IP SHOWCASE THEATER

CURATED BY VSF VIDEO SERVICES FORUM

ST 2110
From Theory to Reality

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tpc Switzerland AG

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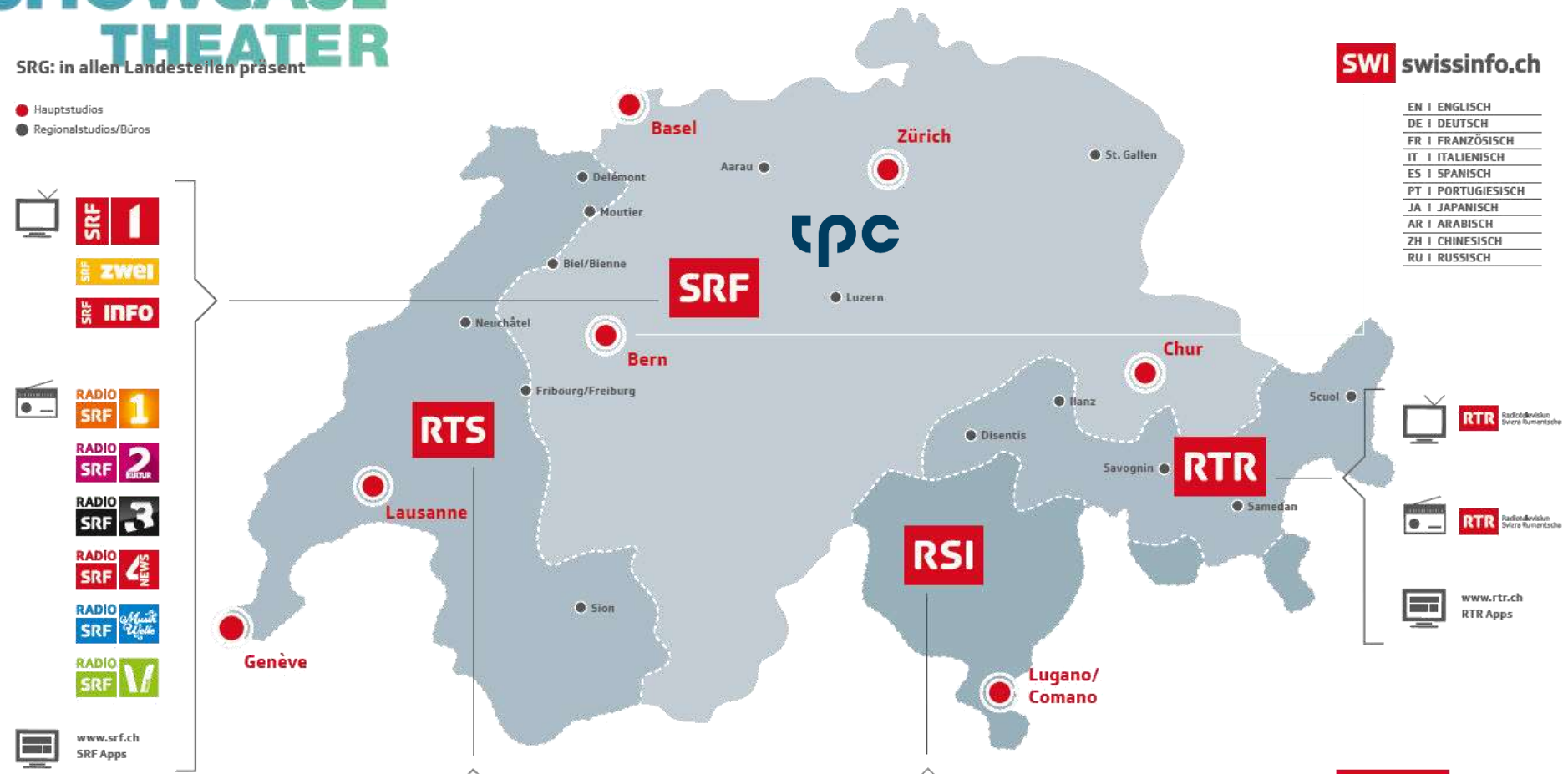
SRG: in allen Landesteilen präsent



UHD1
HDR
SRF

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WHY?

The 3 Typical Reactions When I say IP is ready TODAY

A:

ah really, cool?! Please show me; would be great but **vendors typically overpromise and don´t talk about the problems**

that's why I present here our strategy and our experiences

B:

hmm – maybe – but **it's too expensive, too complicated** to build and maintain and simply I do not have personnel for it

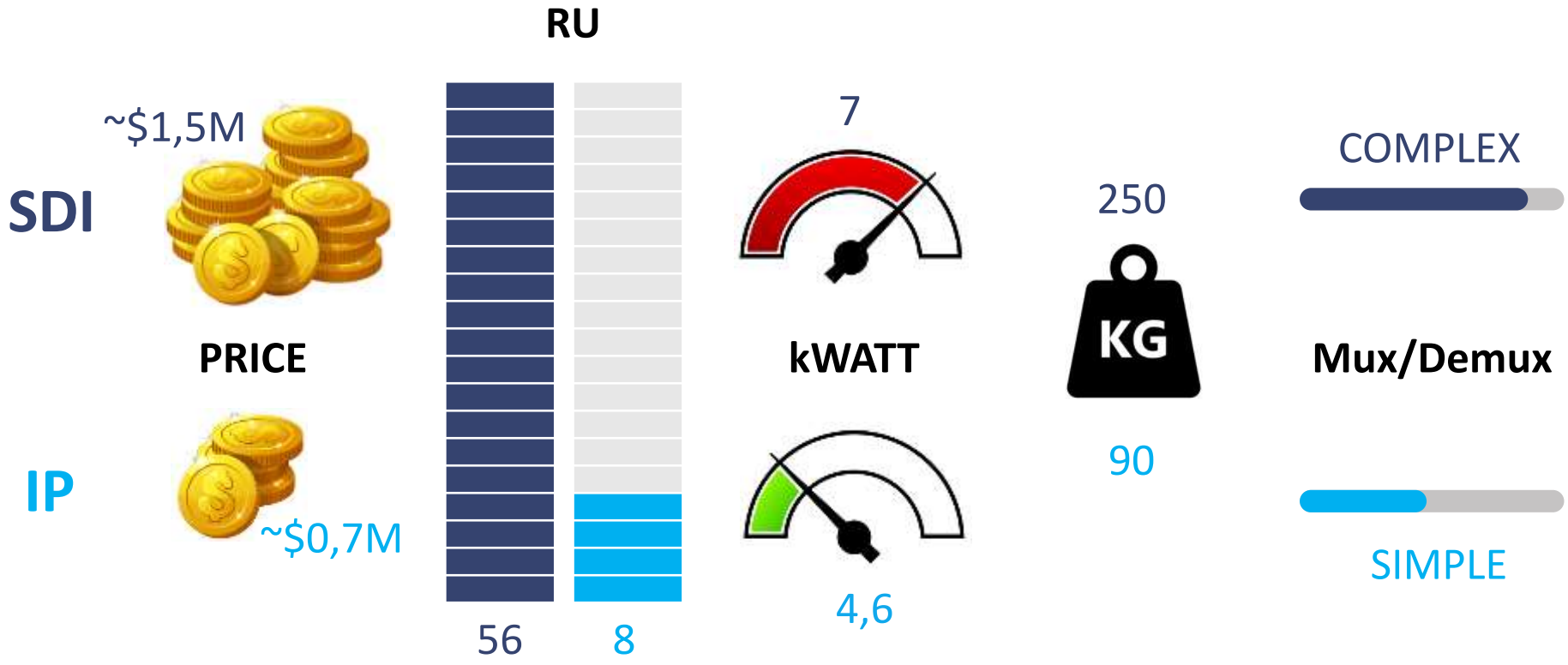
fair points – let's look into these in more detail

C:

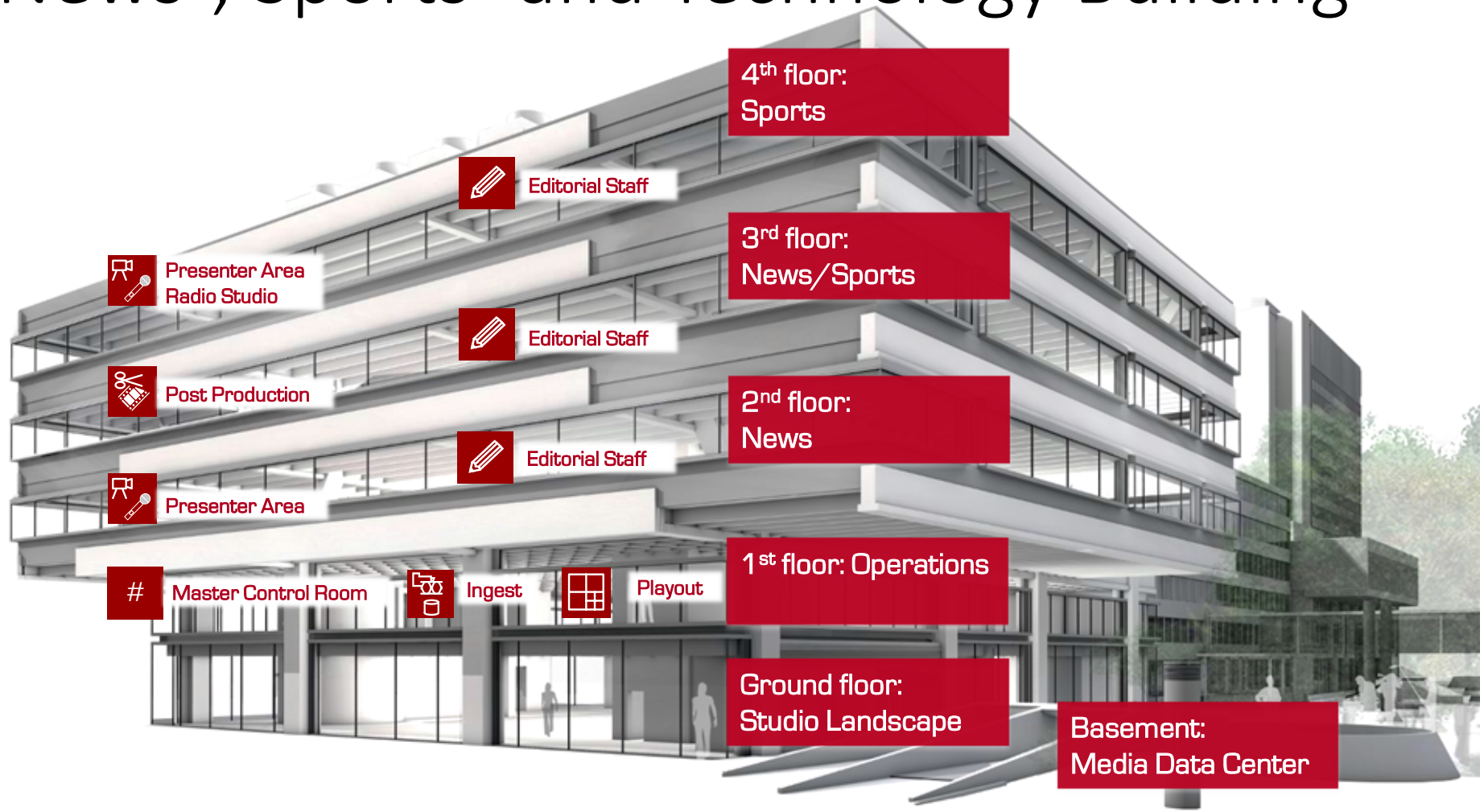
fine – but I hope **I will be retired when it hits my company**…

great plan – please share how you do and finance it and I will follow up

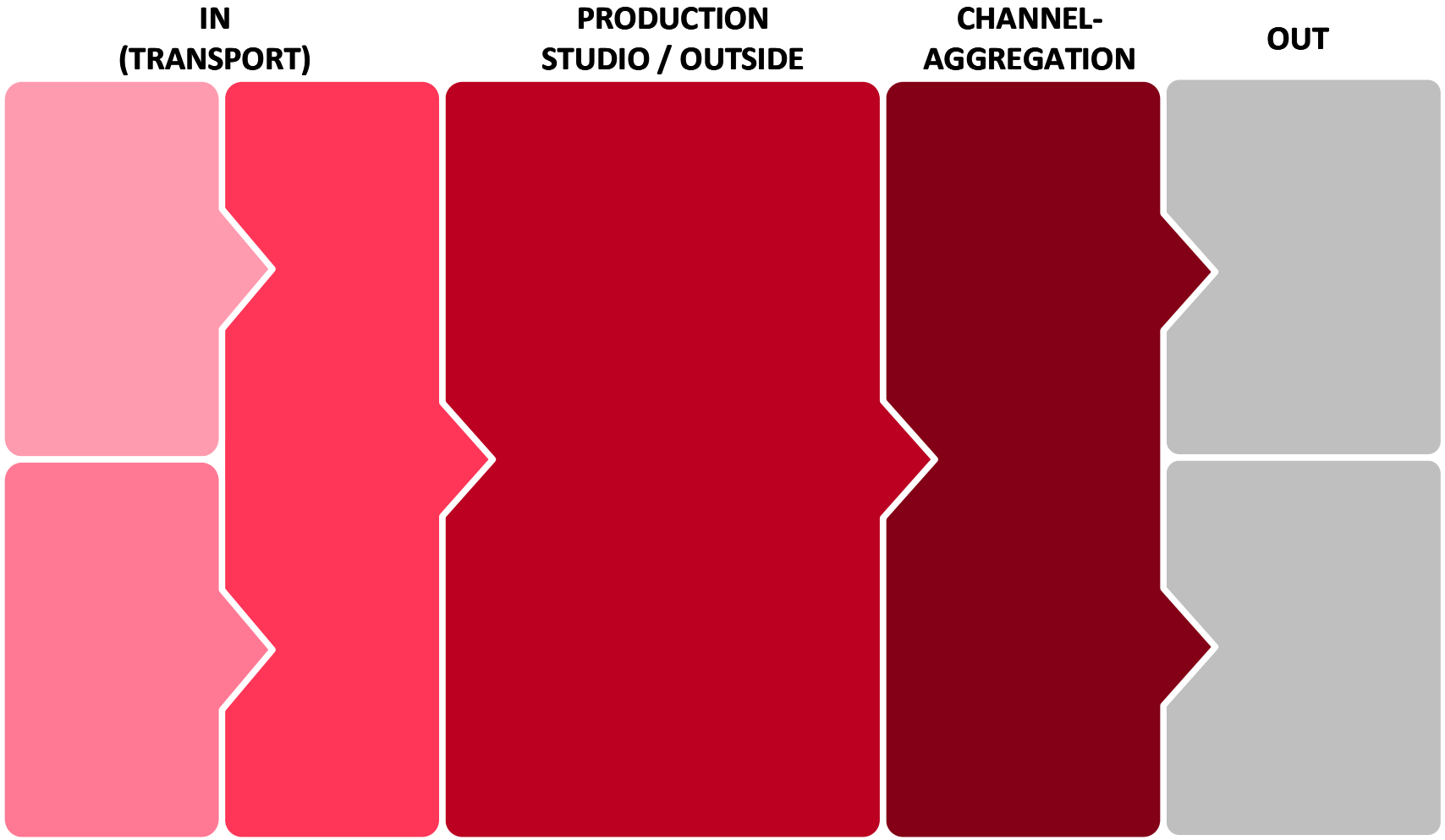
SDI vs IP Core ~256² UHD / 1024² HD



News-, Sports- and Technology Building



Project Perimeter of “Metechno”



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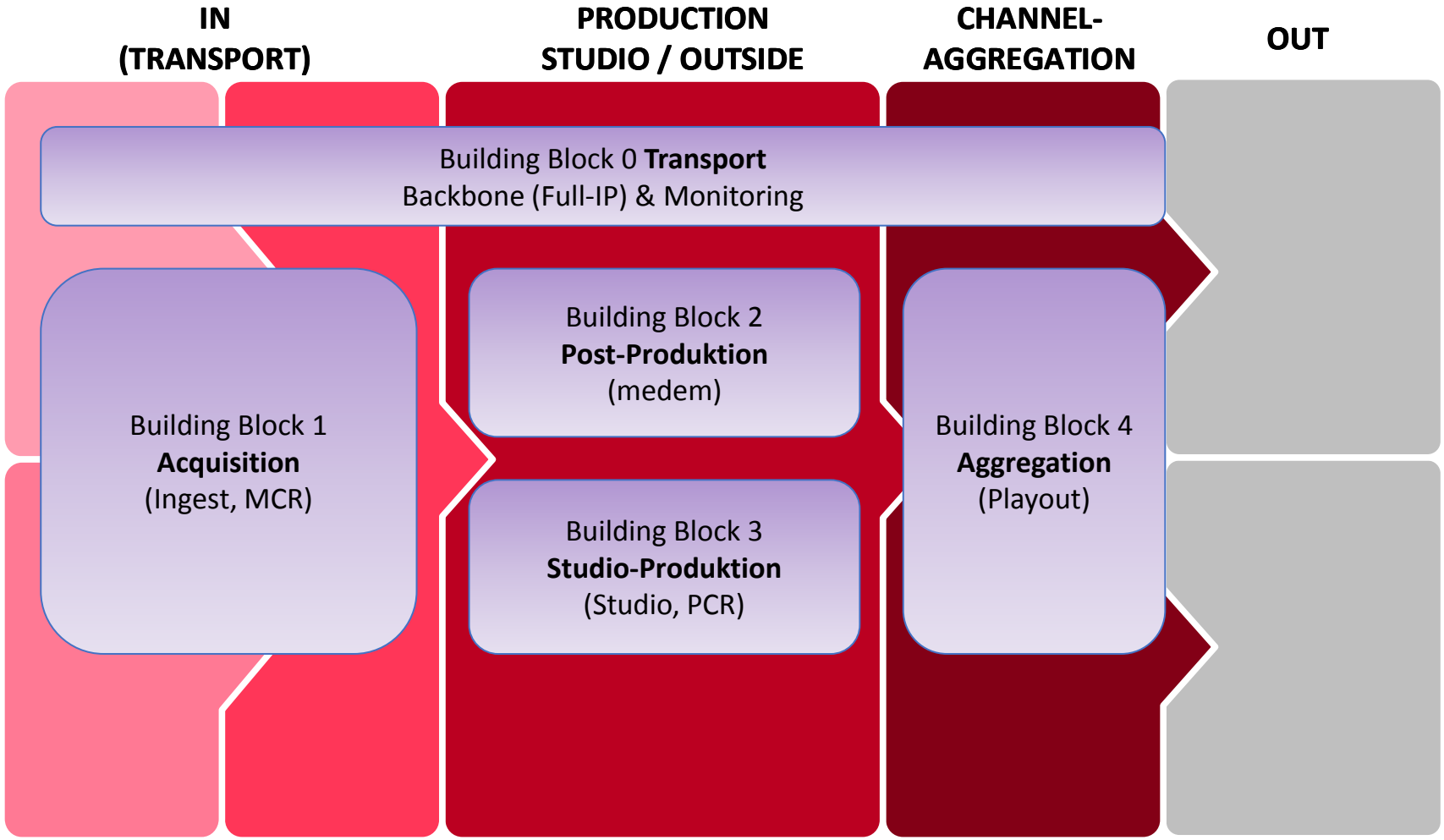


Metechno Technology - Full-IP SMPTE 2110

AV Signal Transport in the News-, Sports- & Technologycenter will be Full-IP

- In-house SMPTE 2110
- External Connections via SMPTE 2022
- SDI Peripherals via Gateway – No hybrid SDI Infrastructure

Why now?

- Committment to Project and Company Goals ➔ Flexibility, Scaleability, future-proof
- Benefits of the «greenfield approach»
- Risks are getting smaller (AIMS, SMPTE 2110 standard approved, AMWA)

Benefits for operation

- Get your signals easier
- Process optimization and automation

The Core Format for HD & UHD

ST 2110-10 System Timing

ST 2110-20 Uncompressed Video

ST 2110-21 Traffic Shaping Uncompressed Video

ST 2110-22 Compressed Video Essence

ST 2110-30 PCM Audio

ST 2110-31 AES3 Transparent Transport

ST 2110-40 Ancillary Data

ST 2022-08 Integration with ST 2022-6

Metechno Technology - Full-IP SMPTE 2110

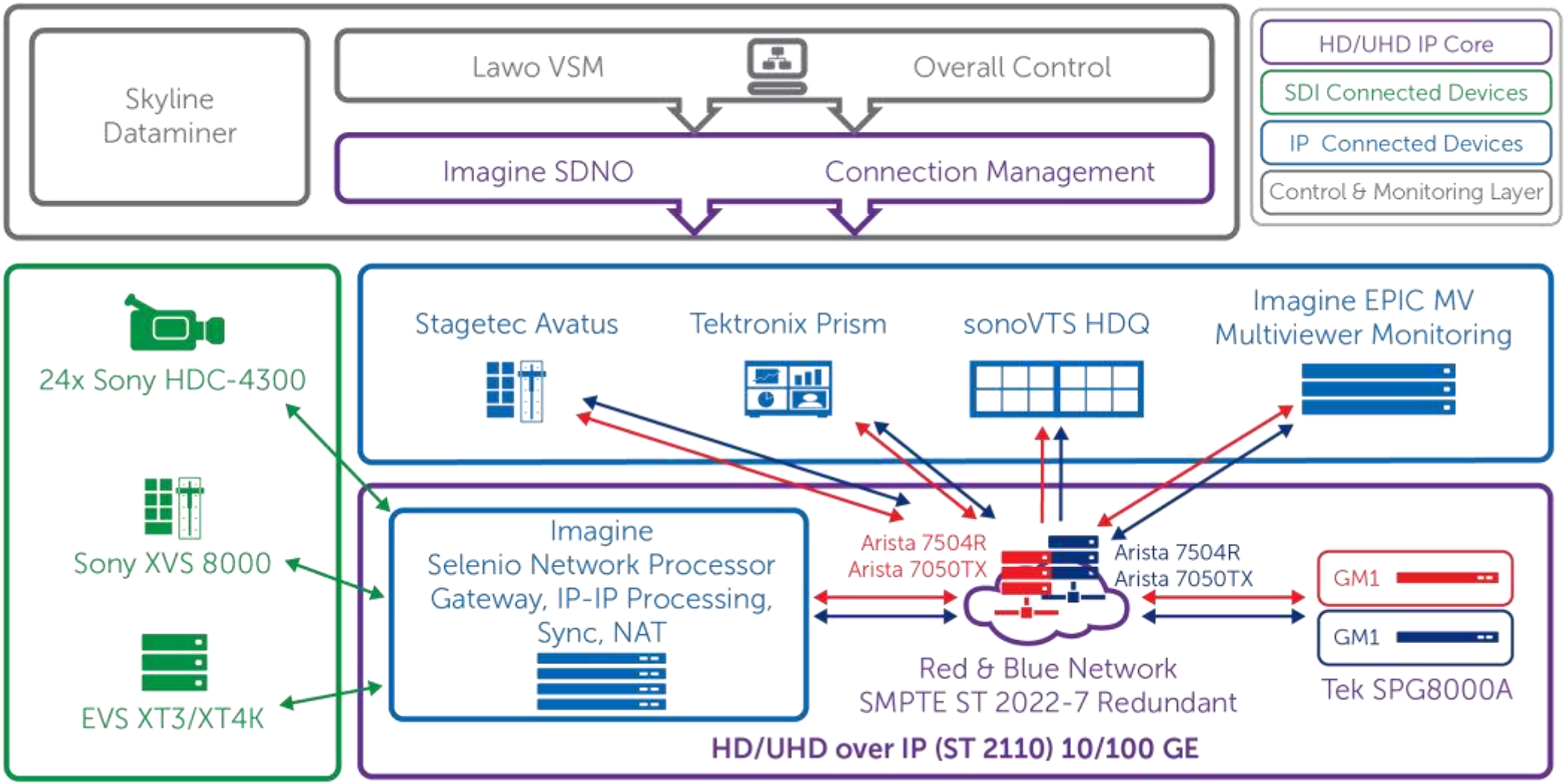
Decision Process

- Summary of what evolved in the last year
- Update risks and chances of the Full-IP decision
- Metechno internal assessment
- External assessment (EBU)

UHD-1 HDR

- Length: 16.5 m; 54ft
- With: 2.5/5.6m; 8.2/18.4ft
- Weight: 39t; 165k lb
- Power: 2 x CEE 63
- Up to 24 UHD-Cameras
- 288 Audio Channels (5.1)
- HD/UHD opt. HDR

Technical Overview UHD-1 HDR



IP Concept

No SDI or AES Router → Full IP Backbone

Compared to SDI: ~184x184 UHD Videomatrix

Extensions can be made easy

SDI / AES3 Sources via Gateways to ST 2110

Full IP to EPIC Multiviewer

COTS Network but Datacenter Class

Non-Blocking Network Architecture (Building will be Blocking!)

Uncompressed Video (up to 12GBit/s)

“Proxy” Generation of each source → Orchestrator switches i.e. Proxy to Multiviewer

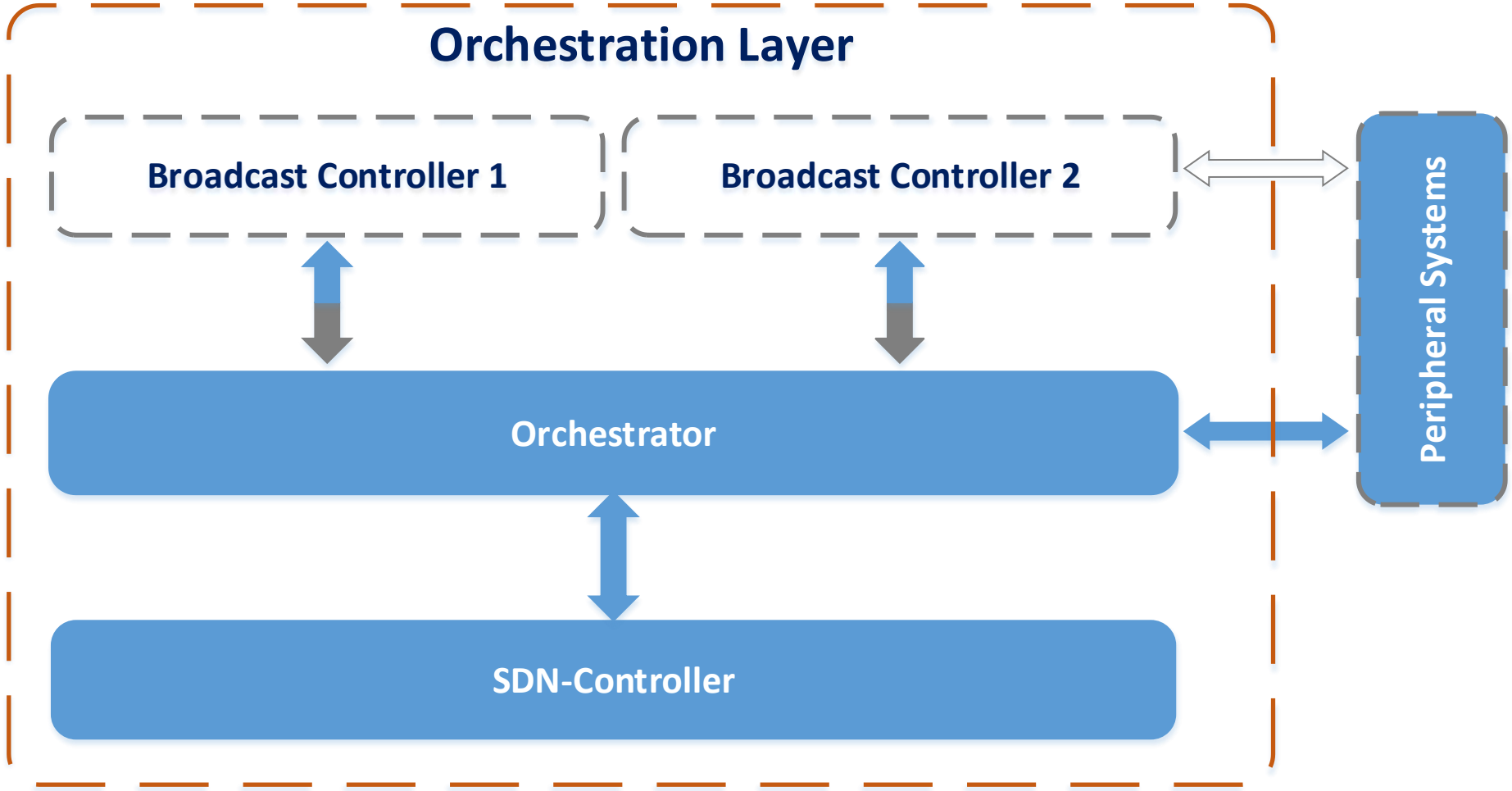
No IS-04 or IS-05 in the Truck → More than 50k Multicast IP-Adresses!

Redundancy

- What if a Switch Fails?
- What if the Optics Fail?
- What if a cable Fails?

- ST 2022-7 Redundancy
  - Send ***Two Copies***
  - On ***Two Interfaces***
  - To ***Two Switches***
  - Join and Receive from both
  - Packet-by-packet merge
  - **Also used for all parts of SMPTE ST 2110!**

ARCHITECTURE



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The «MATRIX»

- 11 Tb/s max throughput
- 108 x 100GE ports (x2)
- In theory: 1000 x 1000 UHD (if fully loaded)

Gateways

- Signal Processing and Format conversion will be made with Imagine Selenio™ Network Processor
- Interfacing from 4x 3GBit SDI / 12 Gbit SDI / SMPTE 2022-6 / NAT to 100GBit/s SMPTE 2022 and vice versa
- 4 independent Processor blocks per unit
- Generates “Proxy” while processing to IP

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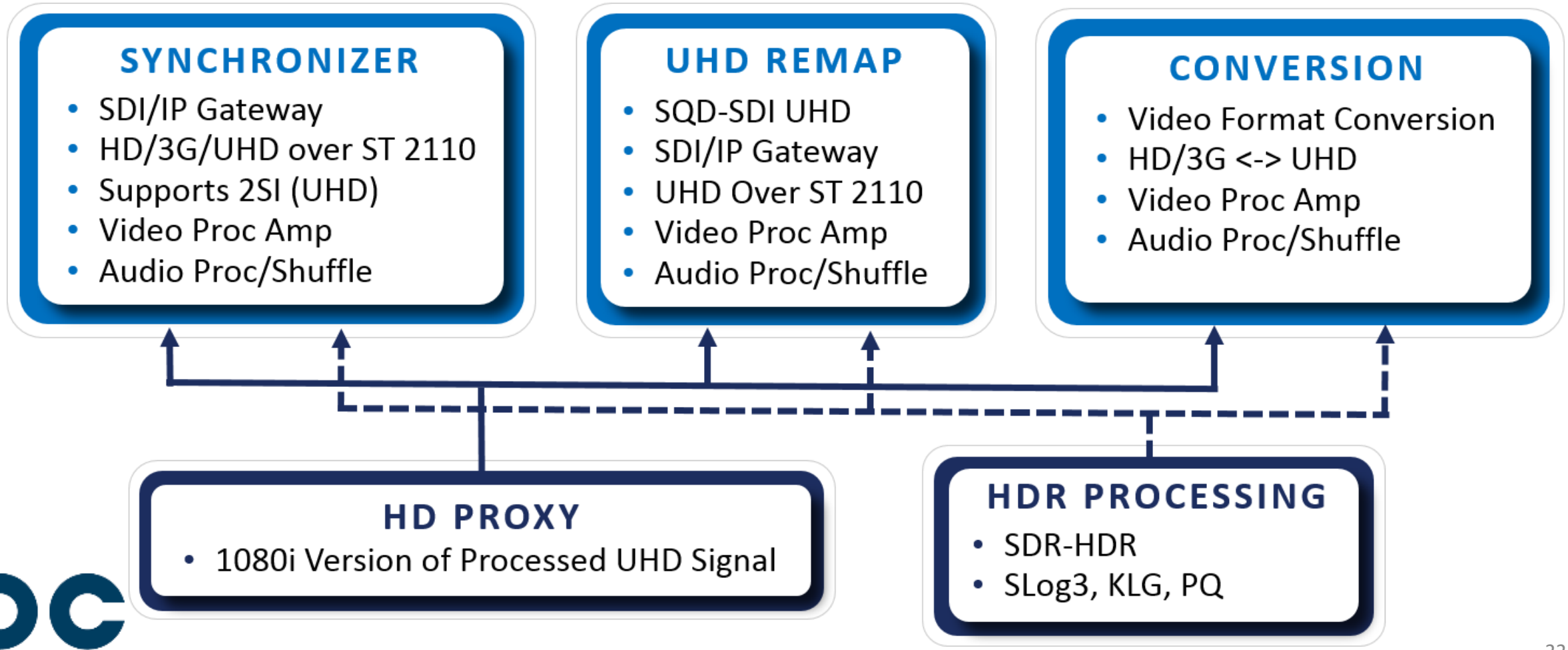
SNP processor personalities (modes of operation)



Experiences with UHD1 HDR

Realtime Network runs stable and solid

No Capacity or Bandwidth issues

Due to Elementary Streams

- Latencies i.e. A/V Runtimes need attention again but are stable and predictable
- Gateways have to modes: Low-Latency or Sync-Mode (like Framestore)
- Audio Mixes are available in the Network in different Timebases

No Embedding or De-Embedding anymore

- Virtualised Embedding in the Orchestrator, Maximum of Flexibility in Audio Handling

Multiviewer Flexibility

- Every Audio / Videosource can be routed to every Monitor, no fixed connection from Multiviewer to Monitor

Experiences with UHD1 HDR

PTP

- Not stable in the beginning
- PTP is less stable than Blackburst or Tri-Level-Sync
- No problems if you stay in IP but Wander if you convert to SDI

Directors Experiences

- No negative feedback because of IP but positive feedback due to the higher flexibility

Training

- Basic Network training for all Operators
- Super-Users have deeper training
- i.e. IP-Address Conflicts can be solved from normal Operator
- Couple of unicorn’s (Hybrid of IP, Audio, Video Experts)

Experiences with UHD1 HDR

UHD and HDR

- Soccer Europa league and Champions league → UHD SDR
- Cultural Events like Ballets or Concerts → UHD HDR
- Other Productions mainly 1080i/25 SDR

HDR Experiences

- HDR is more challenging for Vision-Engineers
- We have the SONY Workflow: Matching in SDR
- Master-Controller is controlling the HDR
- Clear and strict Workflows are necessary

Focus Control of Cameras

- Again more challenging than in HD

UHD1 HDR – Main Products

IP Realtime Network and Orchestration…… ARISTA Imagine COMMUNICATIONS

Broadcast Controller…… LAWO

IP Gateways & Processing…… Imagine COMMUNICATIONS

Cameras and Vision Mixers…… SONY

Graphics…… vizrt

Audio System…… STAGETEC

Umbrella Monitoring…… skyline communications

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Metechno Technology – Main Products

IP Realtime Network and Orchestration……. ARISTA nevion

Broadcast Controller…… BFE

IP Gateways & Processing…… Imagine COMMUNICATIONS

Post-Production System and Cameras …… SONY

Robotics…… ELECTRIC FRIENDS

Studio Automation and Graphics …… vizrt

Vision Mixers…… EVS

Umbrella Monitoring…… skyline communications

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Conclusion

IP in ST 2110 works in reality

Expected flexibility fulfilled

Format agnostic approach works

No IP-Experts needed in production → Change is possible and not as hard

Compromises (Gateways) in the truck, much less in the building

Experiences are very helpful for the planning → IP-Lab

Close relationship to manufacturers is needed

Very motivated Employees!

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Thank You

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