A “full IP” UHD system camera solution supporting SMPTE 2110 in any operational mode

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IP SHOWCASE THEATRE AT METexpo 17-19 July 2019

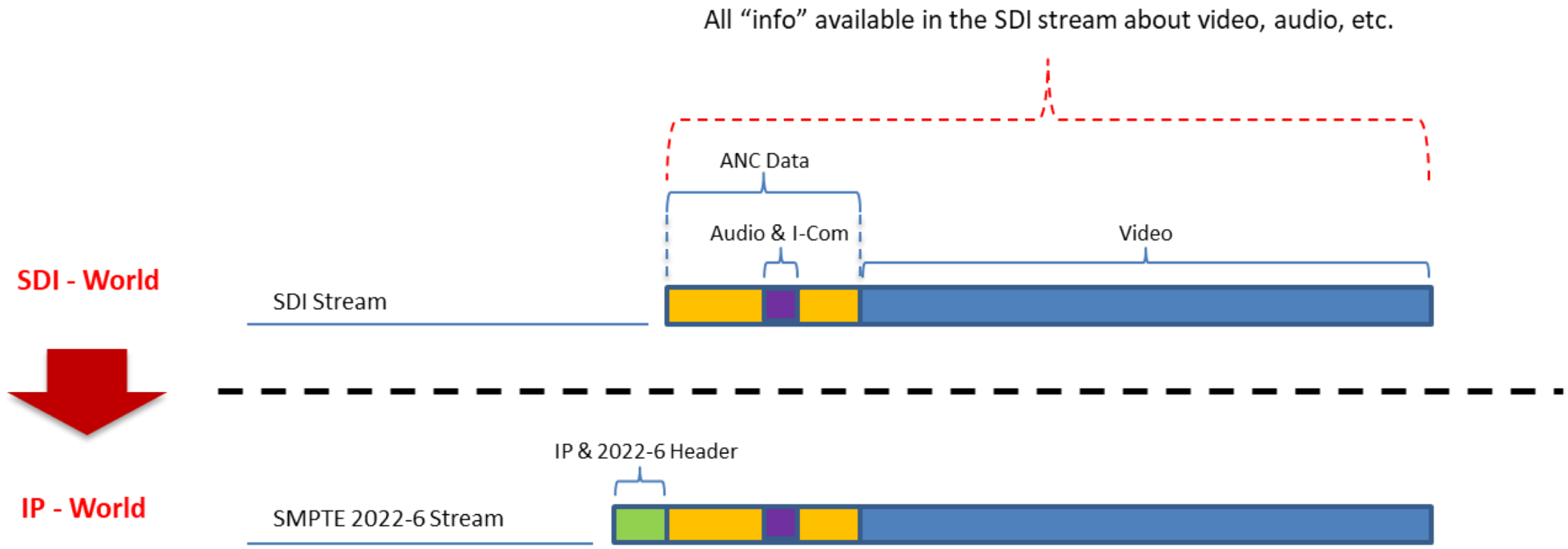
Agenda

- IP fundamentals
- IP connectivity on system cameras
  - IP and base band I/O's
- Connectivity at a "full IP" camera base station
  - DirectIP / DirectIP+
  - IP Trunk
  - C2IP Control
- Conclusion

IP fundamentals

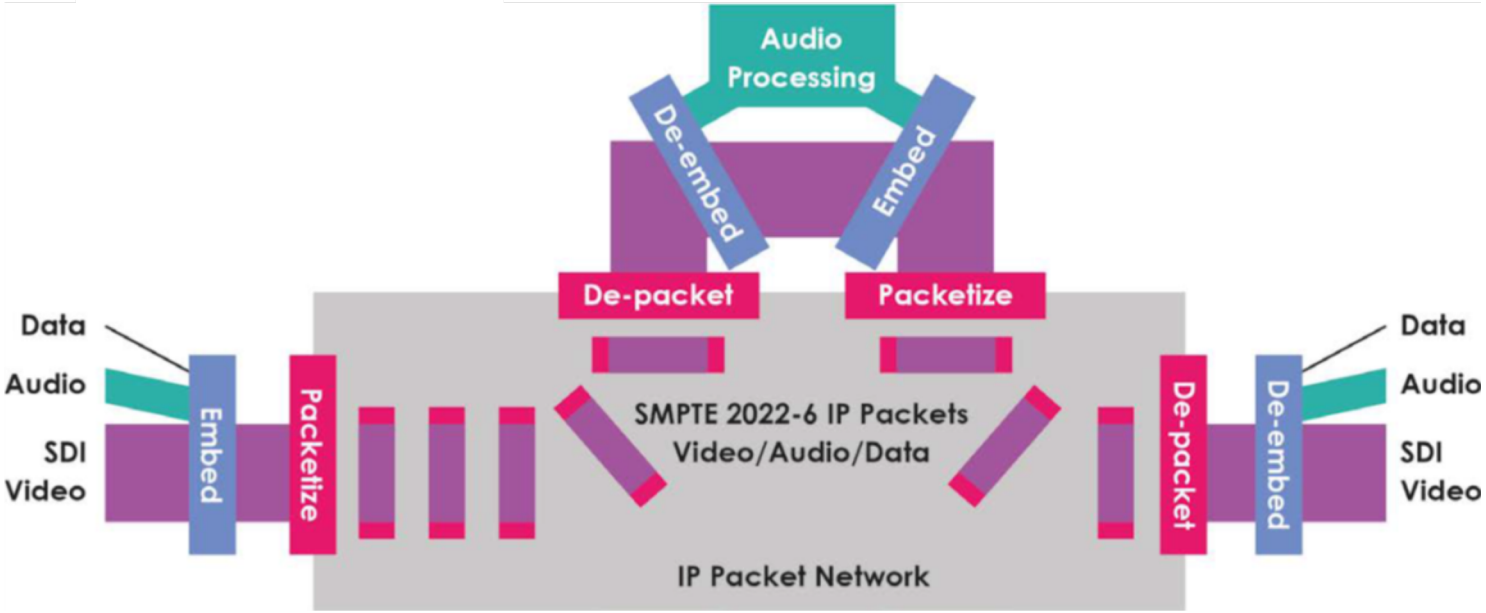
IP - Fundamentals

- SMPTE 2022-6 / It's like converting "SDI into the IP world"



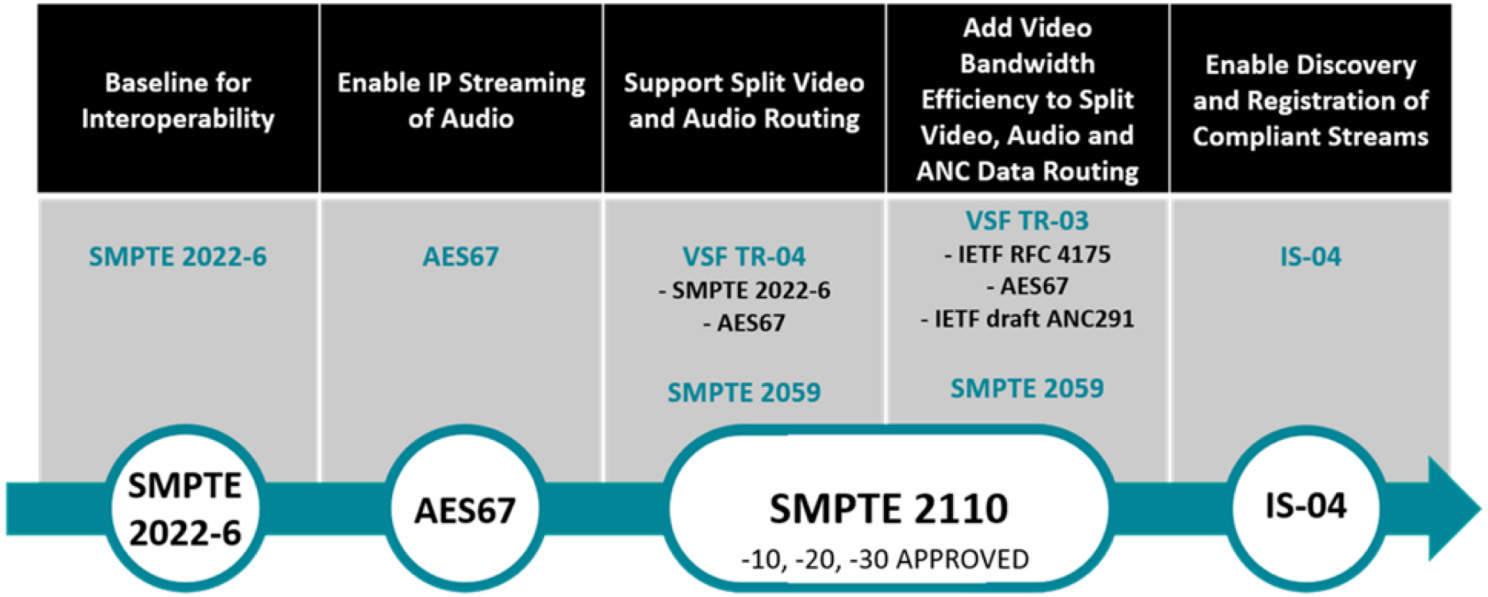
IP - Fundamentals

- SMPTE 2022-6 / Carry all the different signals into one IP stream
  - + All signals are always in sync (an optimized solution e.g. interconnecting two sites)
  - – Any processing require to “un-pack” and “re-pack” the IP stream



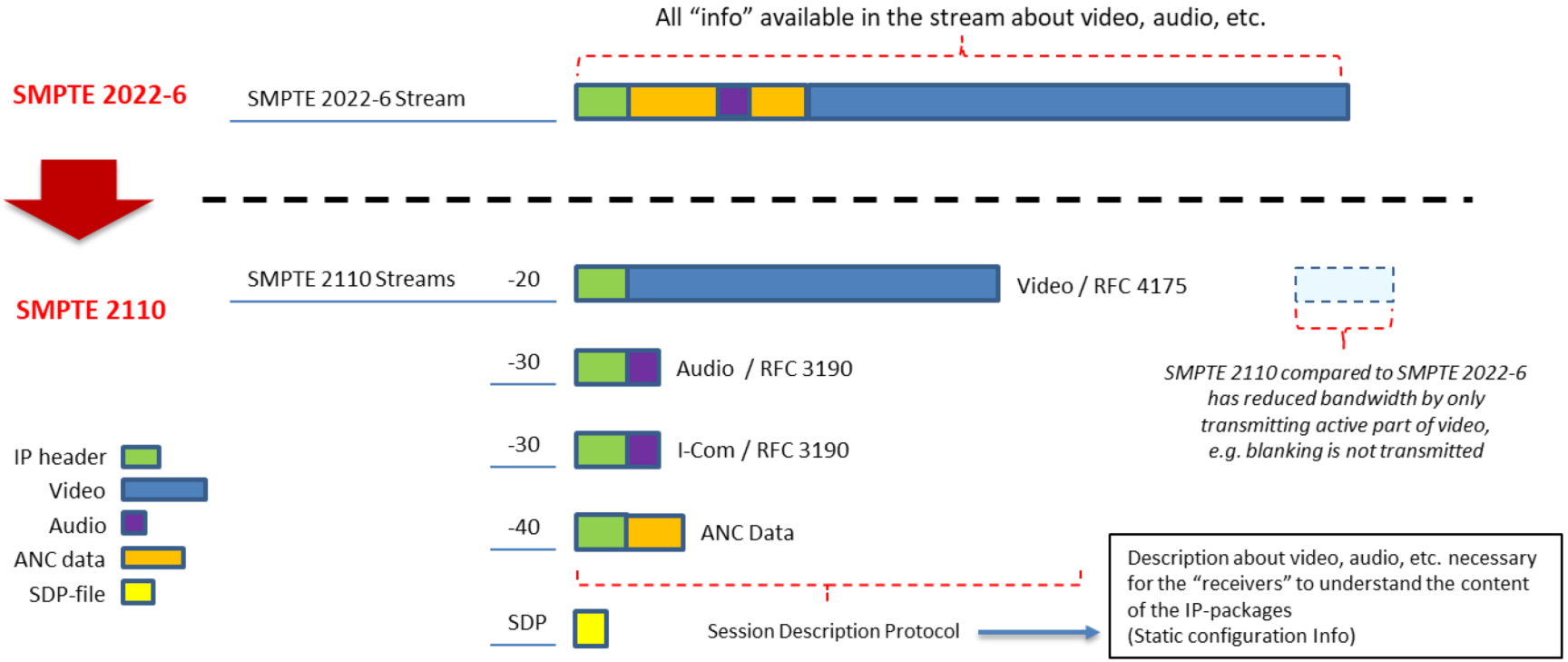
IP - Fundamentals

- SMPTE 2022-6 offers a great solution for point-to-point connections
- Groups such as AIMS helped to define and adopt one set of common standards-based protocols for interoperability over IP – SMPTE 2110



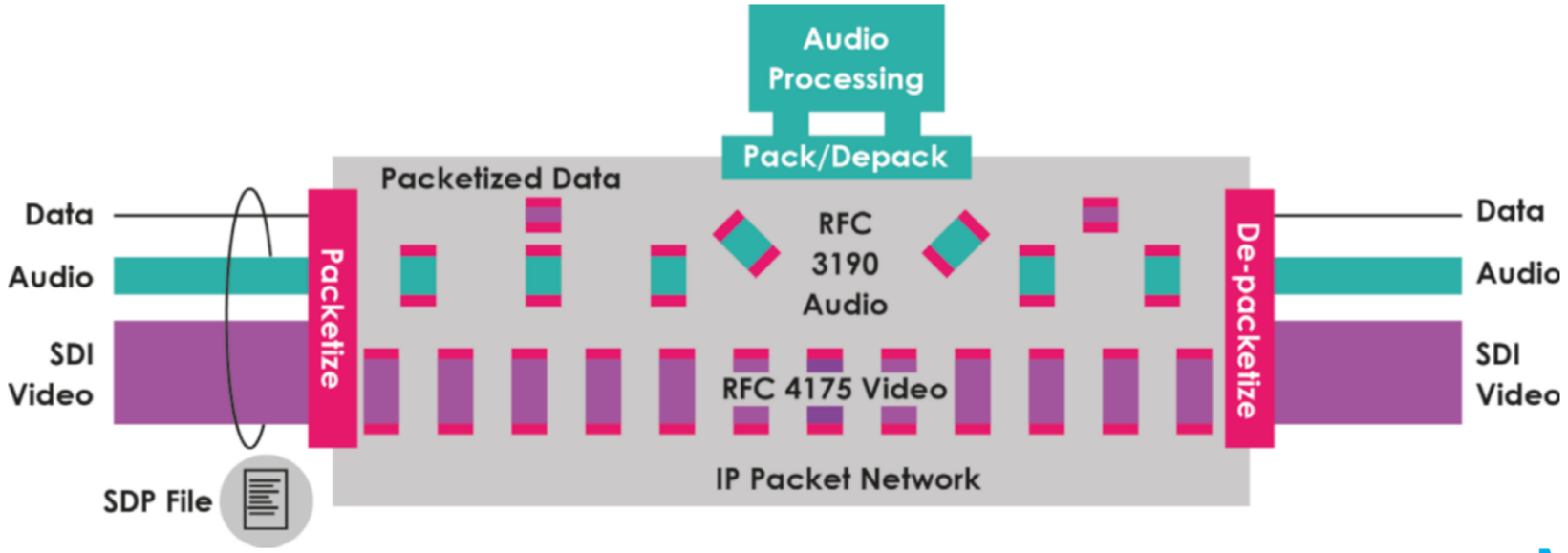
IP - Fundamentals

- SMPTE 2110 / Carry the different signals as separate essence in IP



IP - Fundamentals

- SMPTE 2110 / For more efficient use of IP signal structure
  - Signals available as separate essences (making the individual use easier and more efficient)
  - Optimized bandwidth efficiency by only carry required data's



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IP connectivity on system cameras

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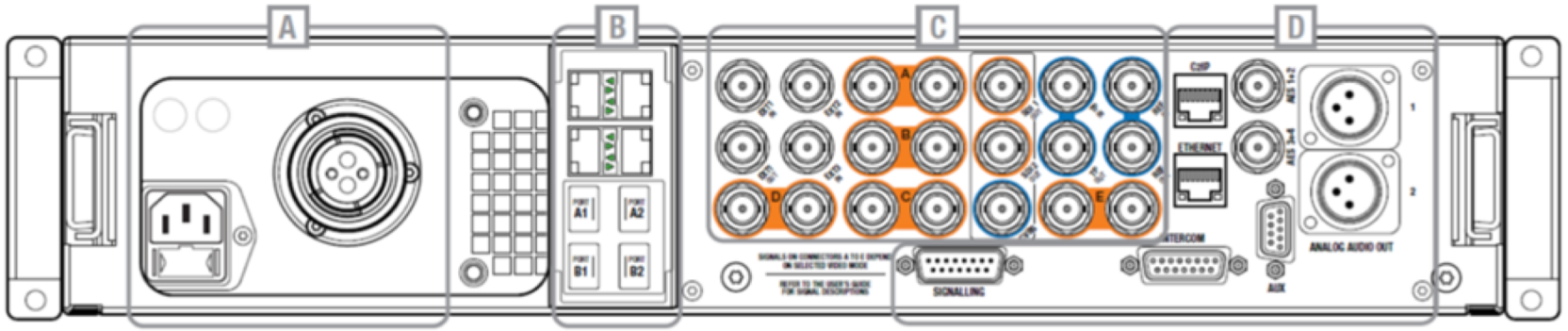
IP connectivity on system cameras

- On a camera base station multiple input & output signals are available:
  - Video
  - Audio
  - Intercom
  - Control
  - Tally
- All these signals need to be provided through the IP-interface

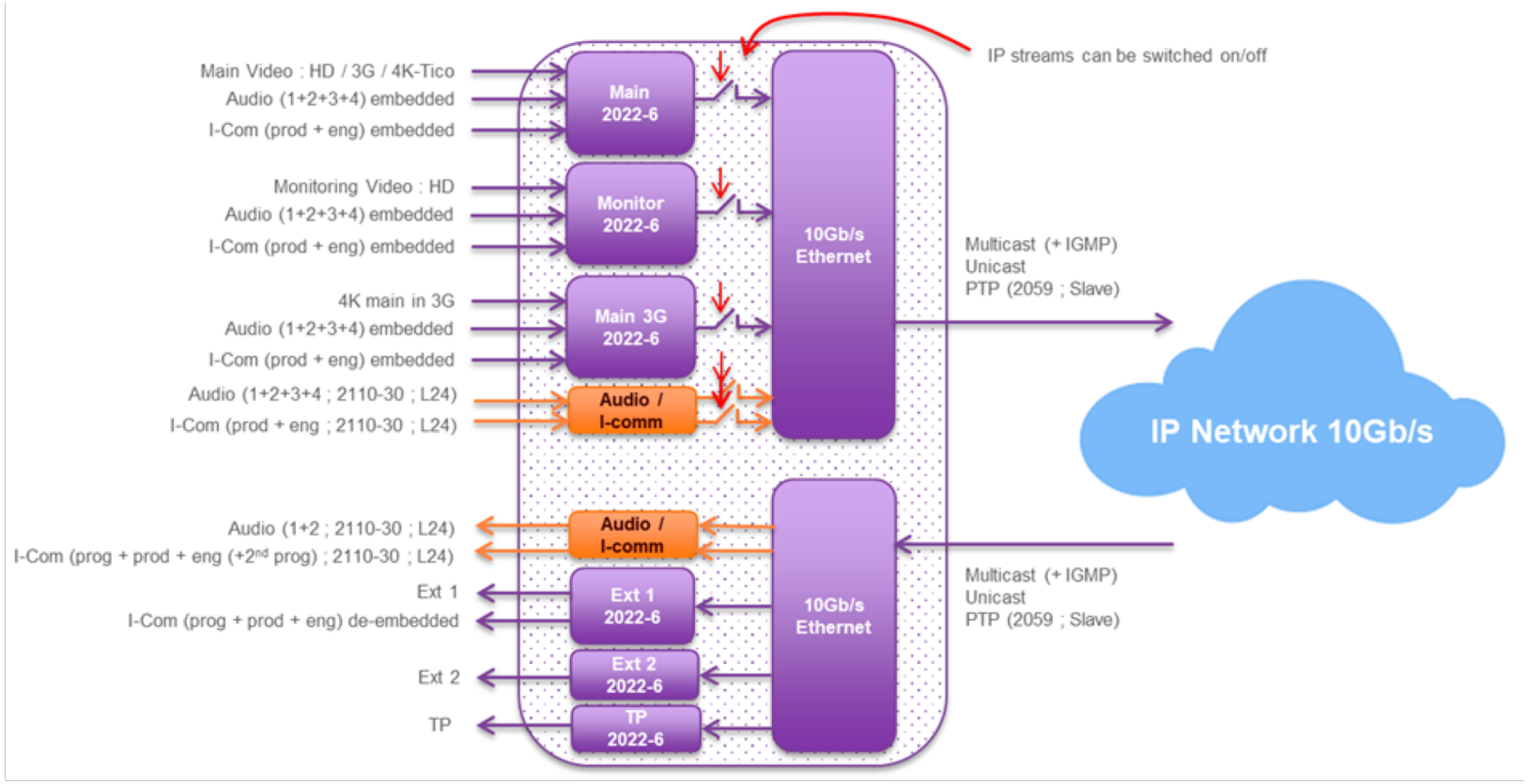


- Area A: Power and Transmission
- Area B: Media Network bay
- Area C: Baseband BNC video connectors
- Area D: Studio connectors

IP connectivity on system cameras

- For ultimate flexibility the IP-interface must support:

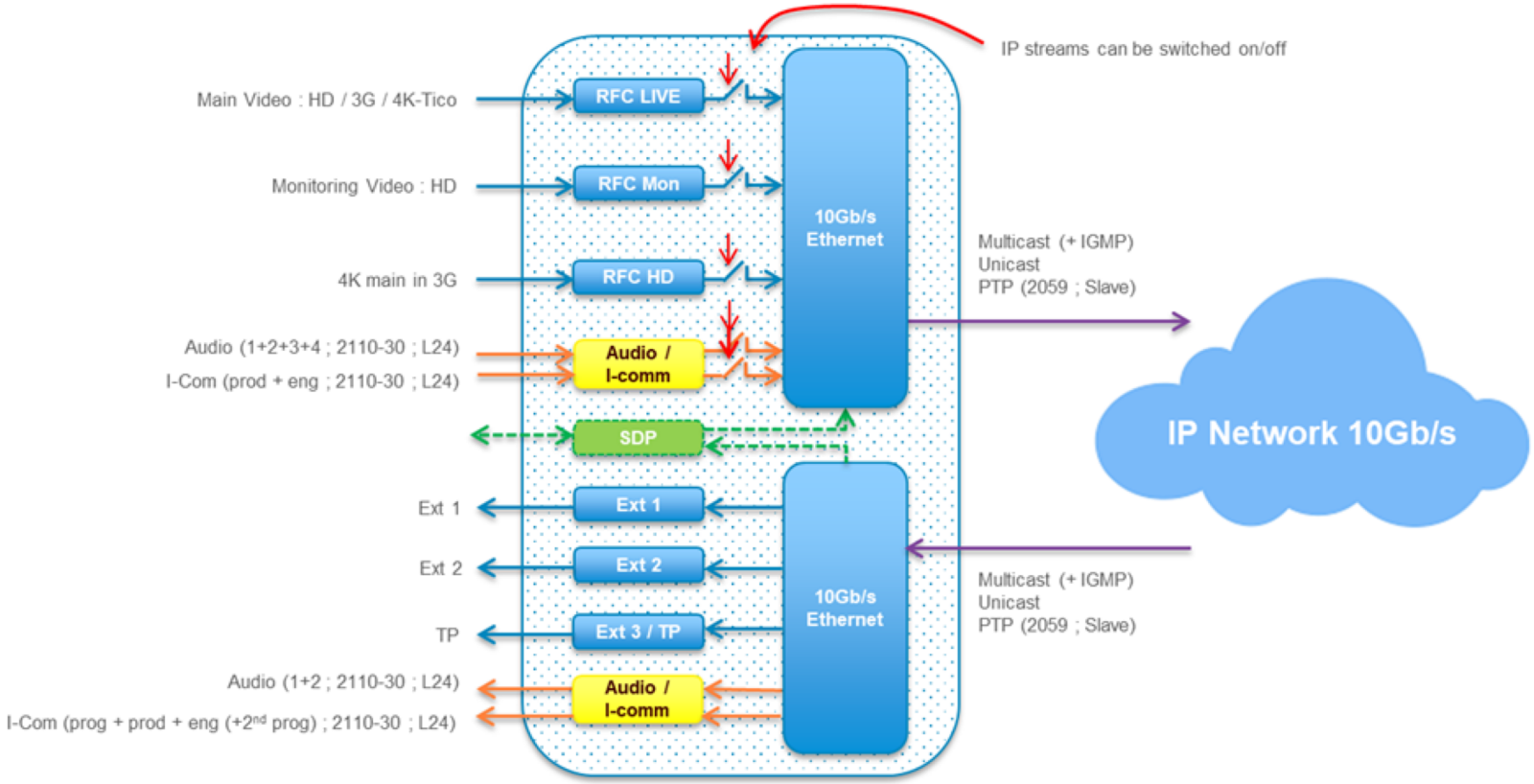
  SMPTE 2022-6 operation…



IP connectivity on system cameras

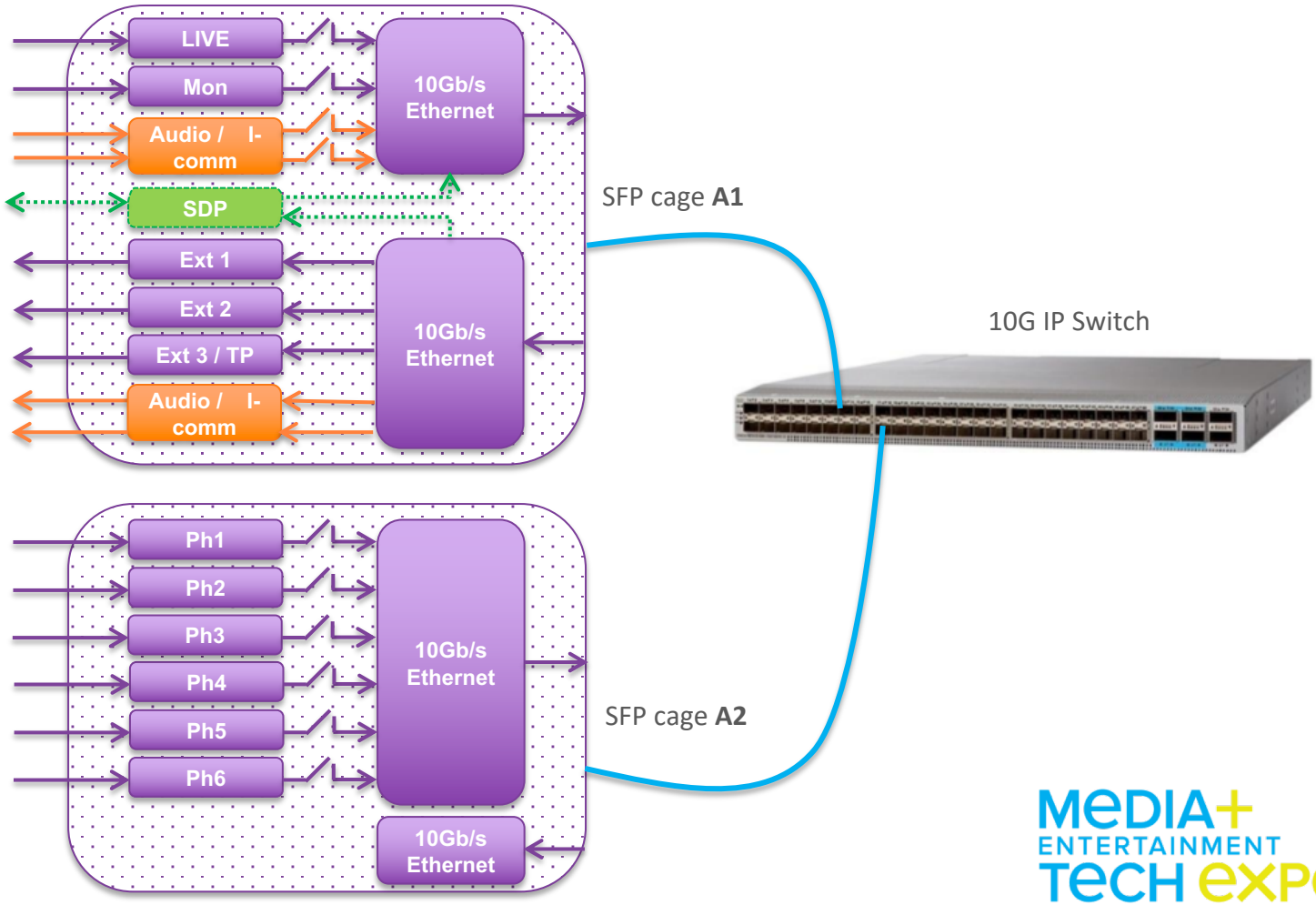
- For ultimate flexibility the IP-interface must support:

  …as well as SMPTE 2110 operation



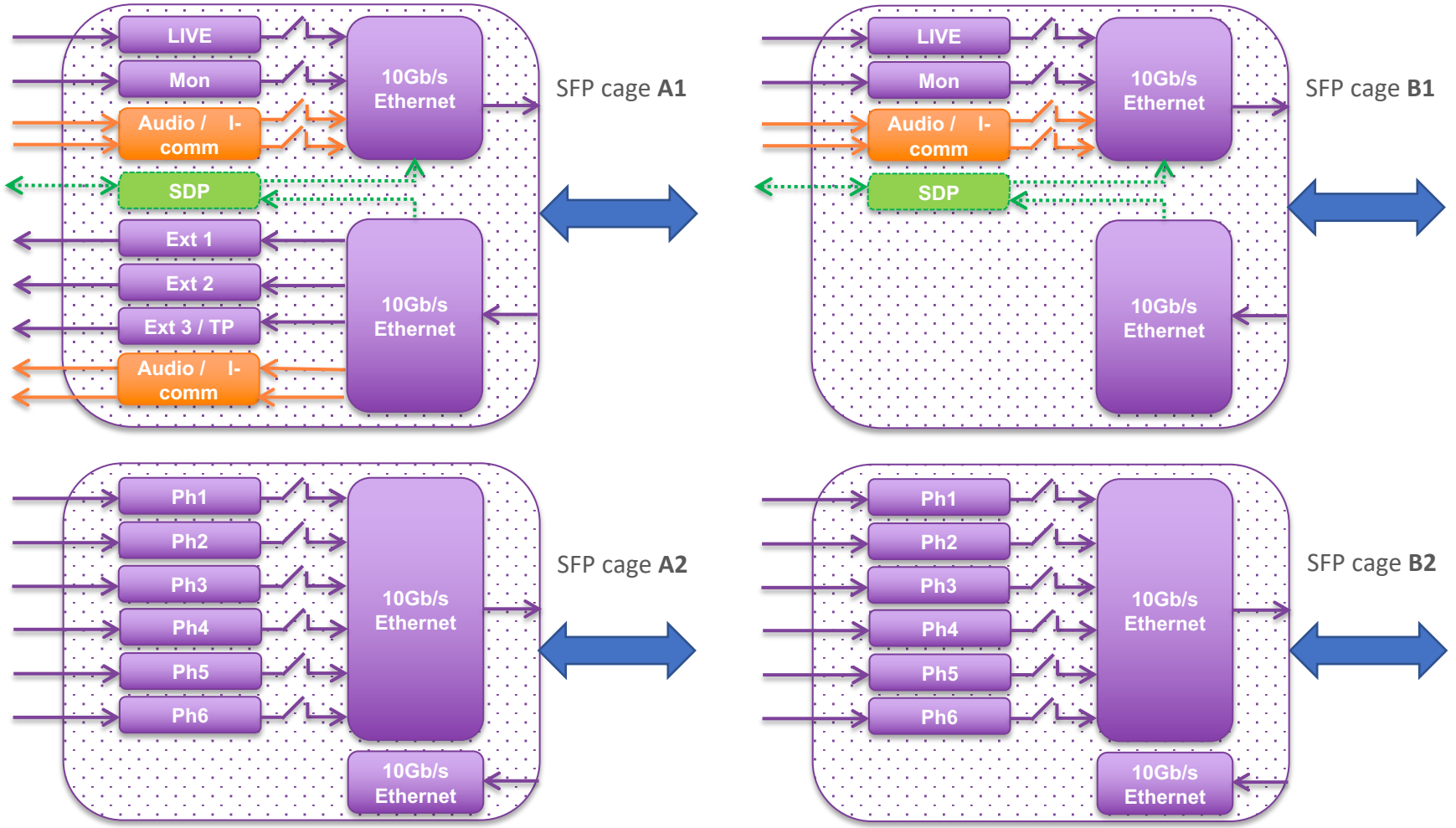
IP connectivity on system cameras

- And all that in 4K, 3G, HD, 3x speed, 6x speed…



IP connectivity on system cameras

- And all that in 4K, 3G, HD, 3x speed, 6x speed…
- And as redundant IP too…



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Connectivity at a “full IP” camera base station

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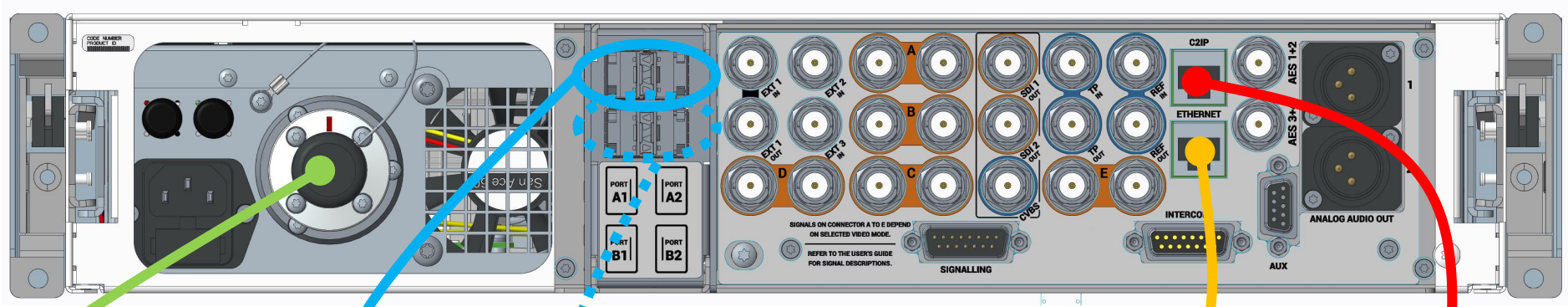

XF transmission
10G IP
(Hybrid Fiber cable)

MAIN
IP network
10G IP

REDUNDANT
IP network
10G IP

IP trunk
10/100/1G

Camera Control
network
(C2IP)

IP switch
10/100/1G

CSS or
MCP450

CGP or
OCP

IP trunk
10/100/1G

e.g. VSM Control
(XML command protocol)

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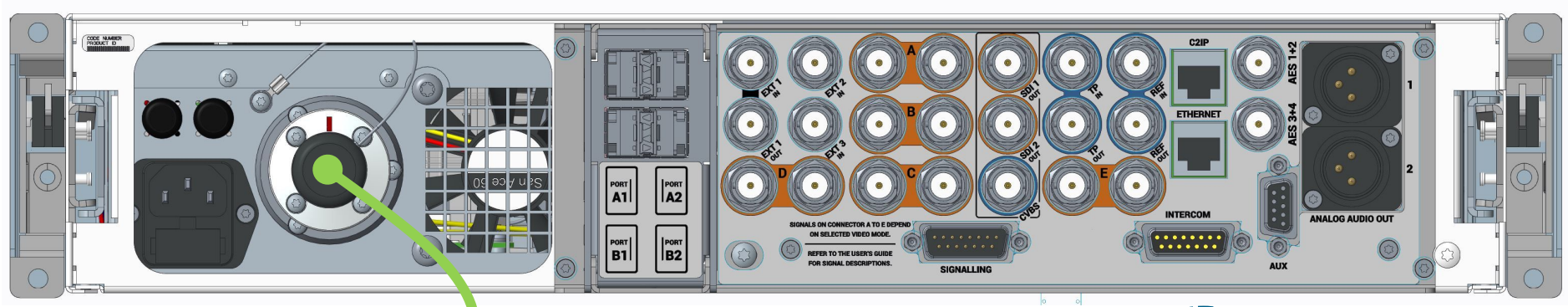
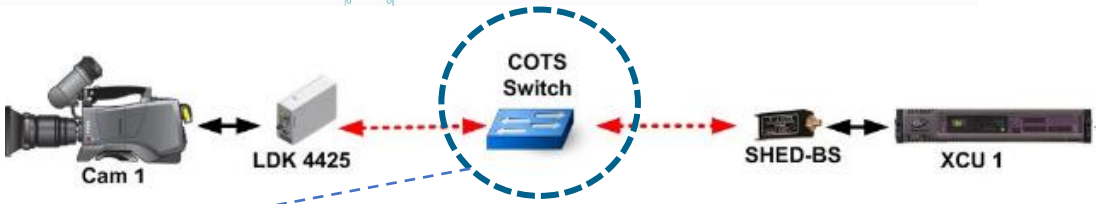
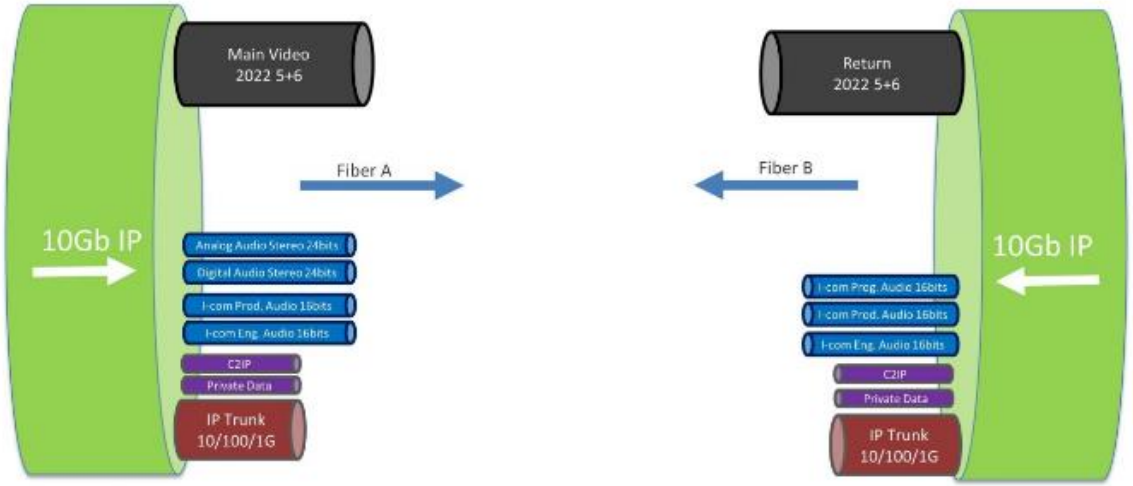
SMPTE



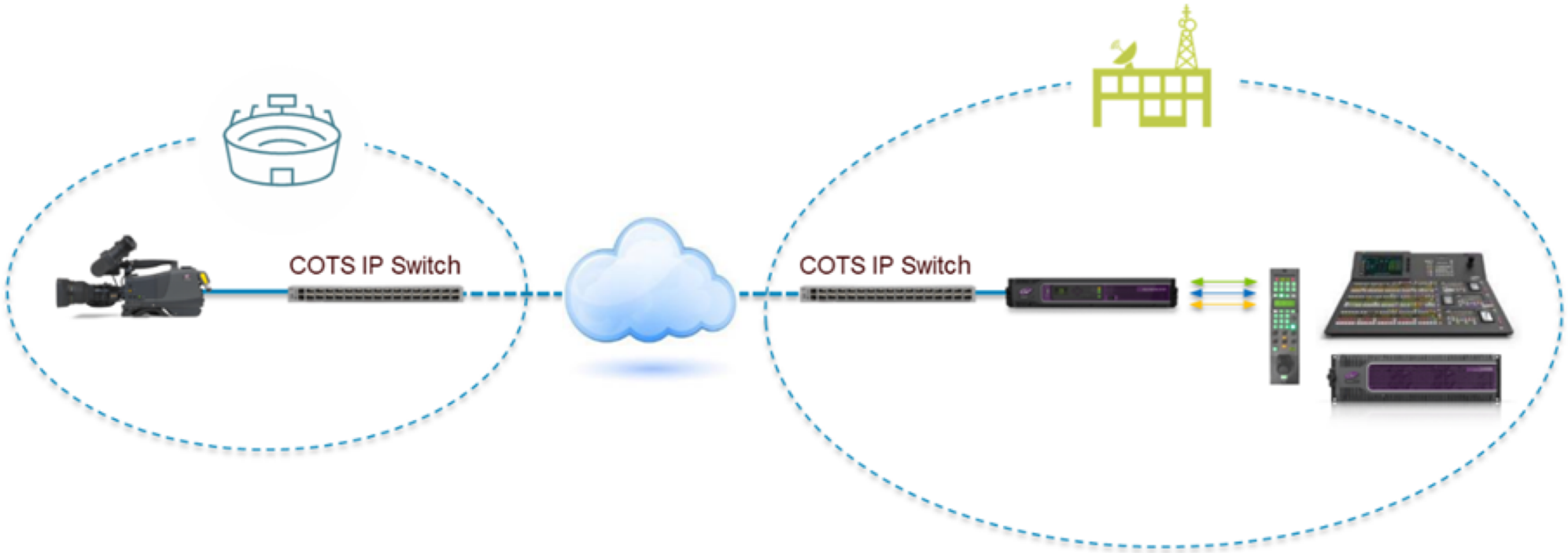


XF transmission
10G IP
(through COTS switches)



DirectIP operation

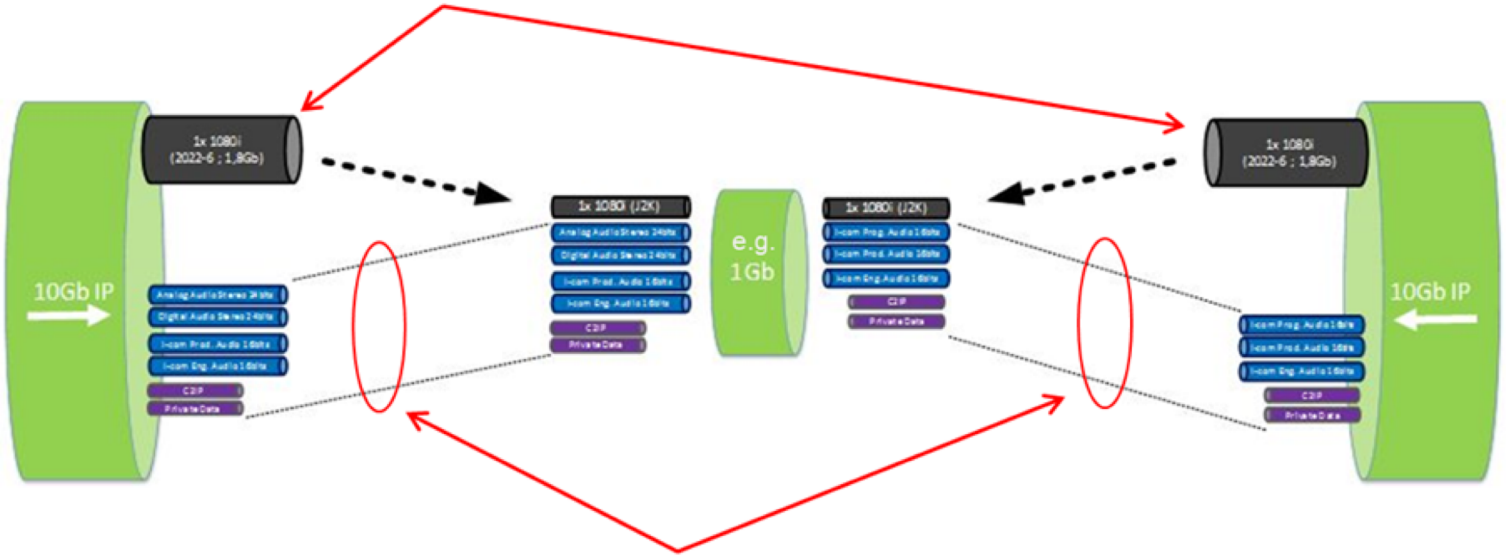
- Fully uncompromised connection between camera and base station
  - Over any distance and without any latency (other than network latency)
  - Many use case around the world



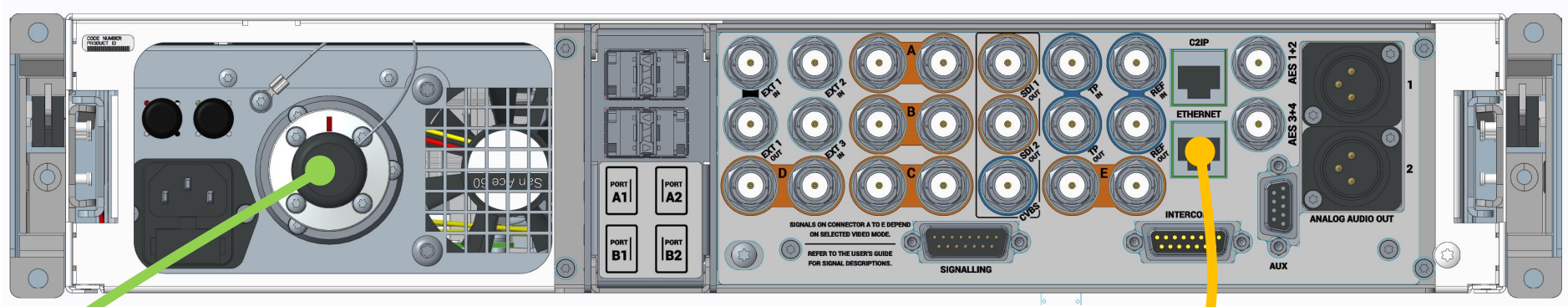
DirectIP+ operation

- If the IP network does not offer the performance required for uncompressed operation compression can be added
  - Reduce bandwidth required for visible lossless image quality by 90%

- Compress the video streams, so they fit into smaller bandwidth



- Keep IP connection for Audio, I-com, C2IP uncompressed (8Mb trunk)



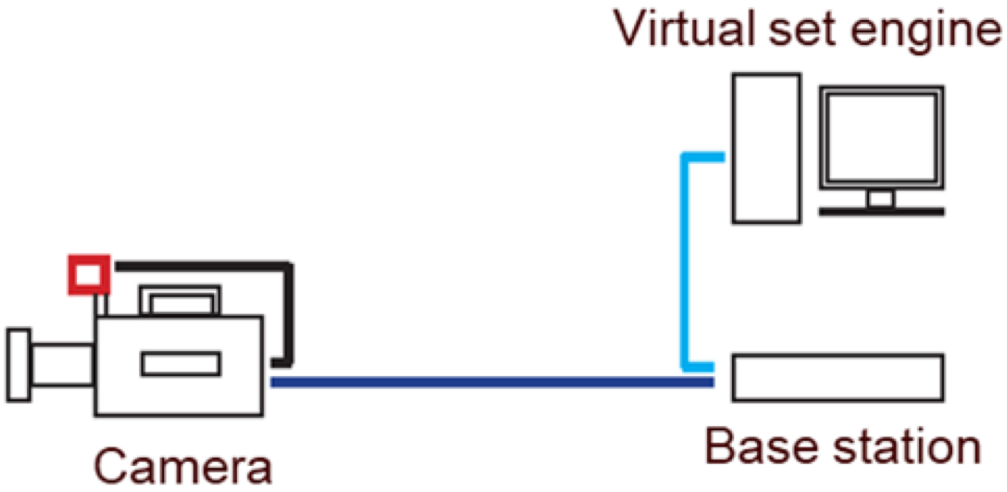
IP trunk
10/100/1G

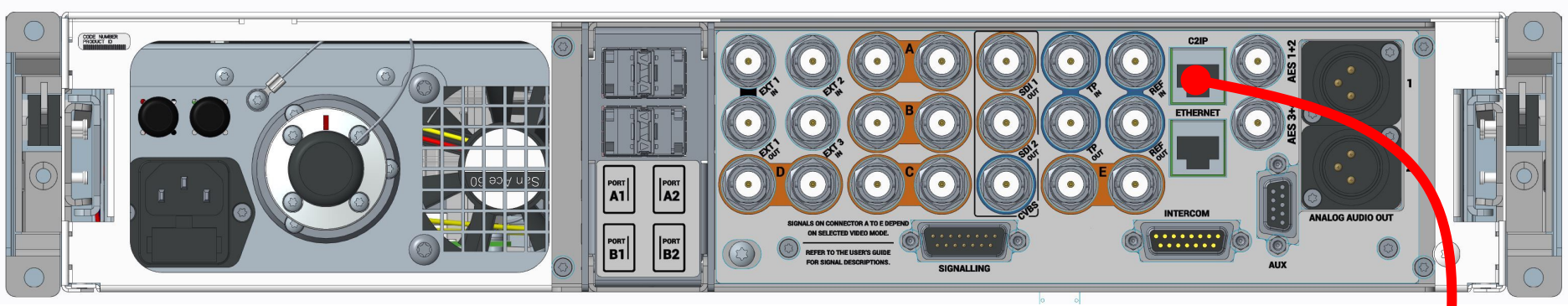
IP trunk (10/100/1G)
Complete independent IP network connection
(separate from camera / XCU)

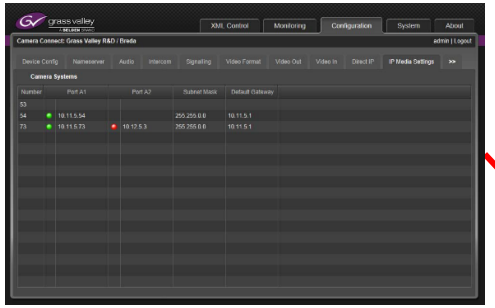
IP trunk
10/100/1G

IP Trunk

- IP trunk can be used for multiple use cases
  - E.g. a fully integrated tracking solution for AR & VR applications







Camera Connect

Camera Control network (C2IP)

IP switch 10/100/1G

CSS or MCP450

CGP or OCP

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Camera Connect SDK function reference

Camera Connect application version	*v1.40*

The following table shows a list of functions and NS_IDs that are available in the system

NS_ID	*Function Name*
513	Gain Red
514	Gain Green
515	Gain Blue
516	Black Red
517	Black Green
518	Black Blue
519	Flare Red
520	Flare Green
521	Flare Blue
522	Notch level
523	Soft Detail level

Software Development Kit (SDK)
To have “remote” camera control
(XML command protocol)

e.g. VSM Control
(XML command protocol)

Conclusion

- IP infrastructures offer many advantages
- IP interfacing of head and base station offers great potential
  - New workflows for on-campus installations
  - Remote at-home productions over unlimited distances
- A camera base station offering…
  - All the current baseband connections
  - All signals over SMPTE 2110 including redundant operation
  - Additional IP connectivity for control and camera signal transmission

…delivers a fully future proof solution

Thank You

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