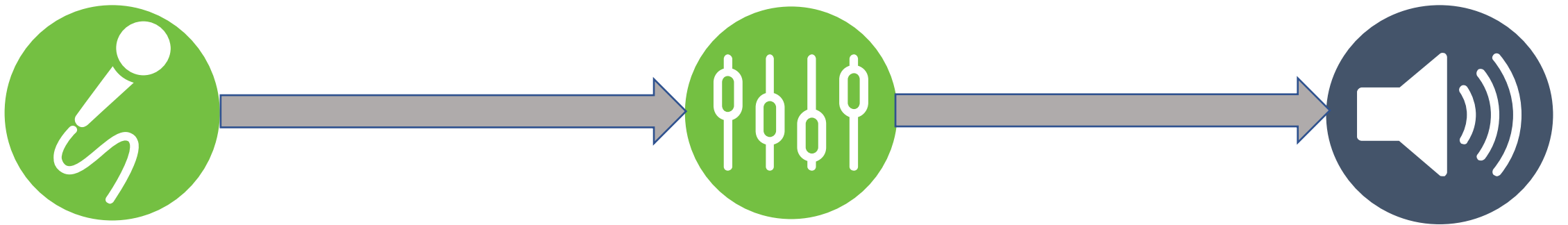
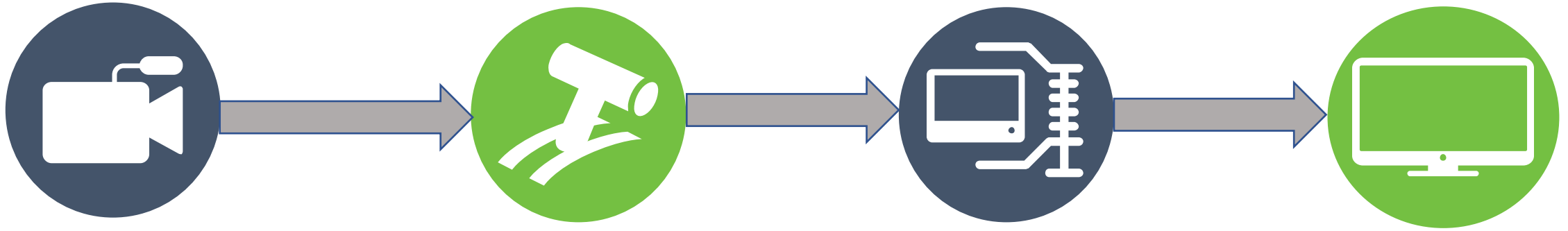


Moving outside campus based audio production islands

- WAN connectivity involved
- Longer latencies
- (Potentially) Asynchronous sources
- Layer 2 too limiting
- Layer 3 (routed) needed for larger and multi-campus networks



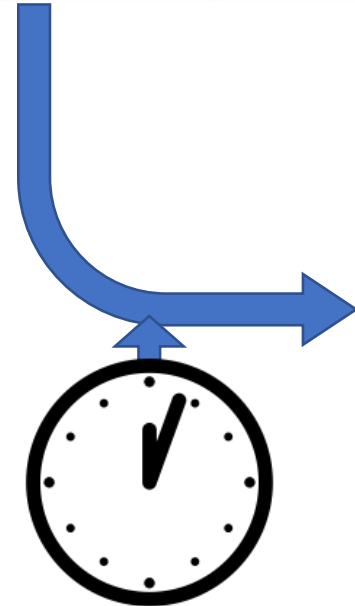
From link-based IP systems
to end-to-end IP systems



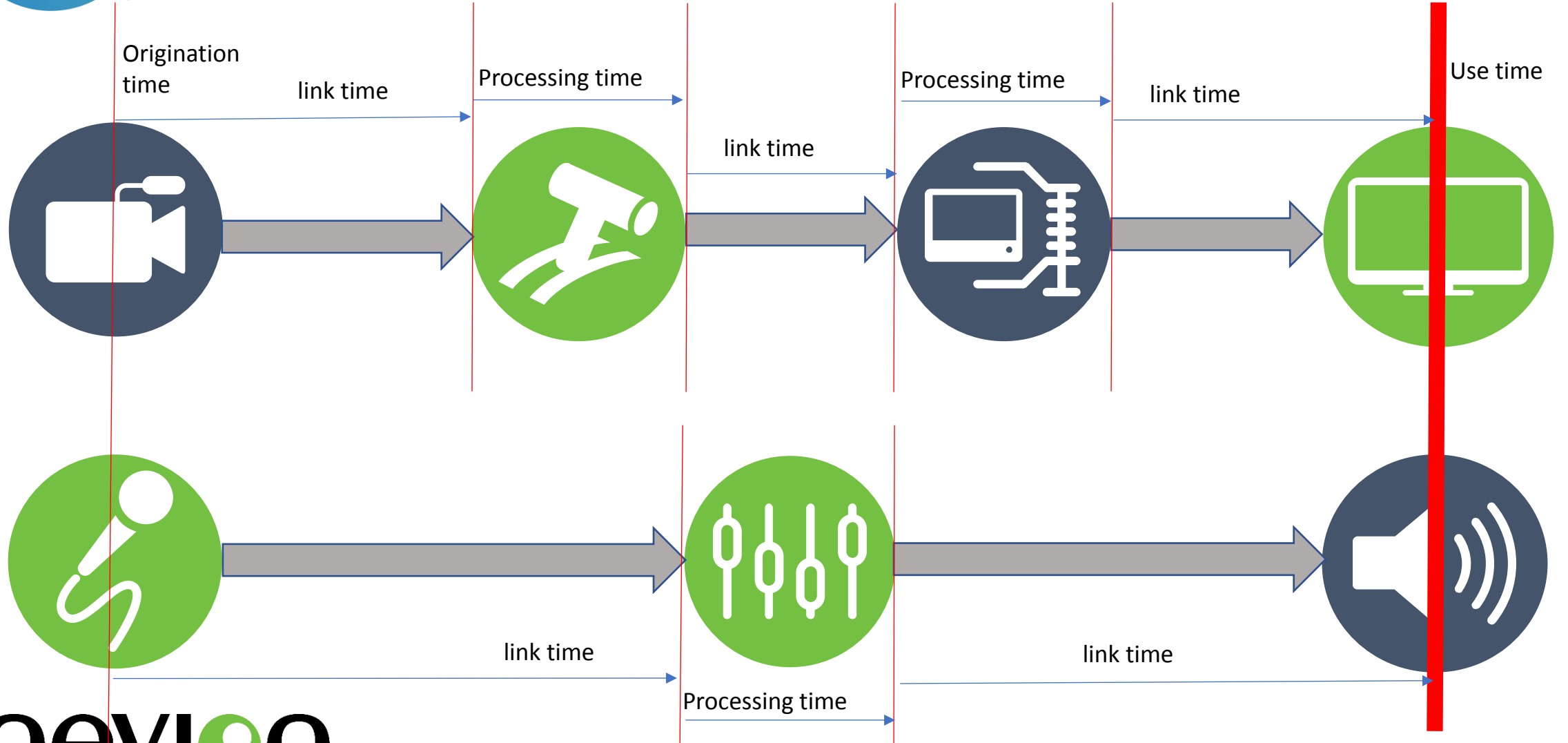
Absolute time of origination is captured in AES67/ST2110-30



...but quickly lost as it is treated as a transport timestamp



Reconciling essence timings for use



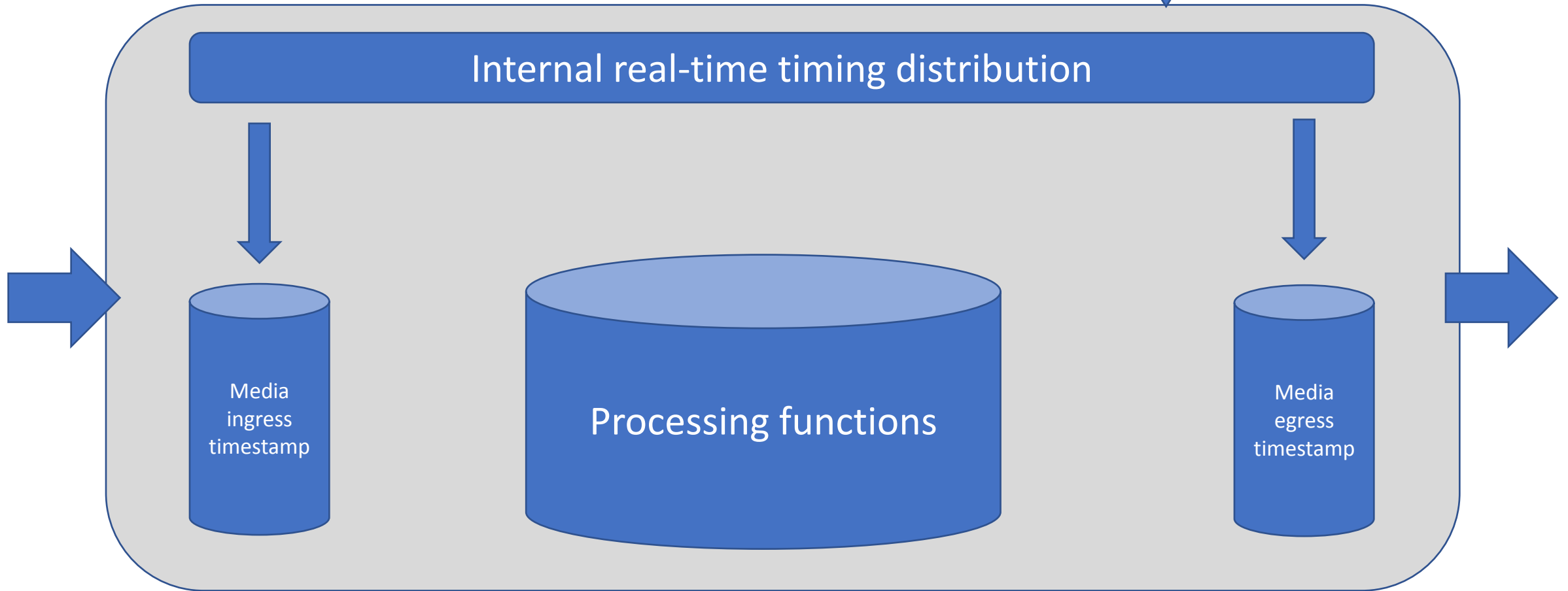
Why are we in the current approach?

- ST2110 doesn't (yet) actually specify using timing for end2end ☹️



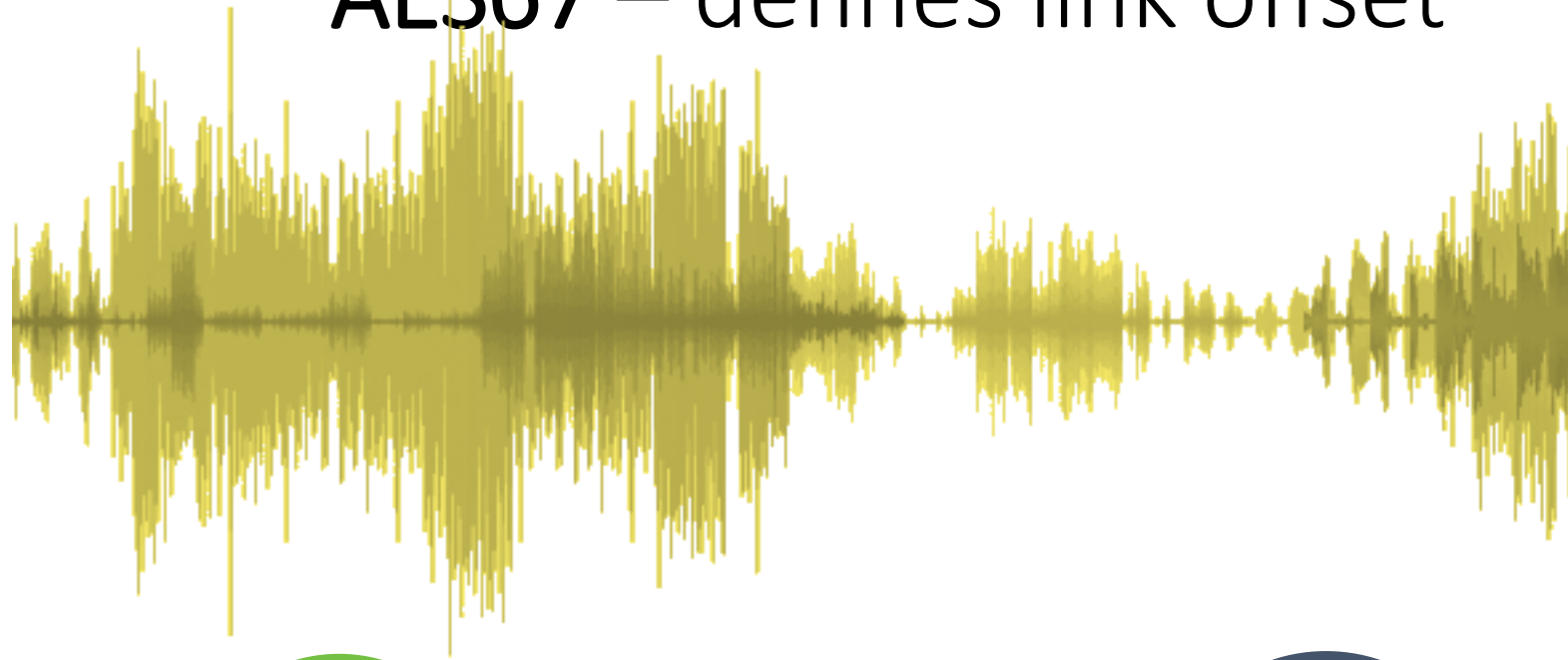


Device internal architecture tracking moments of time through a system



Analogy: PTP transparent clock handling in switches

AES67 – defines link offset



link time



PTP holdover is capable of being very long – let's make it so!



PTP TIMING

DEVICE
DISCOVERY & CTL

MEDIA FLOW IP ADDRESSING

ESSENCE
FLOWS

PROTECTION
TERMINATION

ALTERNATIVE TIMING
DOMAINS

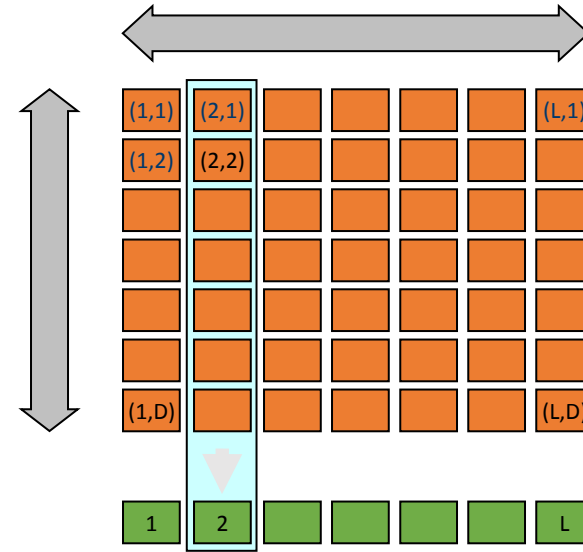
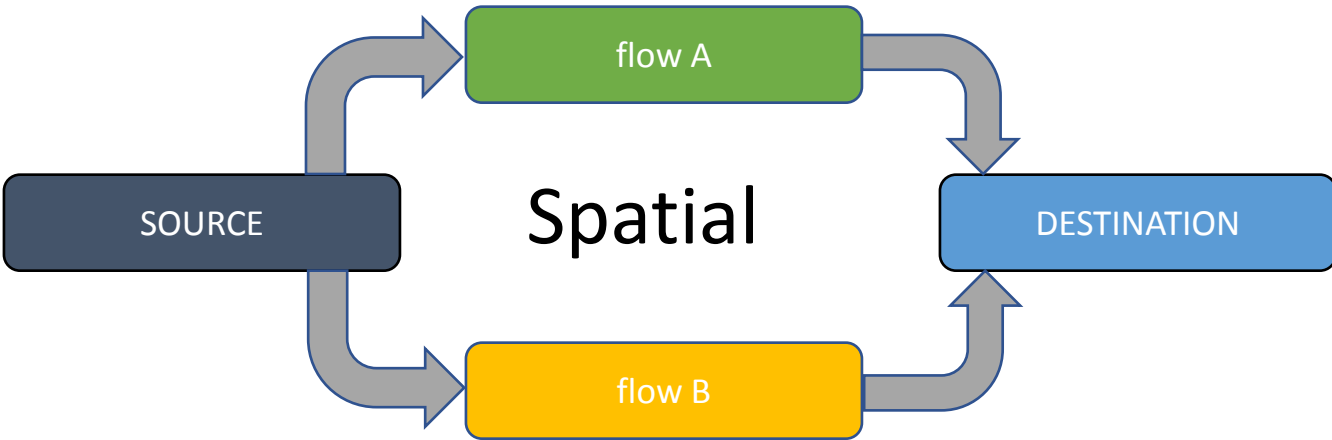
RESTRICTED/PROXY
DISCOVERY & CTL

DIFFERENT IP ADDRESSING
(NAT)

ESSENCE OR
COMPOSITE FLOWS

PROTECTION
TERMINATION

Protection – on and off campus



n	n+1	n+2	n+3
n+4	n+5	n+6	n+7
n+8	n+9	n+10	n+11
n+12	n+13	n+14	n+15
n+16	n+17	n+18	n+19
n+20	n+21	n+22	n+23
n+24	n+25	n+26	n+27
n+28	n+29	n+30	n+31
n+32	n+33	n+34	n+35
n+36	n+37	n+38	n+39
n+40	n+41	n+42	n+43

FEC



Plug for current VSF Activity Group

”To enable effective transport of ST2110 media flows and associated control data across Wide Area Networks *in an interoperable manner.*”

ST2110

Come and hear more
on Thursday morning
at the IP showcase

Phase 1: NAB 2019

Phase 2: IBC 2019



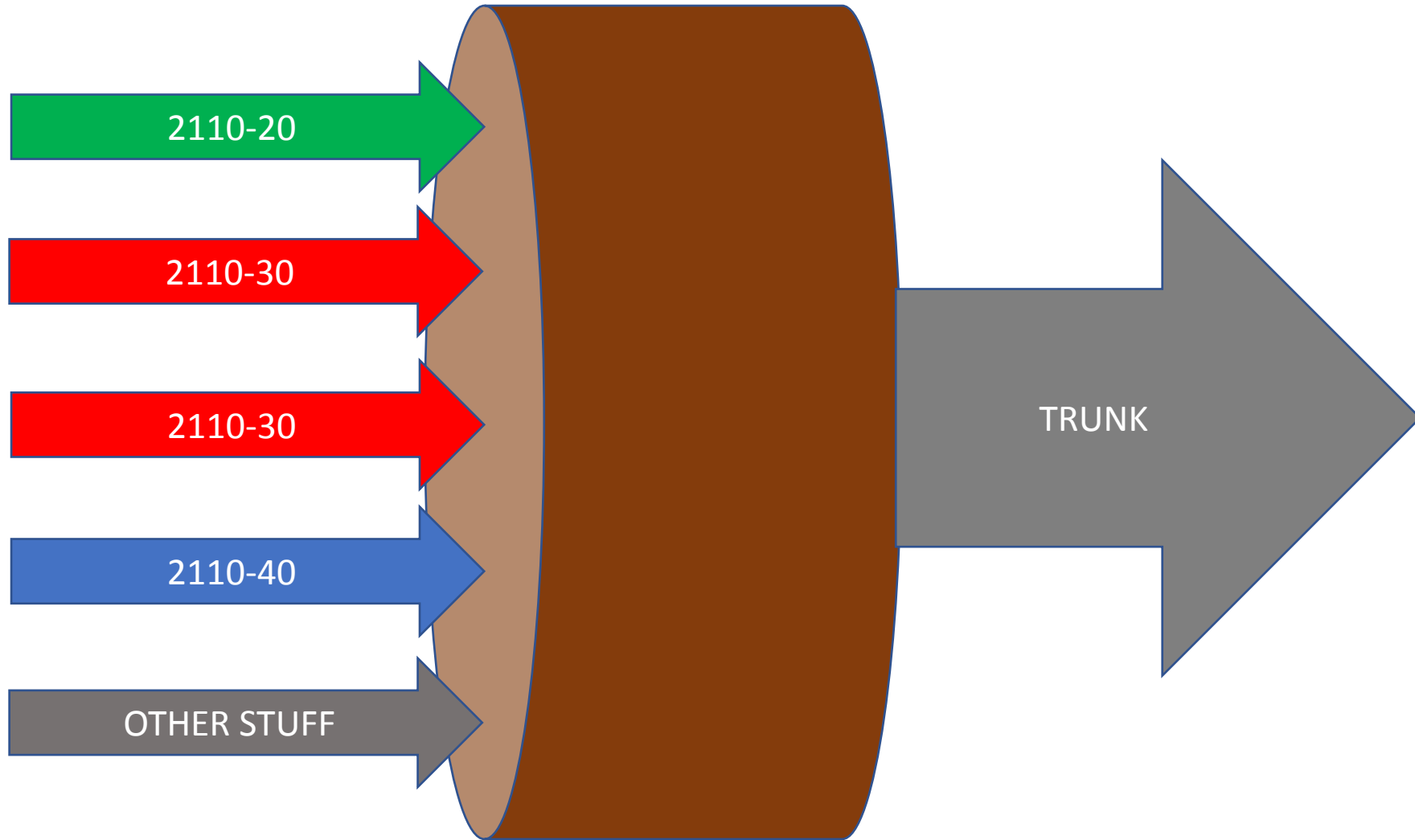
ST2110 over WAN for inter-facility & OBs



- Flow protection ✓
- Flow trunking ✓
- Essence alignment ✓
- Low latency handling
- Format conversion
- Compression ✓
- Protection of other data flows ✓
- Security
- PTP trunking
- Wan timing
- Associated control (NMOS) filtering and border proxying

Next
topic

Trunking 2110 essences



Conclusions

- Audio is incredibly important
- Audio is often the most complex part of the system
- Full standards compliance is essential
- The standardised control layer is less mature – but all the parts are now there
- Standards now provide capability for L3 wide-area data & control planes
- Keeping the audio signal flow All-IP is crucial to gain full benefit

Thank You
Do come and see us SU5510
We do a nice cup of tea!

Andy Rayner, Chief Technologist

arayner@nevision.com

+44 7711 196609

