

Camera Training Center Breda The Netherlands

February 2017

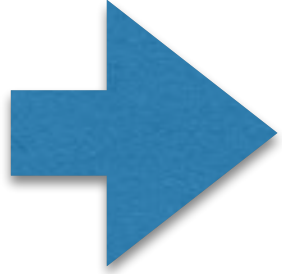


grass valley

A **BELDEN** BRAND

IP Basics and Operability GV products

Session

- 
- ☒ **1: Introduction IP (Basic overview)** Basic knowledge for IP is mandatory
 - ☐ **2: Introduction UXF XCU**
 - ☐ **3: Setup with XCU Menu & Camera Connect** (Available as Video soon)

IP Basics and Operability GV products

❖ Session 2:

❑ Introduction UXF XCU (Package 7 Aug 2018)

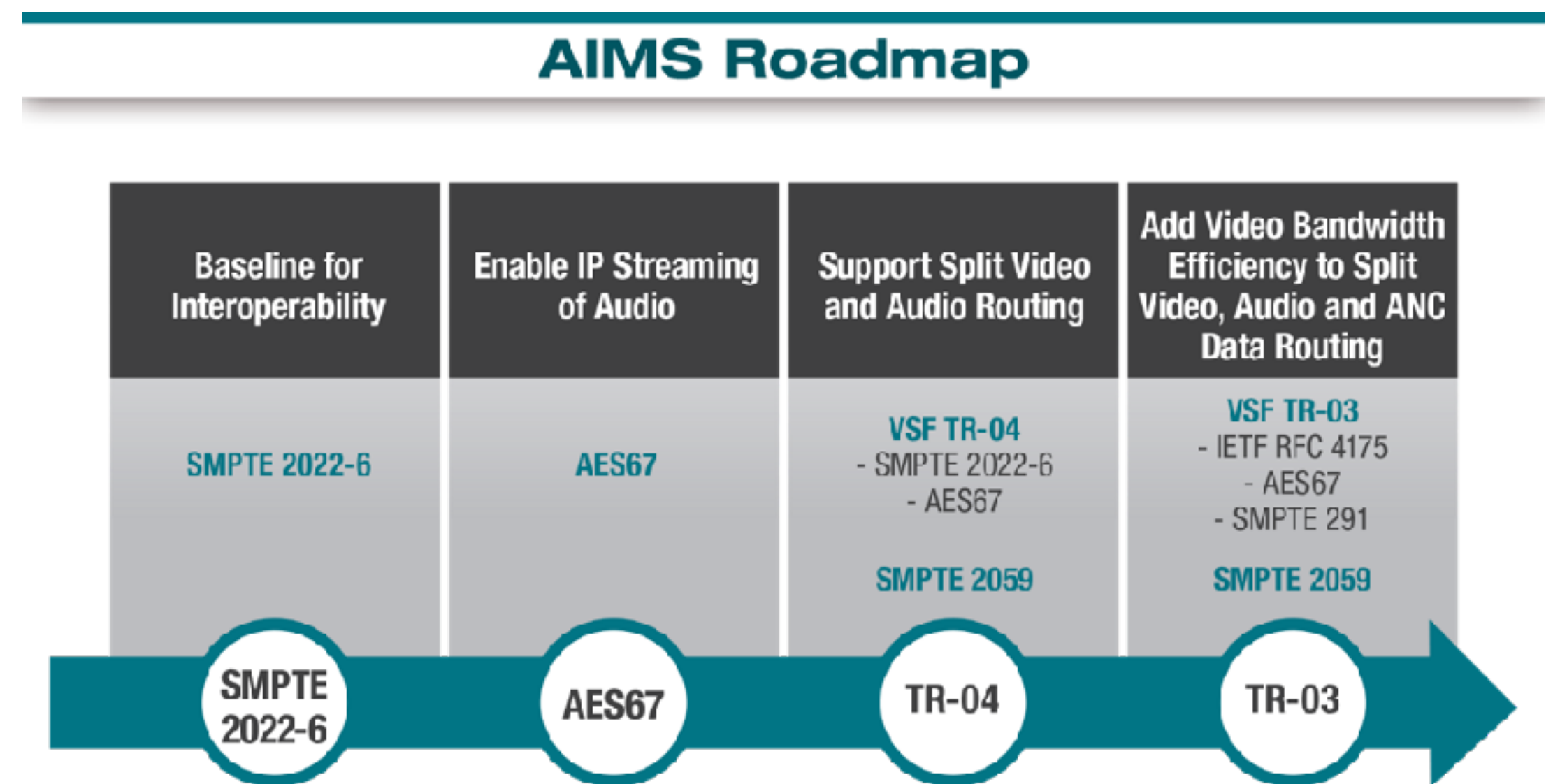
❑ Media Streams

- ❖ SMPTE 2022-6
- ❖ SMPTE 2110 (AIMS)
- ❖ IP streams (several transmission modes)
- ❖ Redundancy SMPTE ???
- ❖ UXF XCU quick test



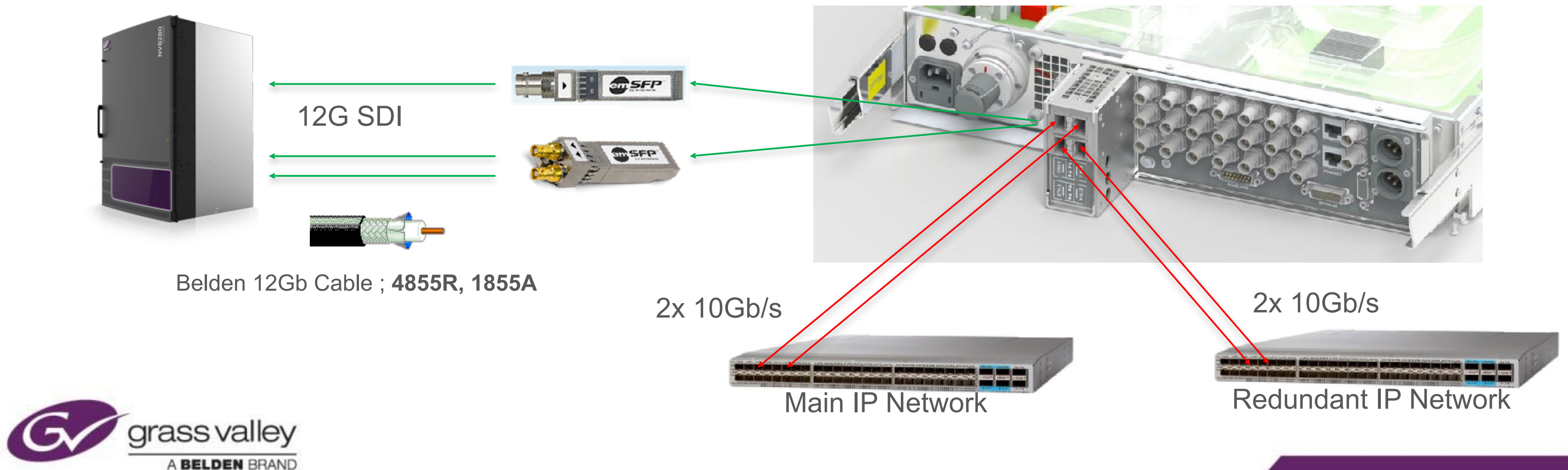
New XCU UXF – Why?

- ❖ Market is moving towards IP-solutions in LIVE-broadcast
 - The XCU HD/4K XF IP is a great first implementation of IP interfacing
 - But has HW/SW limitations for future IP-demands
- ❖ New XCU UXF will support in addition
 - Full “UNIVERSE” functionality over IP
 - Including high speed operation
 - Support of AIMS roadmap
 - TR-04, TR-03, PTP (SMPTE 2059)

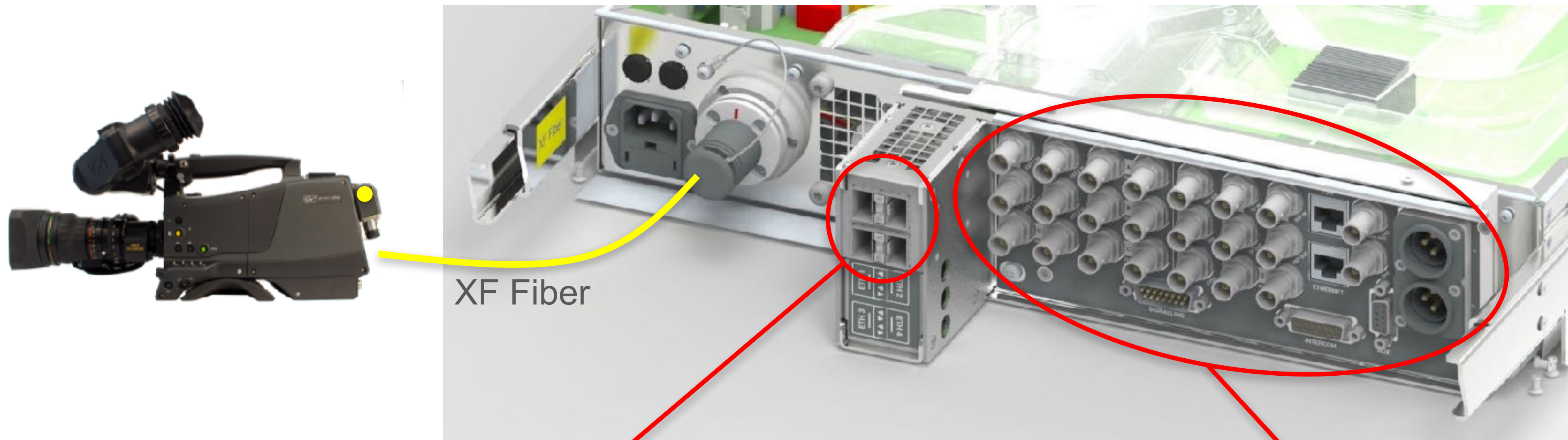


New XCU UXF – Why?

- ❖ Adding network redundancy and 12G SDI
- Introducing a new cradle with 4x MSA (multi-source agreement) compliant SFP+ slots
 - Can be equipped with 1x 12G SDI SFP or with 10 Gb/s Fiber SFP's
 - 12G SDI with single BNC or dual HD-BNC



New XCU UXF – Hybrid connections baseband & IP



UXF Cradle

4x 10Gb/s IP Connections

- 2x main + 2x redundant (“Lite”)
- Supporting TR-04 (at introduction)
(increment plan to TR-03)
- Supporting 4K, 3G, HD, HDR, returns,
monitoring, reference, prompter
- Supporting Audio (AES67)
- Supporting I-Com (AES67)

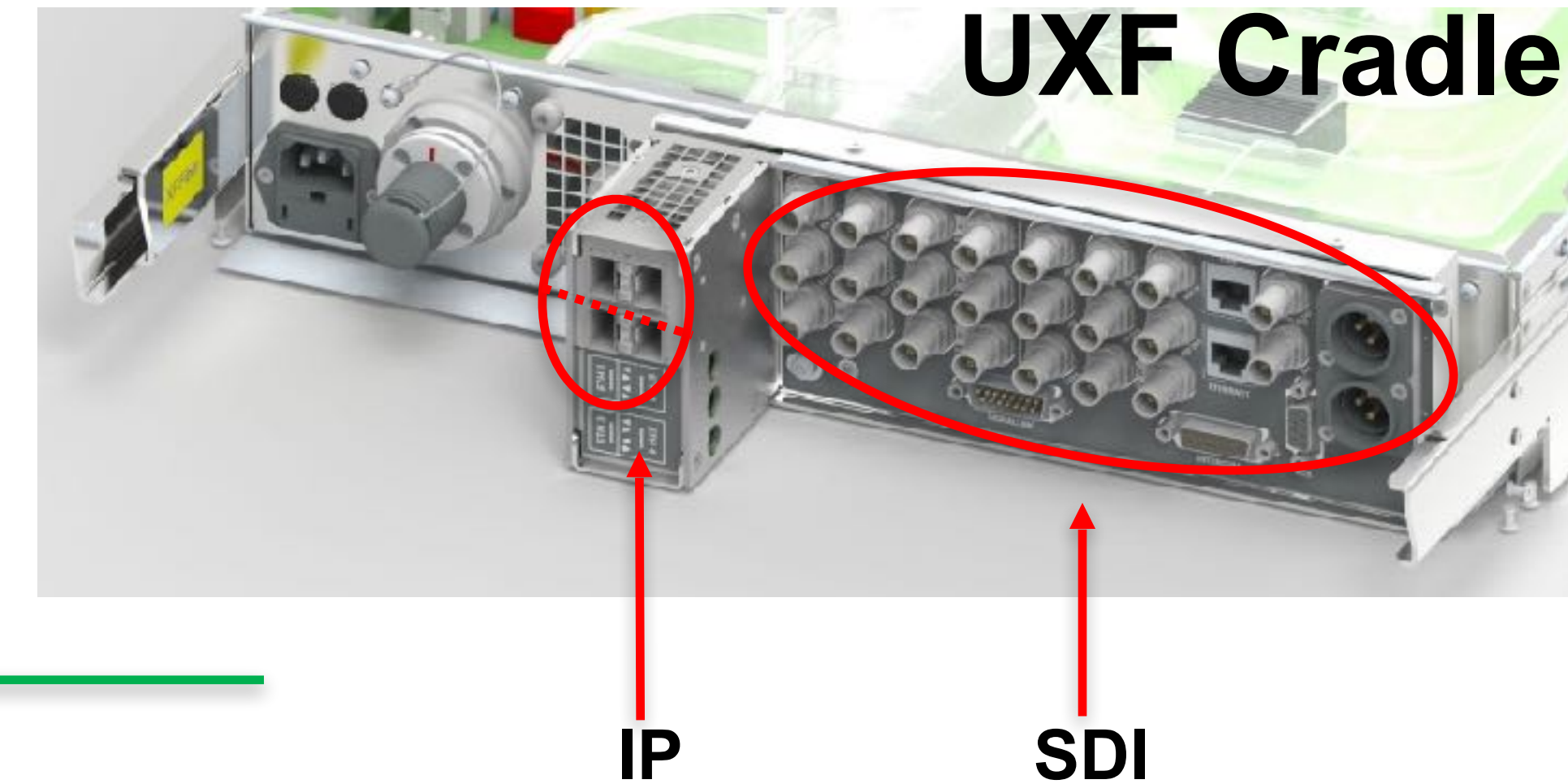
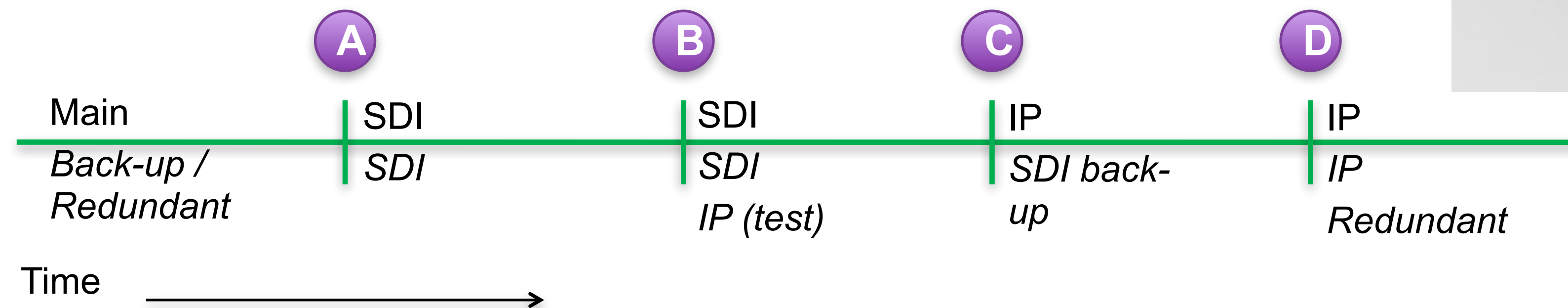
Baseband Connections

- Supporting 4K, 3G, HD, HDR, returns,
monitoring, reference, prompter
- Supporting Audio (Analog / AES67)
- Supporting I-Com (2-wire / 4-wire)
- Supporting Tally
- Supporting Camera Control (C2IP)
- Supporting GPIO / data

New XCU UXF – Smooth Evolution from SDI to IP

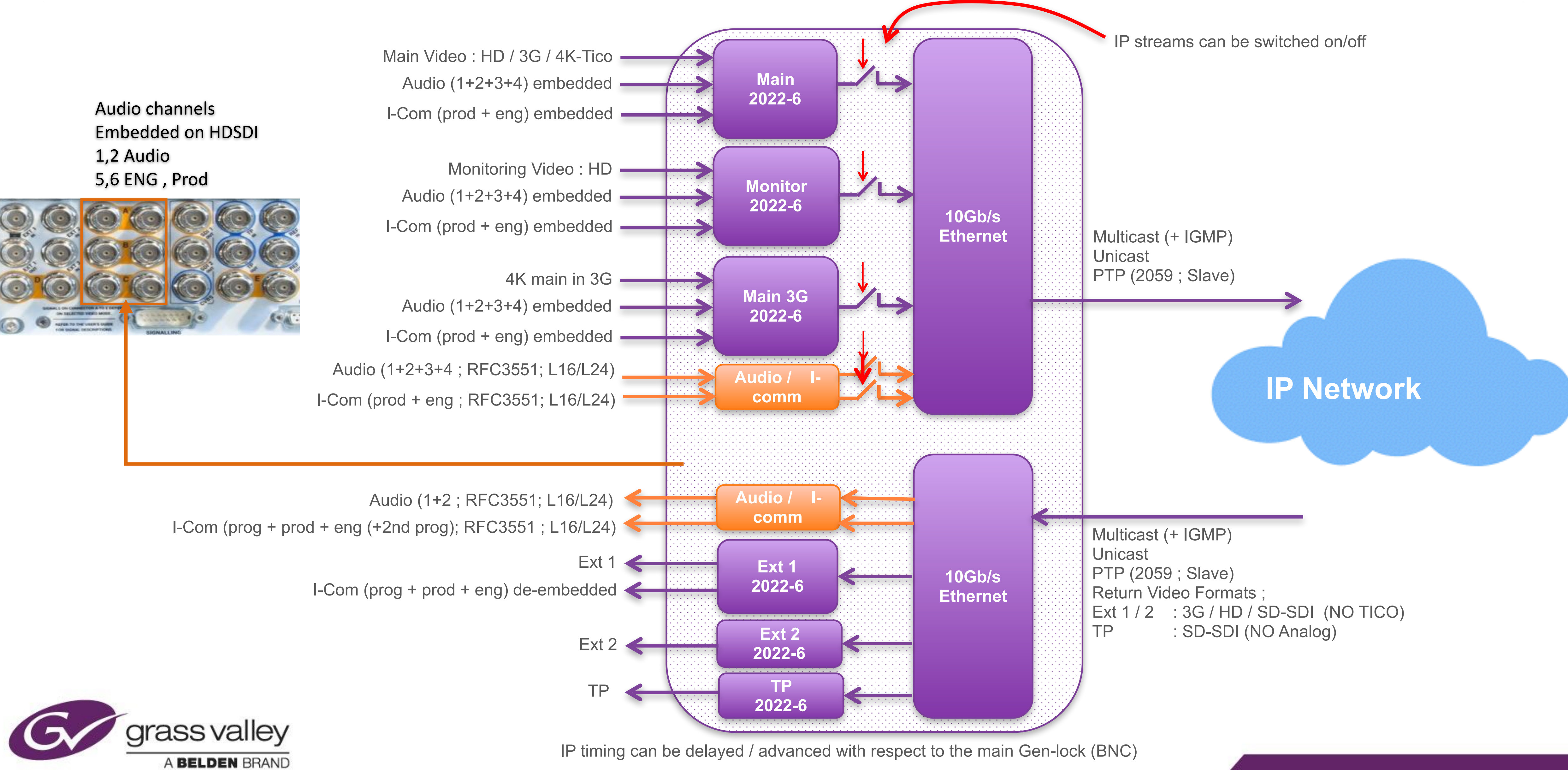
Different steps during Evolution to IP

Advantage: Low risk, keep using proven infrastructure



- A** SDI for main signals and back-up
- B** SDI is still used for main and back-up, test” with IP in parallel (No Risk)
- C** When confident with IP, change-over, IP for main and keep SDI as back-up
- D** Make use of full IP advantage also for Redundant IP path

New XCU UXF – IP Media streams: Video & Audio & I-Com



New UXF Cradle – High level of compatibility

- UXF cradle and the current cradle offer a high level of compatibility
 - Only extended IP support of XCU UXF requires UXF cradle (current level of IP support is provided)
 - Fully compatible in every combination for all base band signals



Cradle *CURRENT*



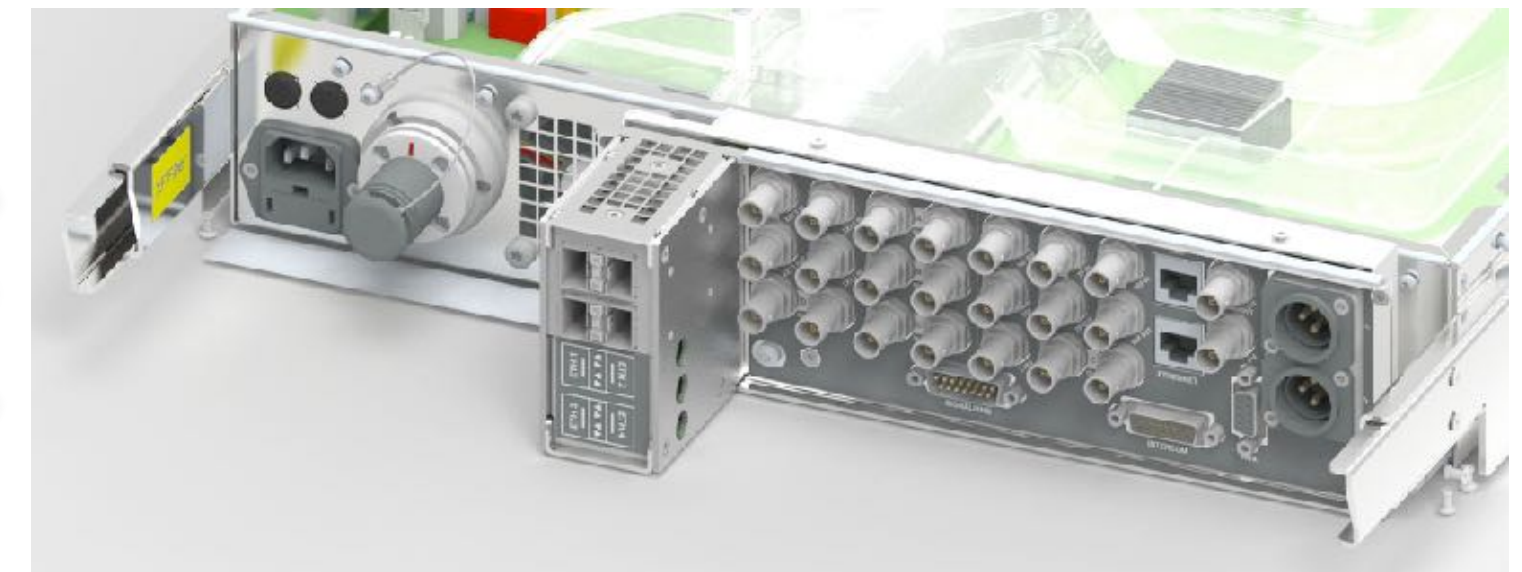
XCU's UXF *NEW*



XCU's XF



3G XCU's

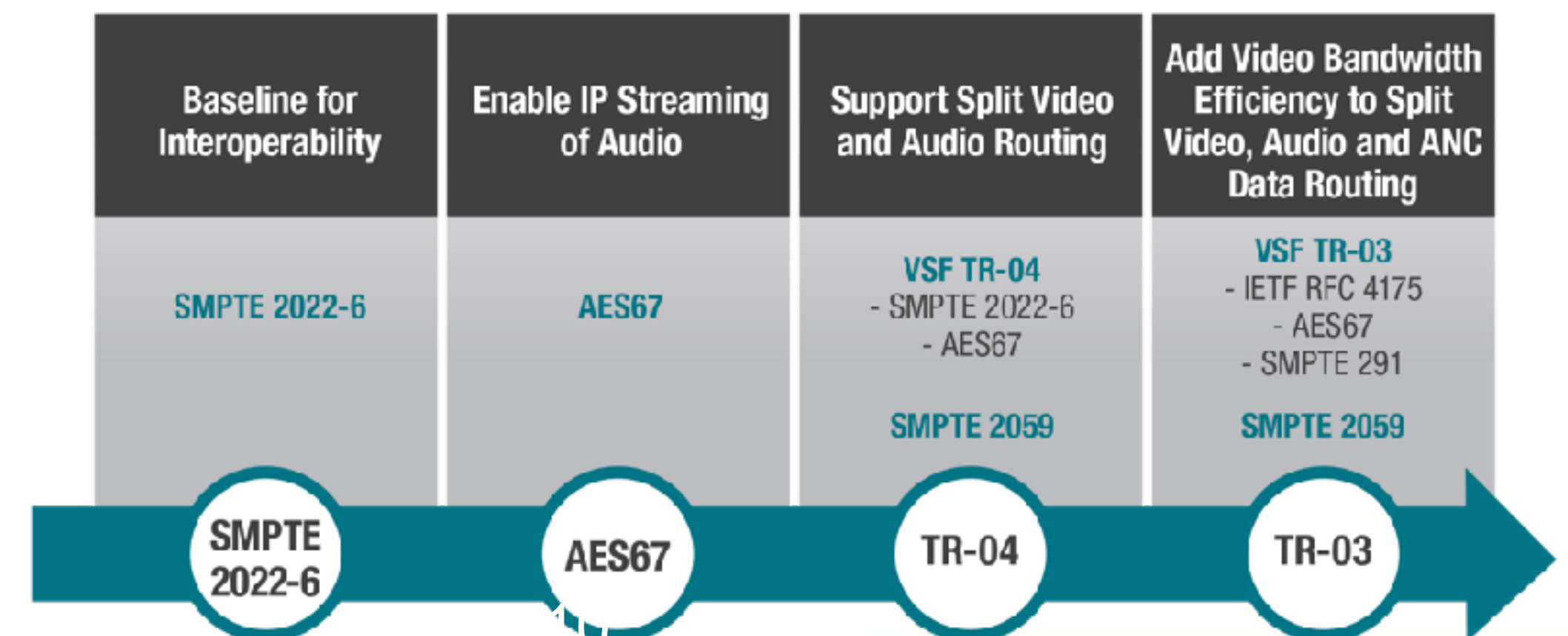


UXF Cradle *NEW*

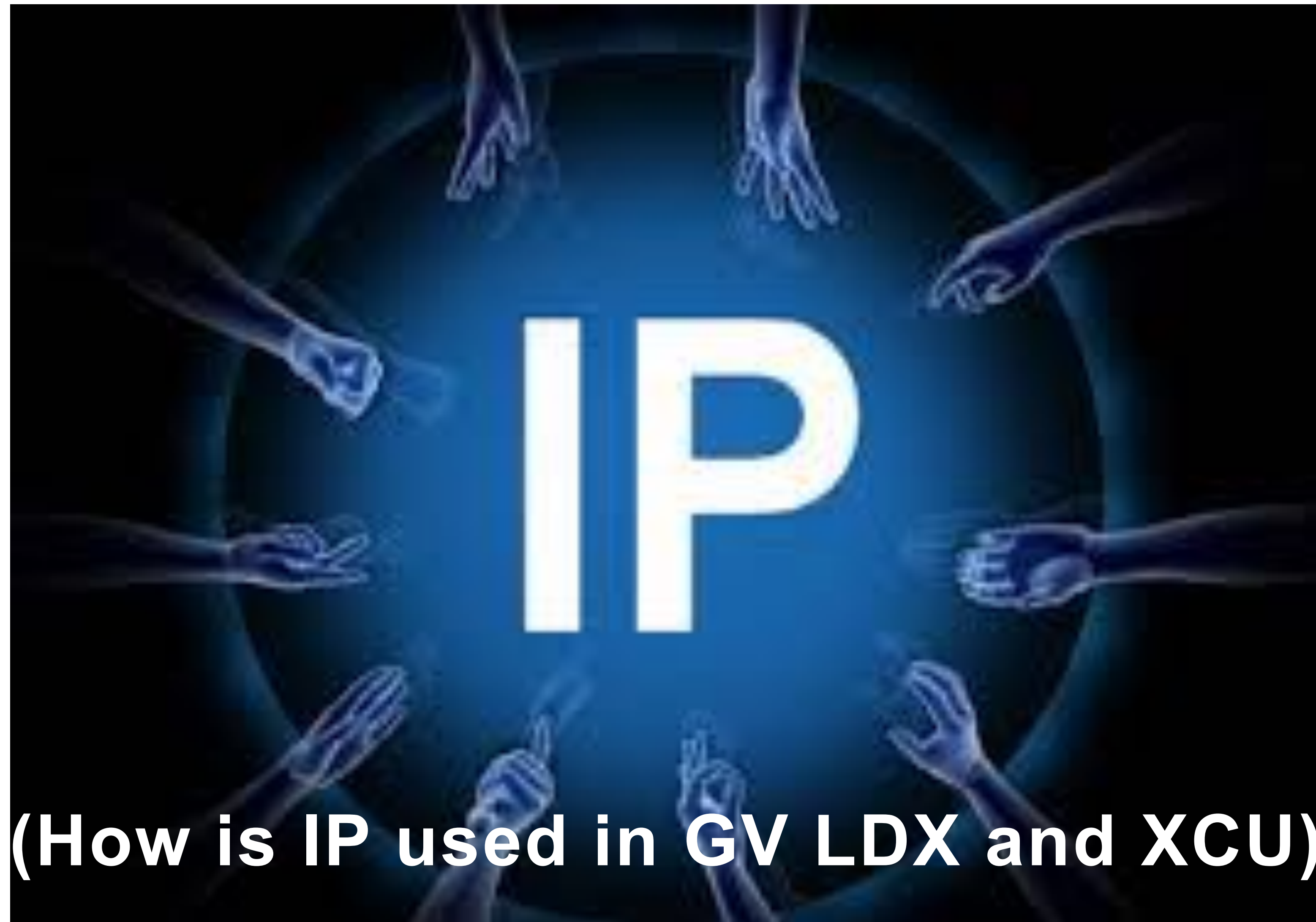
New XCU UXF – Summary Features / Benefits

- ❖ Support all “UNIVERSE” video formats
- ❖ Full Hybrid XCU (SDI and IP)
 - ◆ Creating maximum production flexibility, safe transition from SDI to IP
- ❖ Supporting AIMS roadmap
 - ◆ Interoperability over IP with other brands secured (e.g TR-03)
- ❖ New Cradle (inc. 4x 10Gb/s ports)
 - ◆ Backwards compatible
 - ◆ Redundancy
- ❖ XF Fiber transmission (Cam-XCU)
 - ◆ Support of Direct IP

AIMS Roadmap

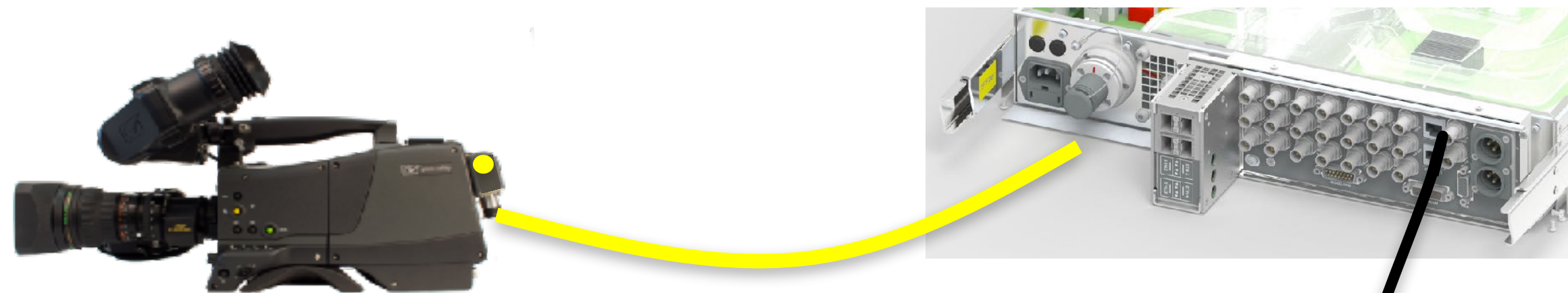


IP Basics

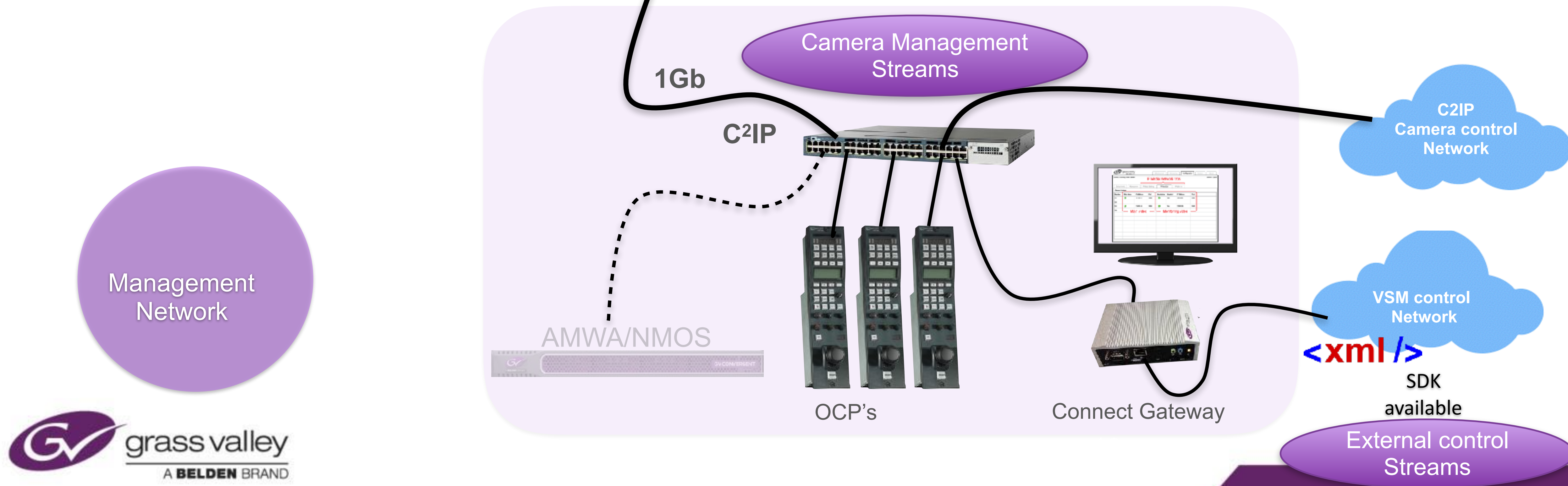


(How is IP used in GV LDX and XCU)

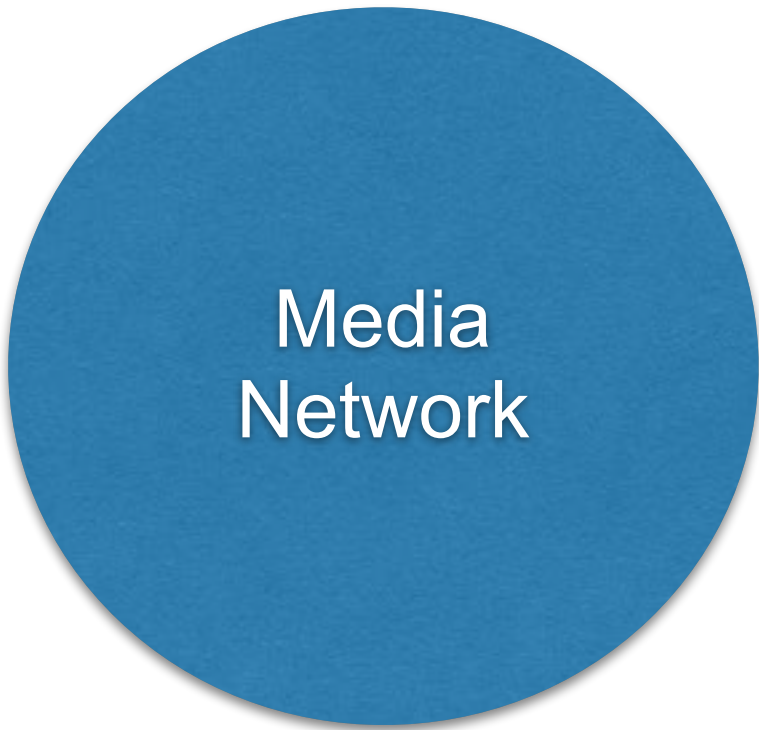
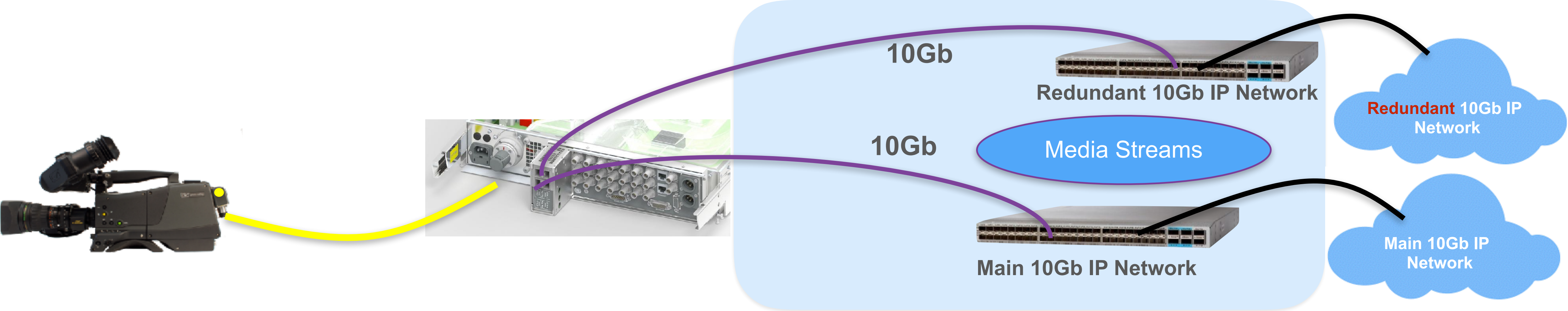
Workflow overview **Management Network**



C²IP **C**amera **C**ontrol over **I**P

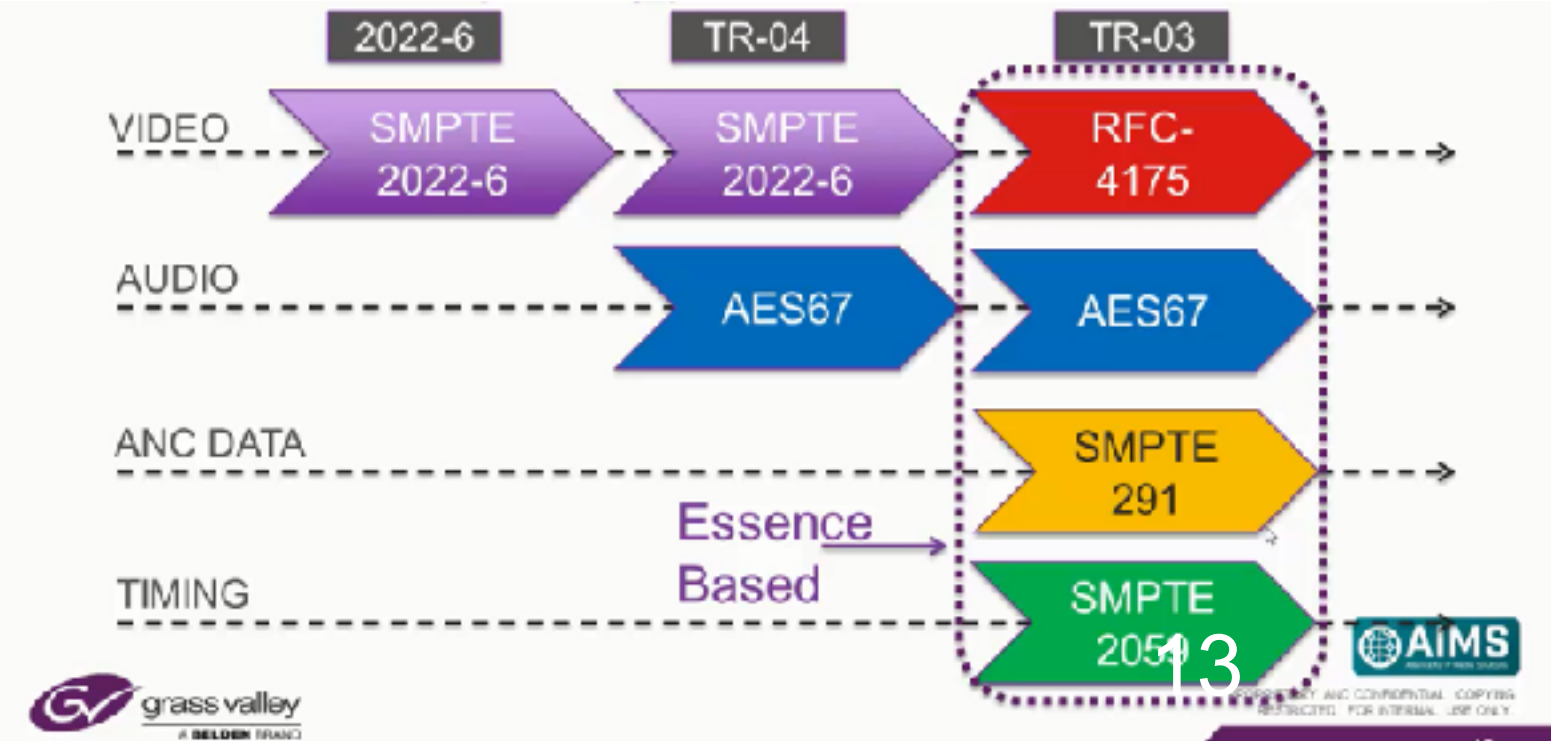


Workflow overview **MEDIA** Network

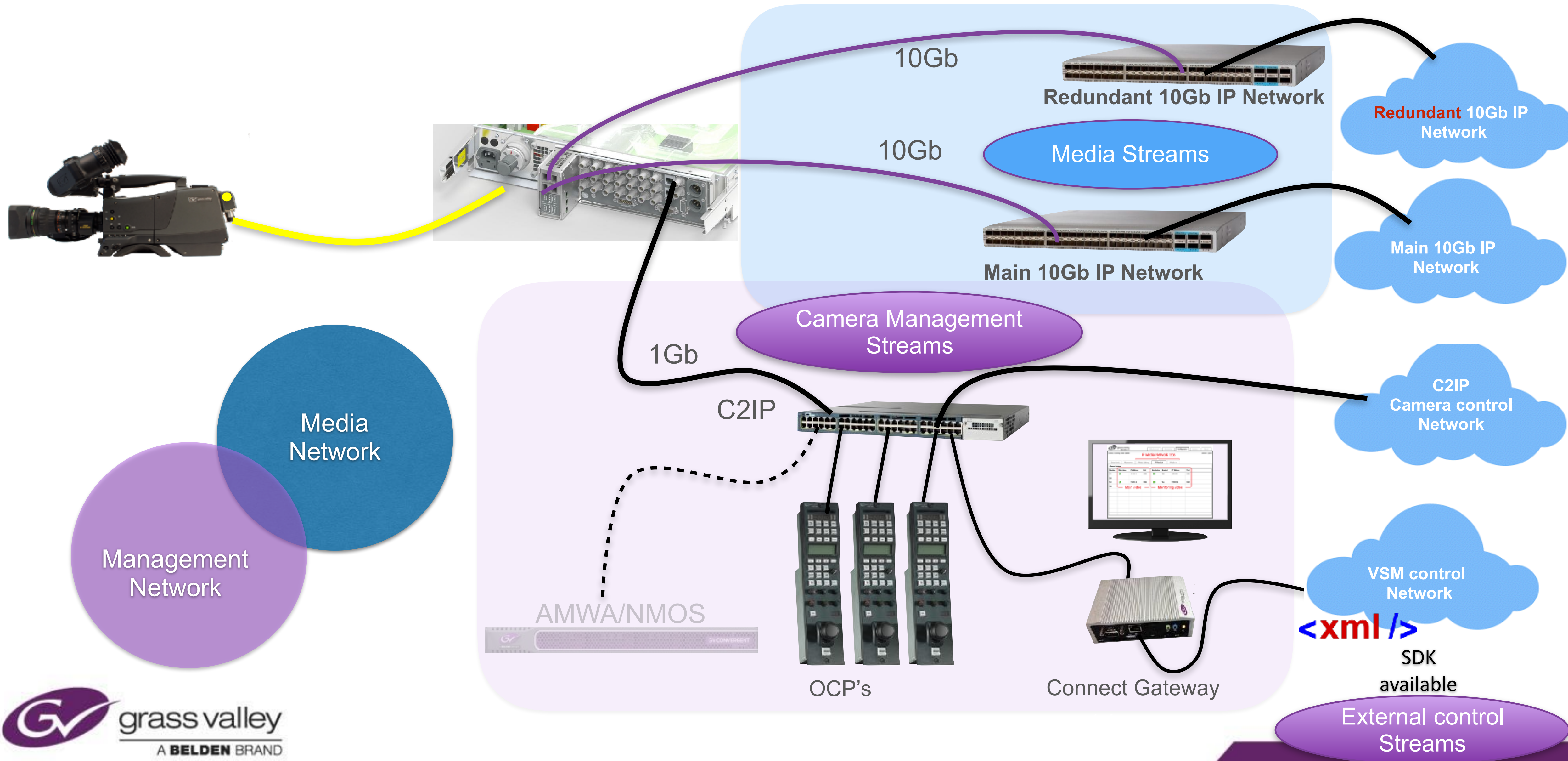


Media over IP

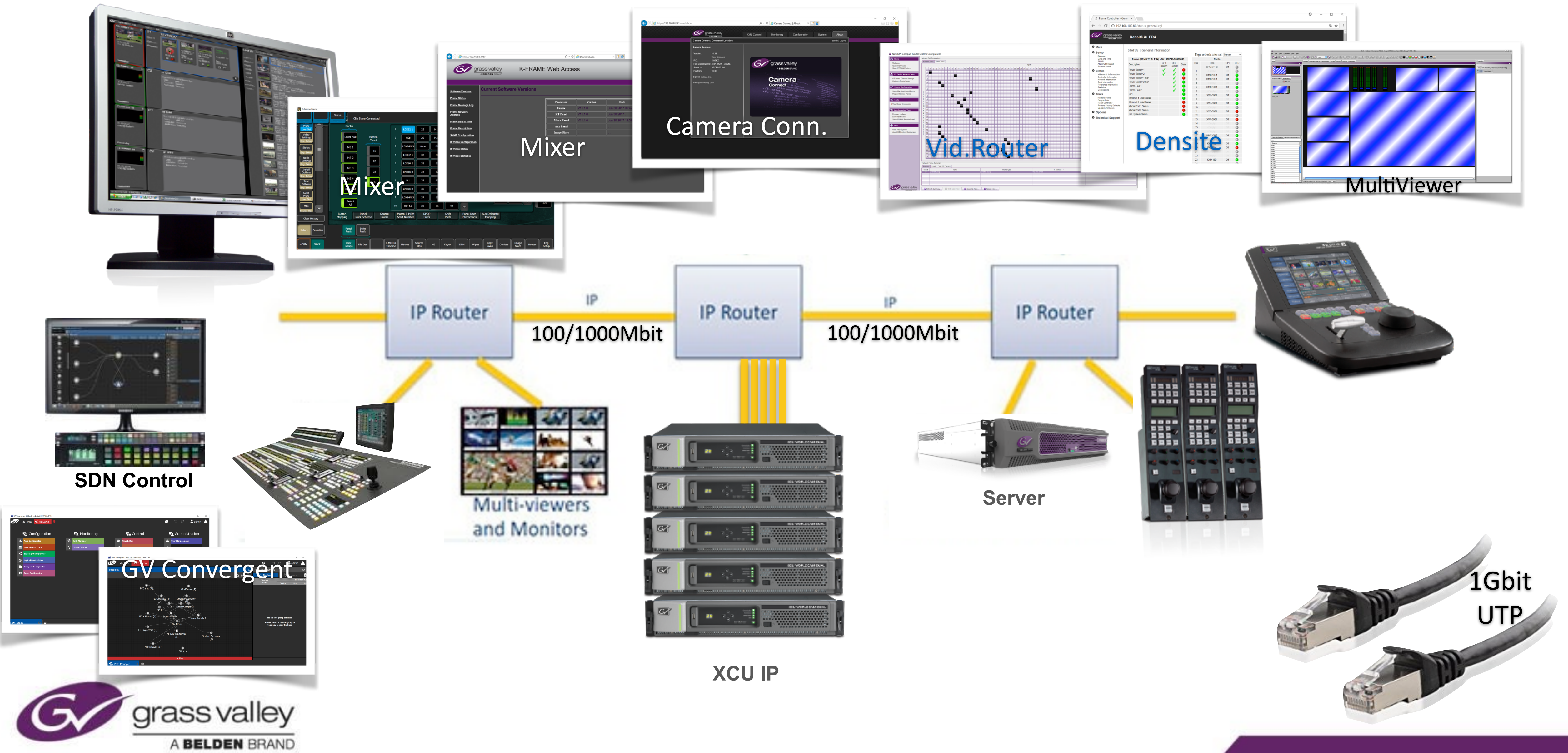
- * yesterday - Based on **SMPTE 2022-6**
- * today also - Based on **AIMS** (TR-03)



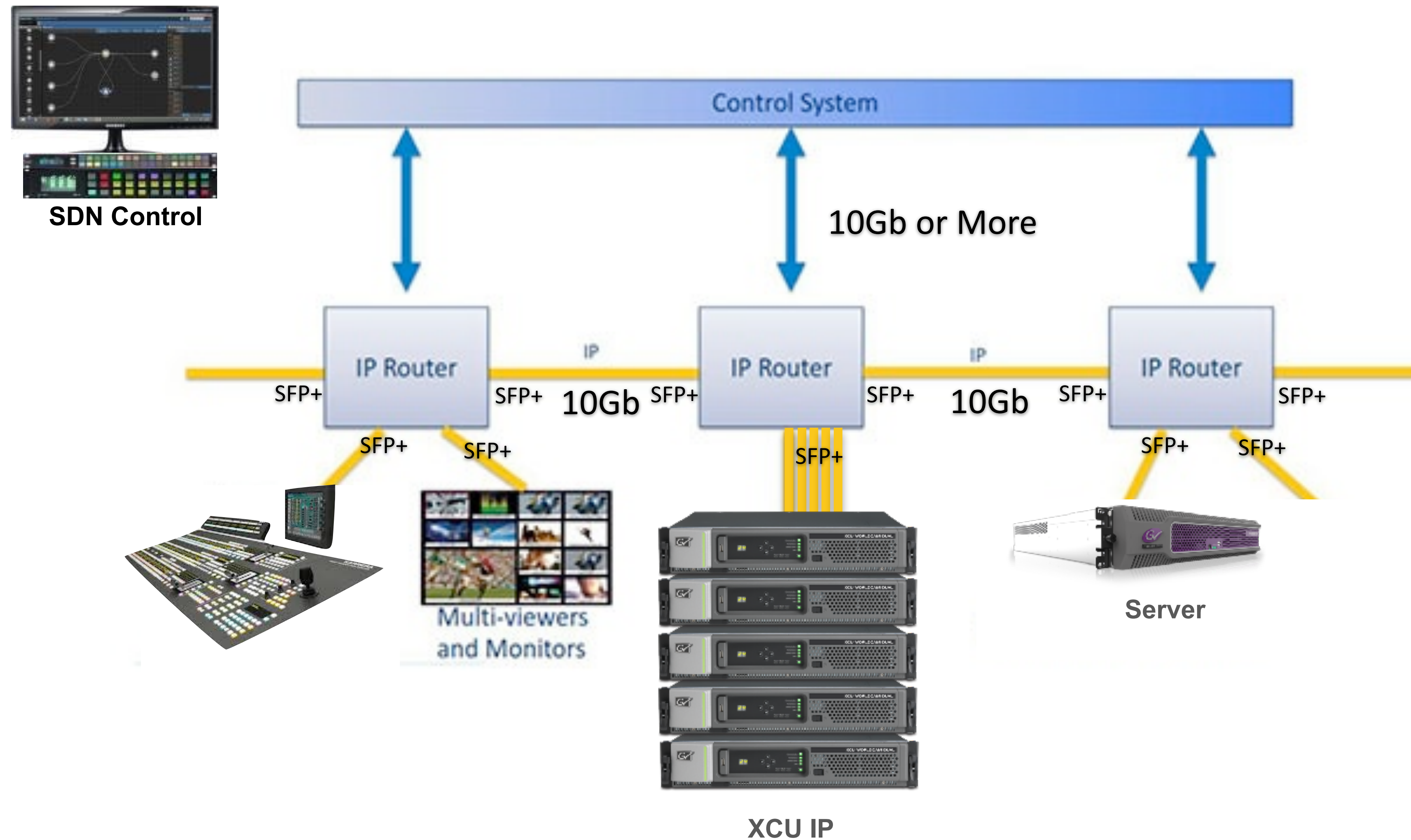
Workflow overview Management and Media Network



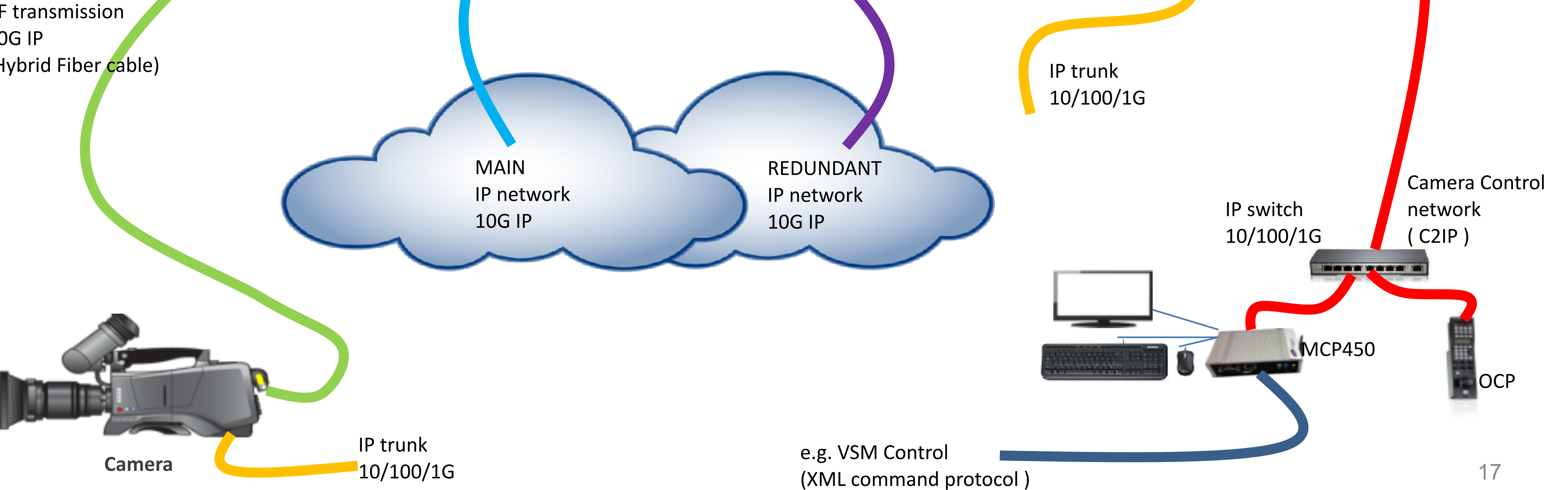
Workflow overview Management Network



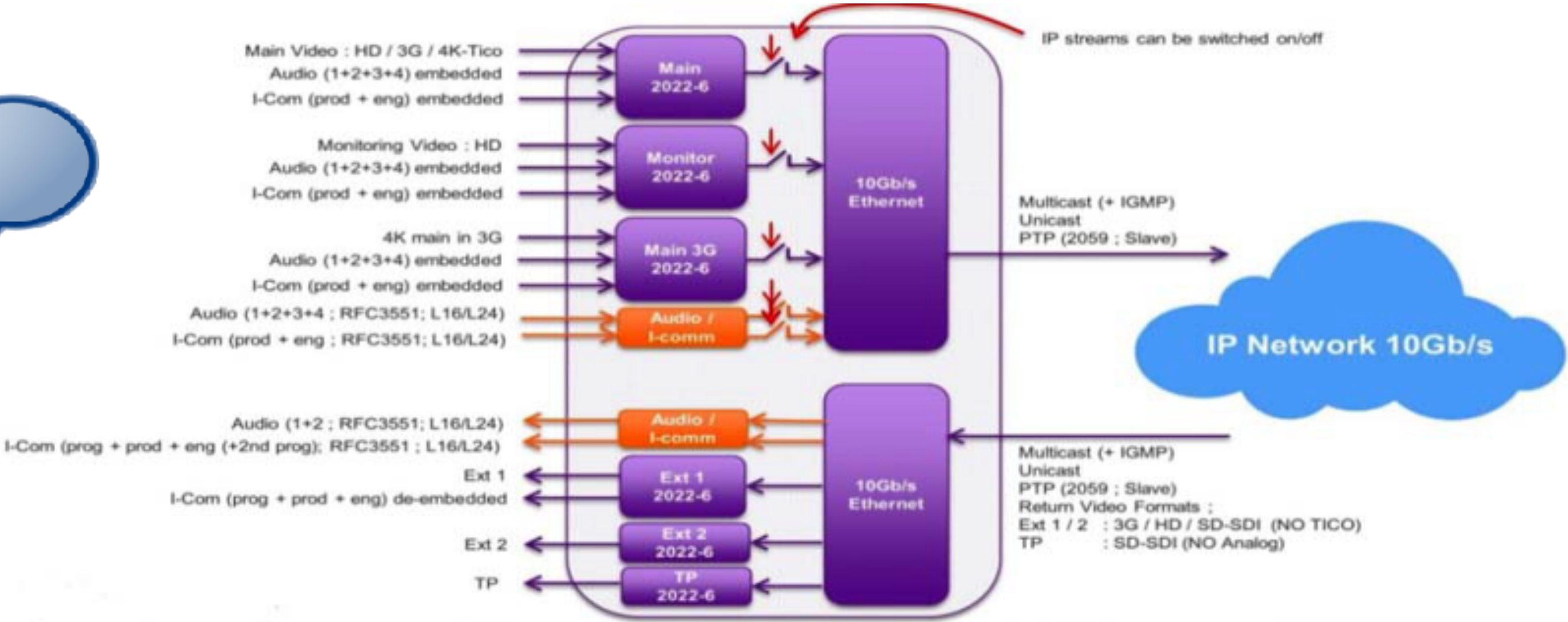
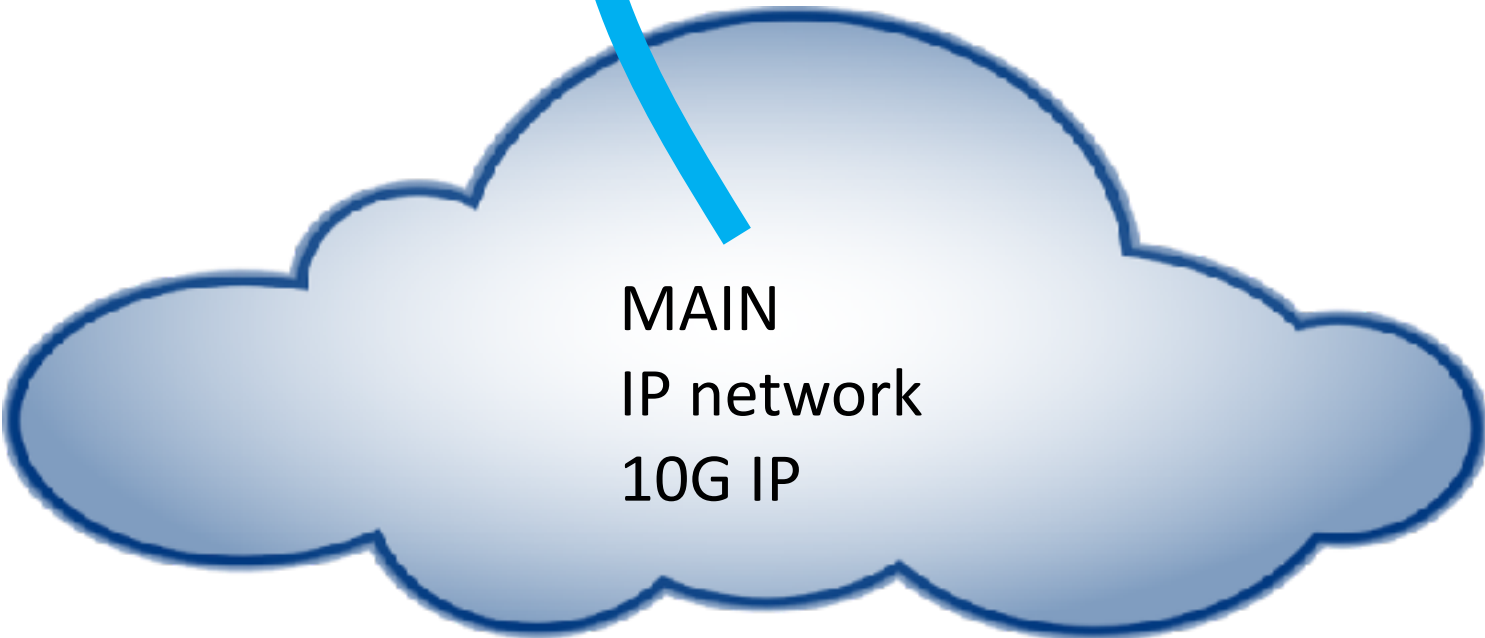
Workflow overview **Media Network**



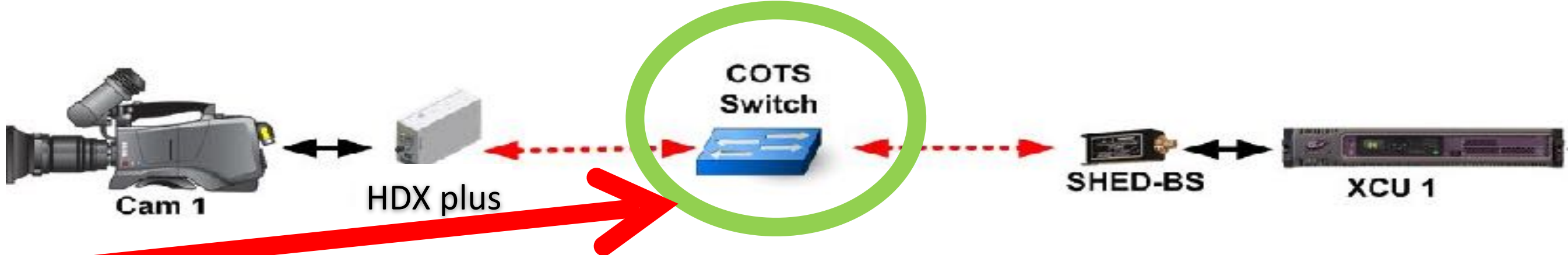
IP connections ; Back side UXF XCU



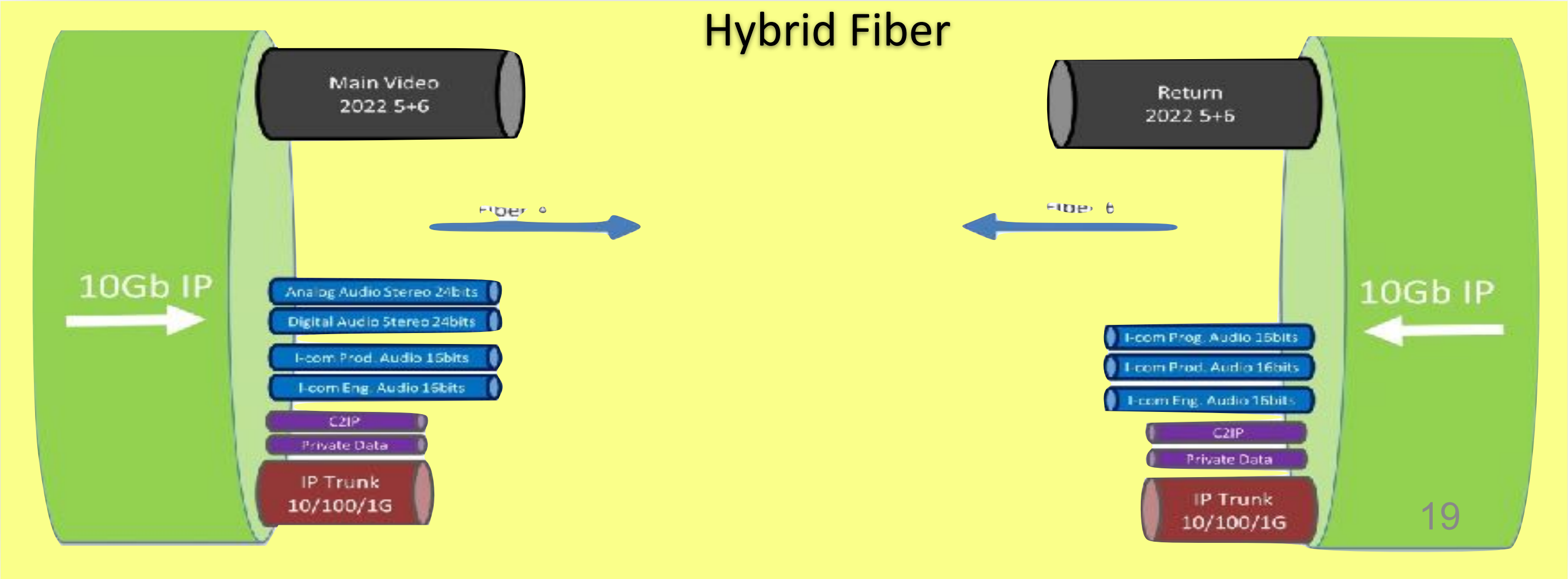
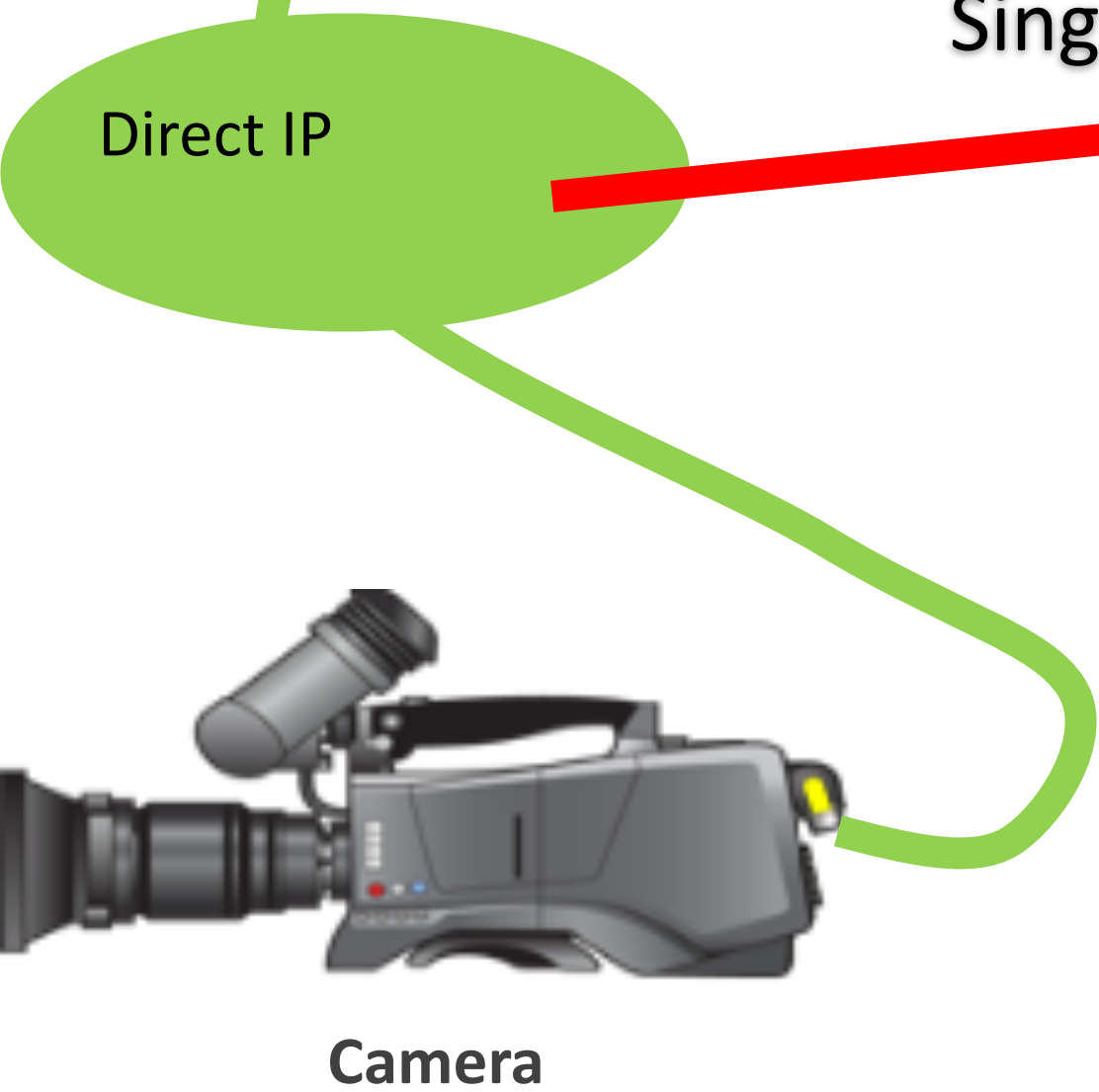
IP connections ; Back side UXF XCU



IP connections ; Back side UXF XCU



Single mode fiber only



IP connections ; Back side UXF XCU



grass valley
A Selden Brand

Camera Connect: Grass Valley R&D / Breda

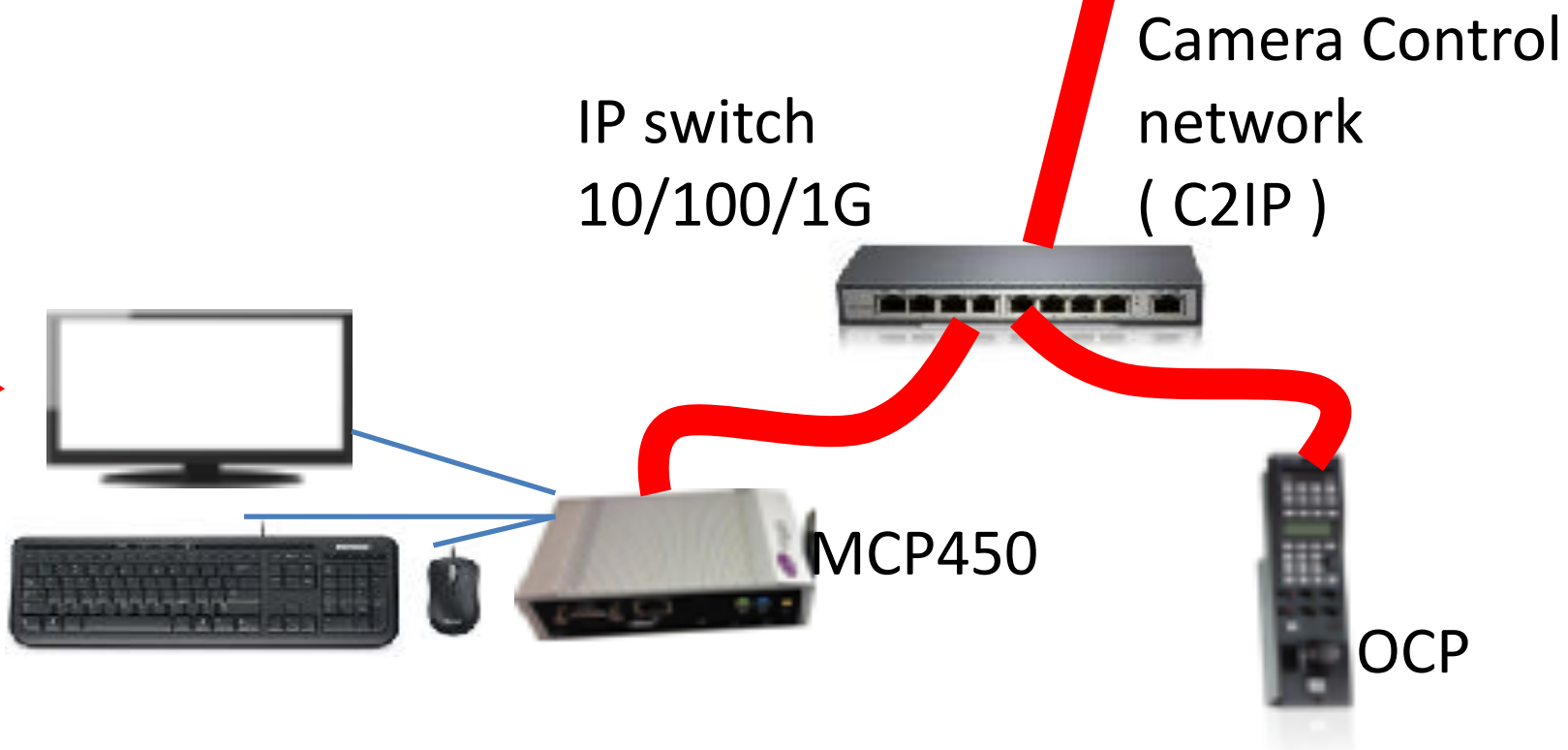
XML Control Monitoring Configuration System About

Device Config Nameserver Audio Intercom Signalling Video Format Video Out Video In Direct IP IP Media Settings >>

Camera Systems

Number	Port A1	Port A2	Subnet Mask	Default Gateway
53				
54	10.11.5.54		255.255.0.0	10.11.5.1
73	10.11.5.73	10.12.5.3	255.255.0.0	10.11.5.1

Camera Connect



IP connections ; Back side UXF XCU



Camera Connect SDK function reference

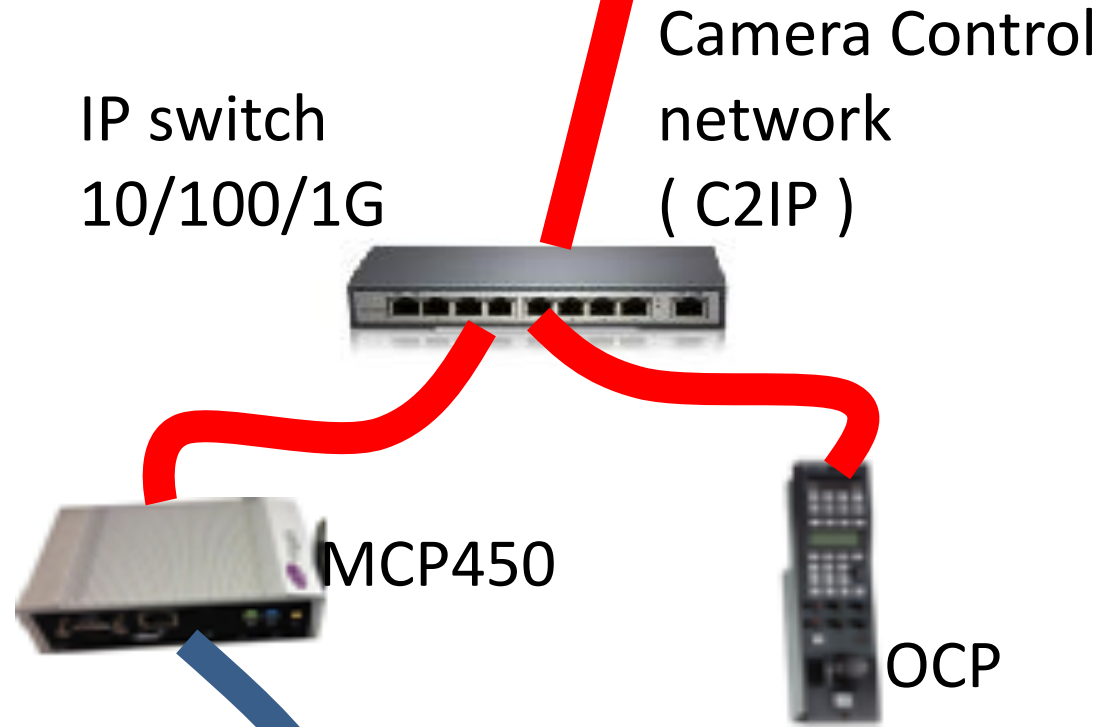
Camera Connect application version	v1.40
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The following table shows a list of functions and NS_IDs that are available in the system

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)



IP connections ; Back side UXF XCU



IP trunk
10/100/1G

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



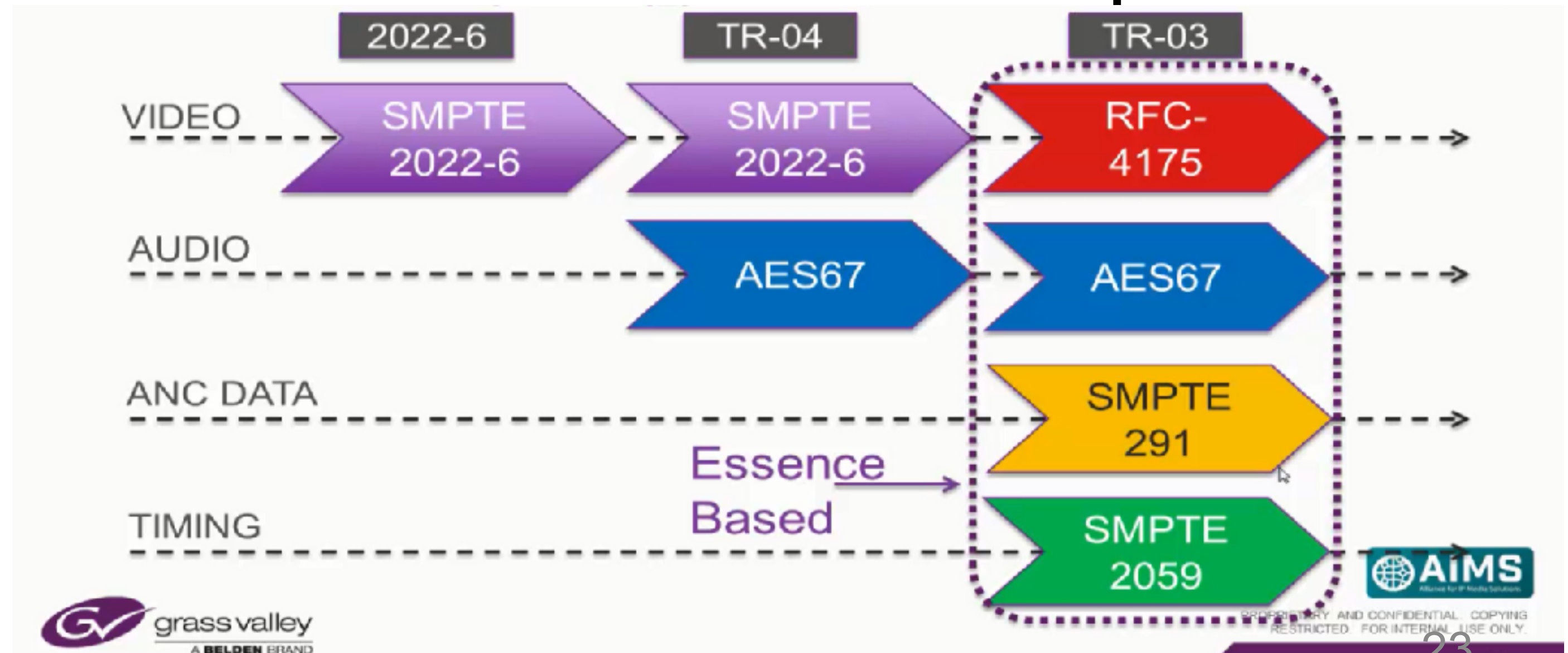
Camera
IP trunk
10/100/1G

- Future: AMWA NMOS IS04 ; discovery & registration
- Future: AMWA NMOS IS05 ; connection management and exchange of SDP files

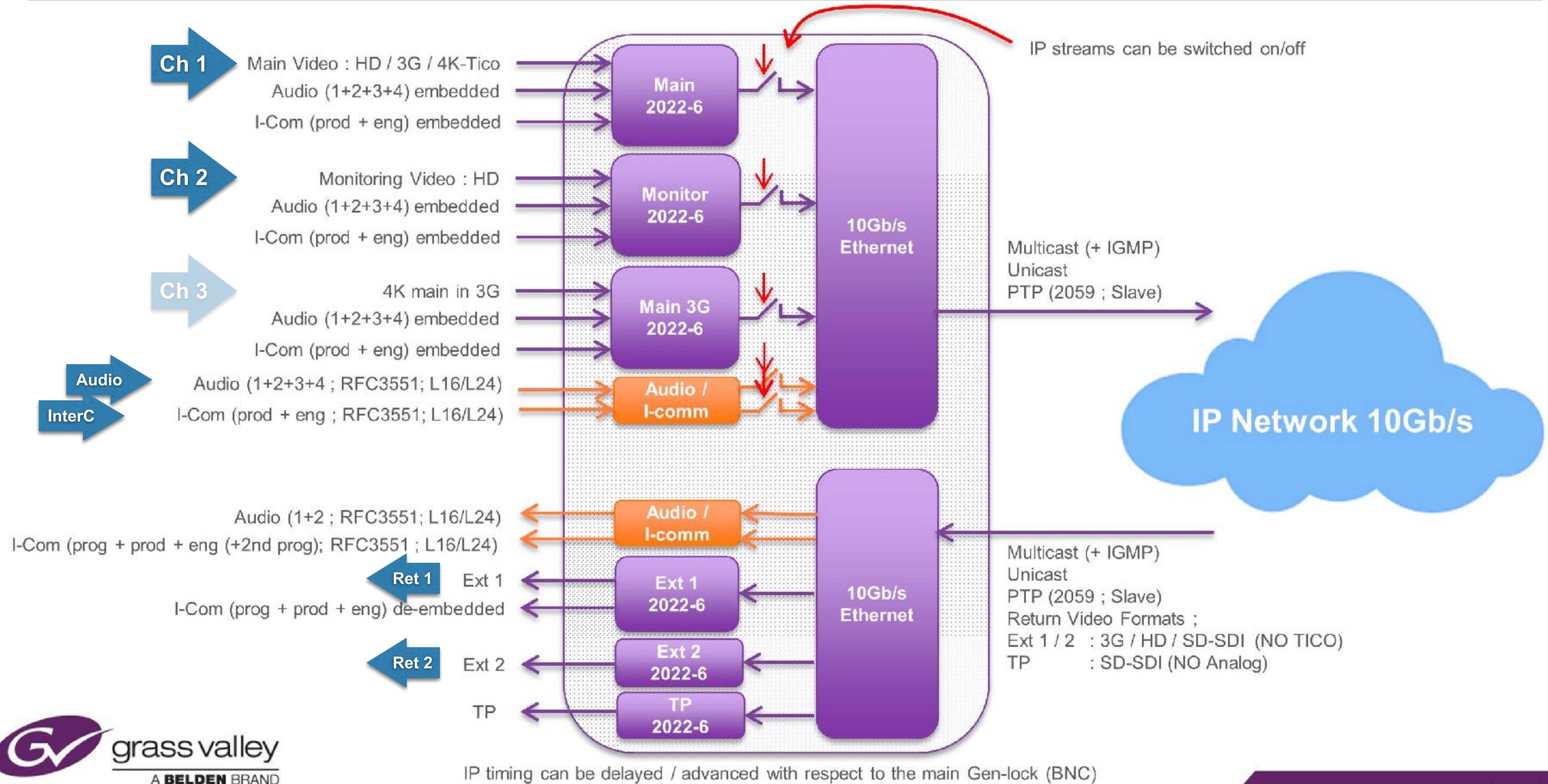
More about AMWA NMOS in next session

- Today: SMPTE2022-6 : SDI stream IP-packatized
- Today: SMPTE2110 ; are all “essence” streams Uncompressed

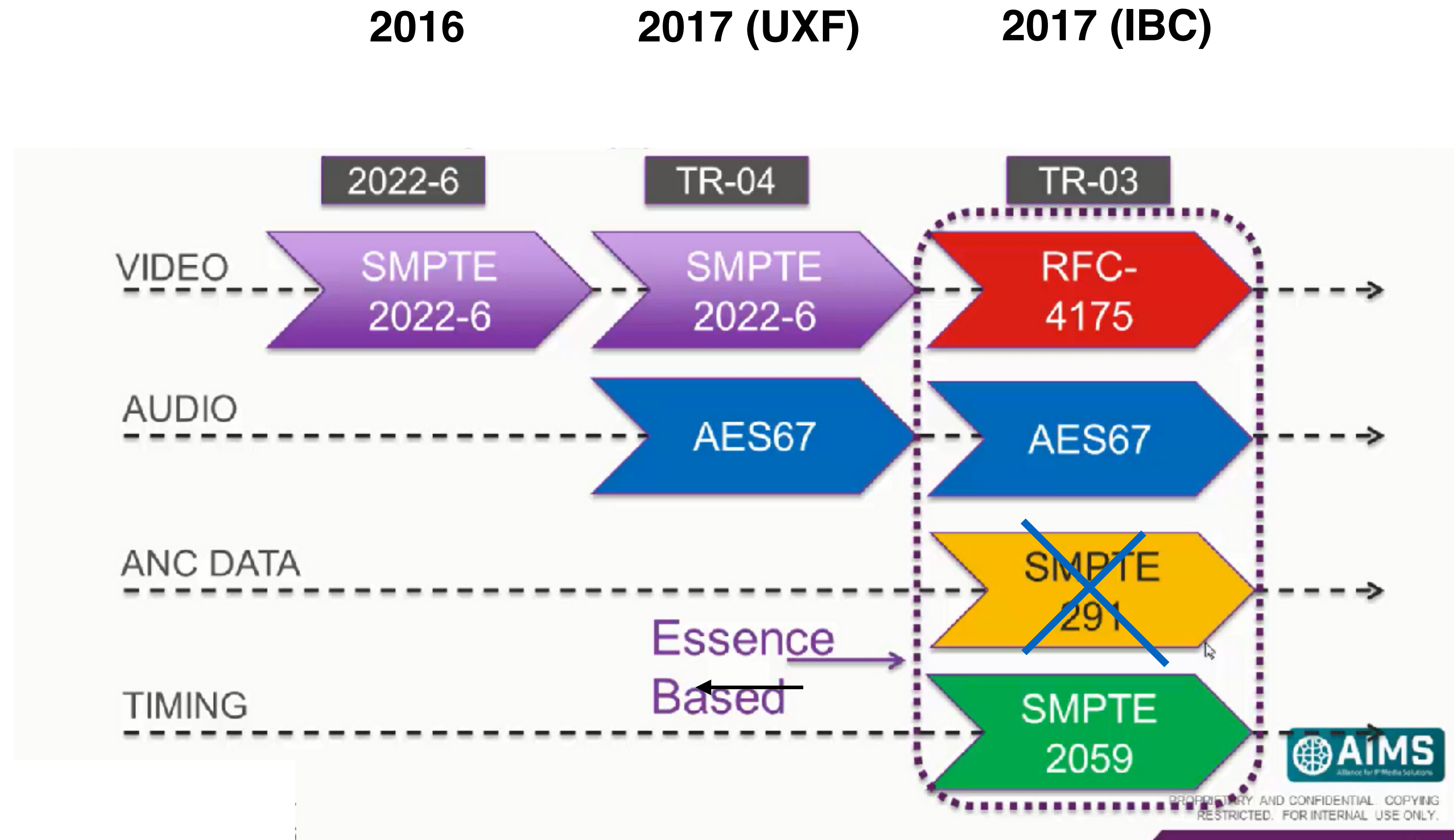
- -10 = PTP (2059)
- -20 = Video
- -30 = Audio
- -40 = ANC



New XCU UXF – IP Media streams: Video & Audio & I-Com



AIMS Roadmap the path to SMPTE 2110



Abstract / high level view

SDI - World

SDI



- IP header 
- Video  2110 -20
- Audio AES67  2110 -30
- SDP-file 
- ANC Data 

All “info” available in the SDI stream about video, audio, etc.

Abstract / high level view

SDI - World

SDI



- IP header 2110 -20
- Video 2110 -30
- Audio AES67 2110 -30
- SDP-file
- ANC Data

All "info" available in the SDI stream about video, audio, etc.

IP / SDI - World

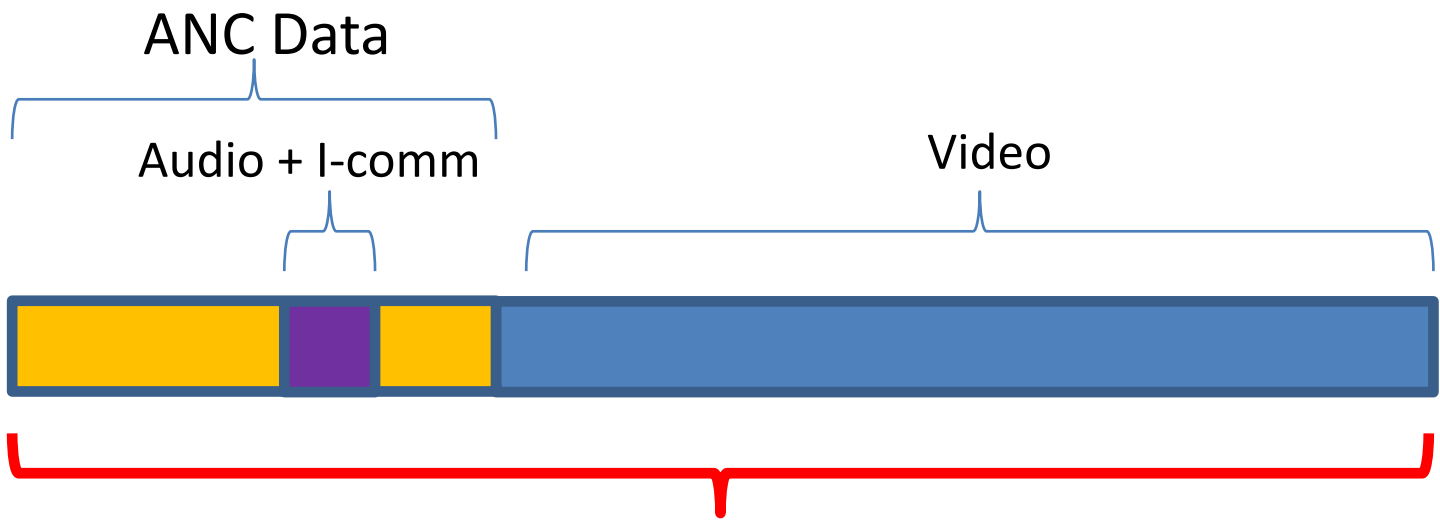
SMPTE 2022 -6



Abstract / high level view

SDI - World

SDI



- IP header
- Video 2110 -20
- Audio AES67 2110 -30
- SDP-file
- ANC Data

All “info” available in the SDI stream about video, audio, etc.

IP / SDI - World

SMPTE 2022 -6



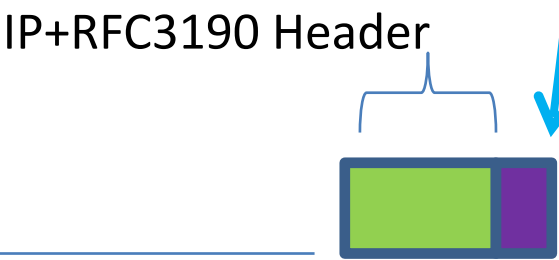
SMPTE 2110 -20



RFC4175 (video)

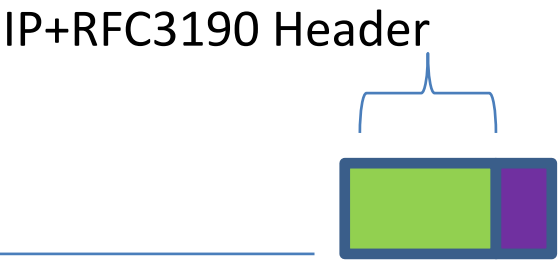
IP – World
SMPTE 2110

SMPTE 2110 -30



AES67 (audio)

SMPTE 2110 -30

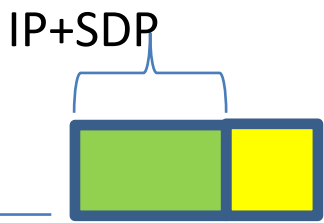


AES67 (I-comm)

SDP “example” ;

```
m=audio 49170 RTP/AVP 0
m=video 30000 RTP/AVP 112
c=IN IP4 239.252.0.1
a=rtpmap:112 raw/90000
a=fmtp:112 sampling=YCbCr-4:2:2; width=1920;
height=1080; exactframerate=60000/1001;
depth=10; TCS=SDR; colorimetry=BT709;
PM=2110GPM; SSN="ST2110-20:2017";
a=mid:2
```

SDP

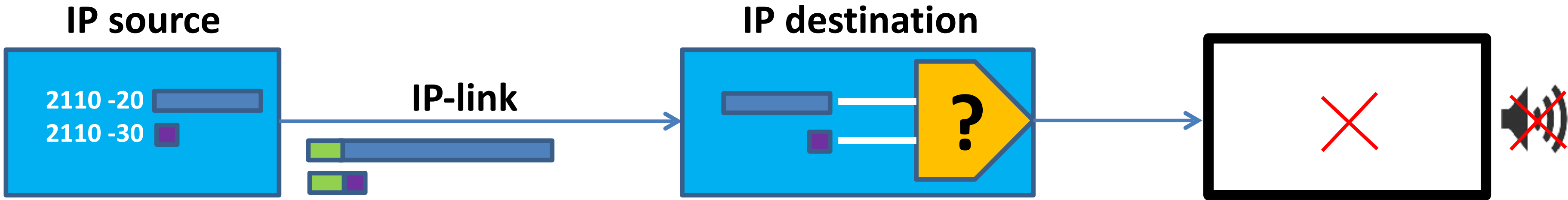


All “info” available about video, audio, etc. necessary for the “receivers” to understand the content of the IP-packages (Static configuration Info)

IP – SMPTE 2110

Why SDP file ?
Additional info needed for each receiver to “understand” the content of the IP packages

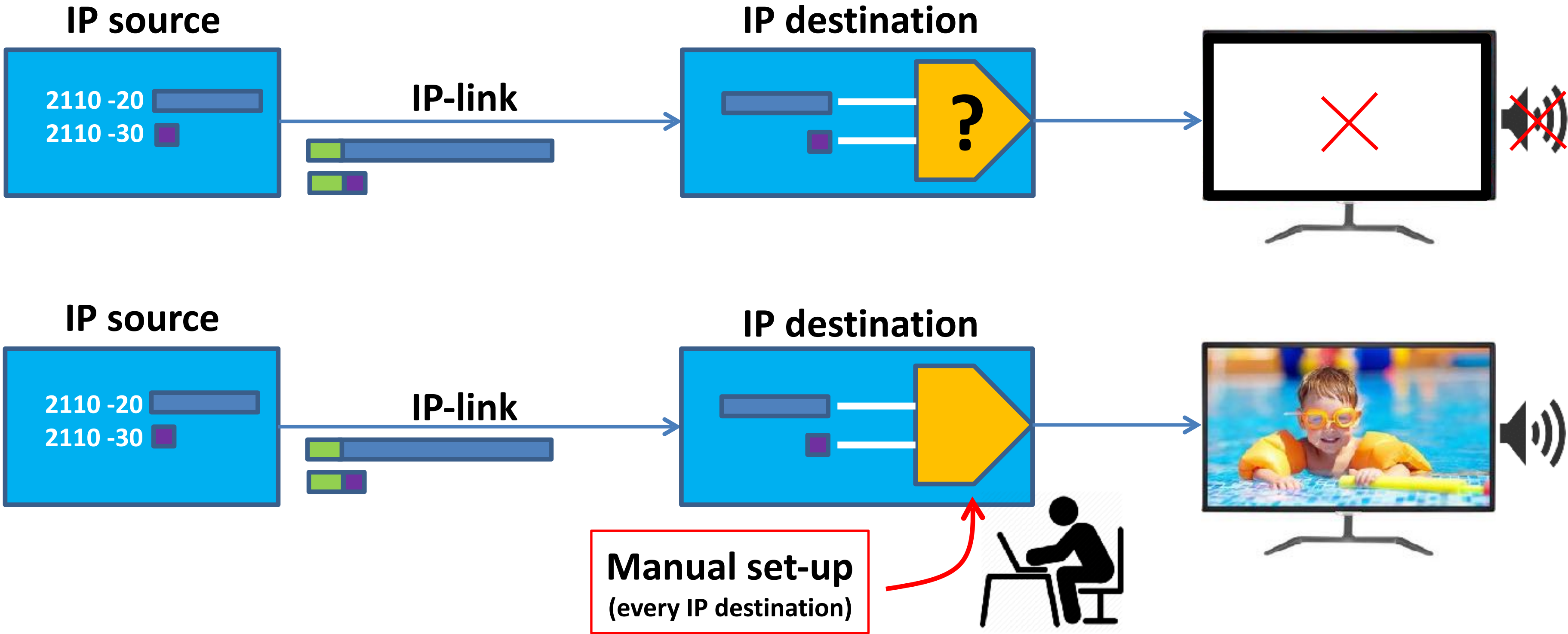
- IP header 2110 -20
- Video 2110 -20
- Audio AES67 2110 -30
- SDP-file
- ANC Data



IP – SMPTE 2110

Why SDP file ?
Additional info needed for each receiver to “understand” the content of the IP packages

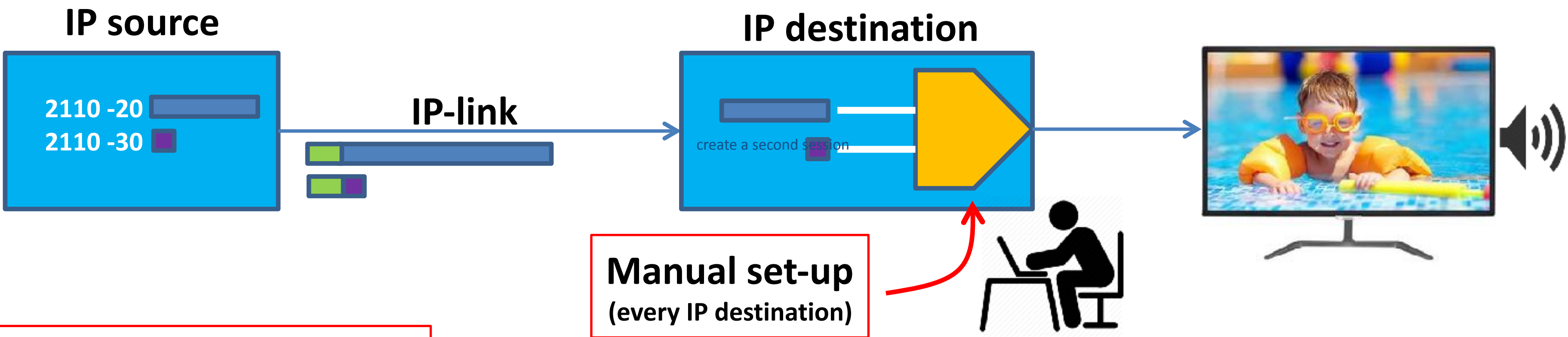
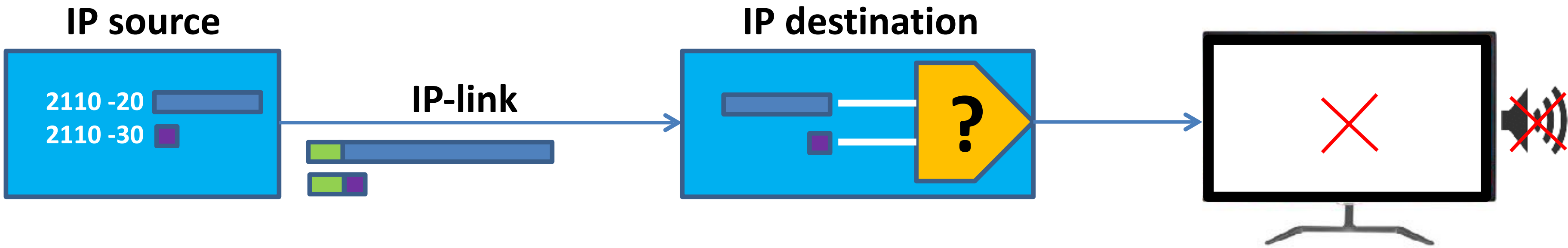
- IP header 2110 -20
- Video 2110 -20
- Audio AES67 2110 -30
- SDP-file
- ANC Data



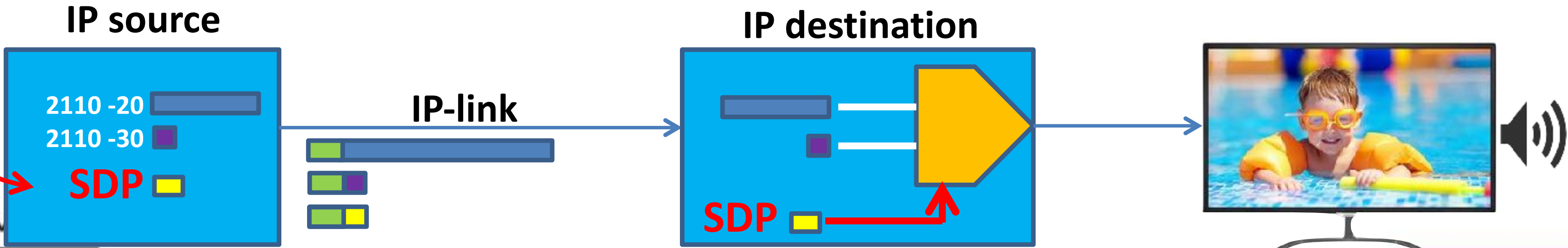
IP – SMPTE 2110

Why SDP file ?
Additional info needed for each receiver to “understand” the content of the IP packages

- IP header 2110 -20
- Video 2110 -20
- Audio AES67 2110 -30
- SDP-file
- ANC Data



Automatic set-up via SDP
Generated by IP source



“Control” over IP (today and future)

- ❖ today - Set-up is manual (type IP addresses, etc.)
- ❖ future - Set-up Automatic
- ❖ future - Discovery and registration (IS-04)
 - ◆ Layer2 ; how can the product recognize each other on the network without IP addresses ? How does this work?
- ❖ future - Connection management (IS-05)
 - ◆ Layer3 ; IP address “exchange”
 - ◆ GV convergent, other server, etc..
- ❖ future - Connection management (IS-05)
 - ◆ How does it work in Audio / Intercom

XCU UXF is capable
to do this all.
Future software updates

Intercom over IP (today and future)

- ❏ today - Interop with Riedel, RTS, ClearCom (more complicated)
- ❏ today - Set-up manual similar as with Audio (via camera connect)
- ❏ future - Set “automatic”
 - ◆ Protocol ; SIP, SAP, NMOS IS-04 / IS-05
 - ◆ Clearcom is using “DANTE” → SAP protocol needed.
 - ◆ SDP-files

XCU UXF is capable
to do this all.
Future software updates

SFP Case configuration from the XCU UXF

4 Functional SFP Cages

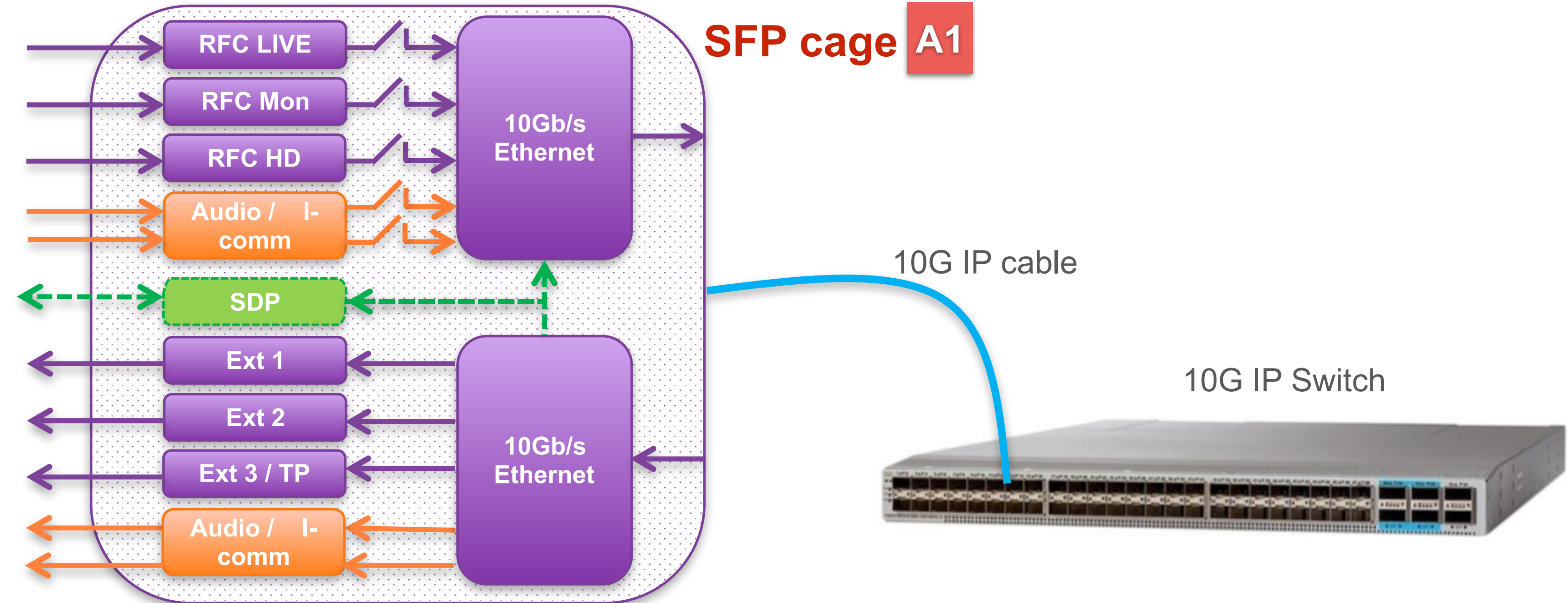
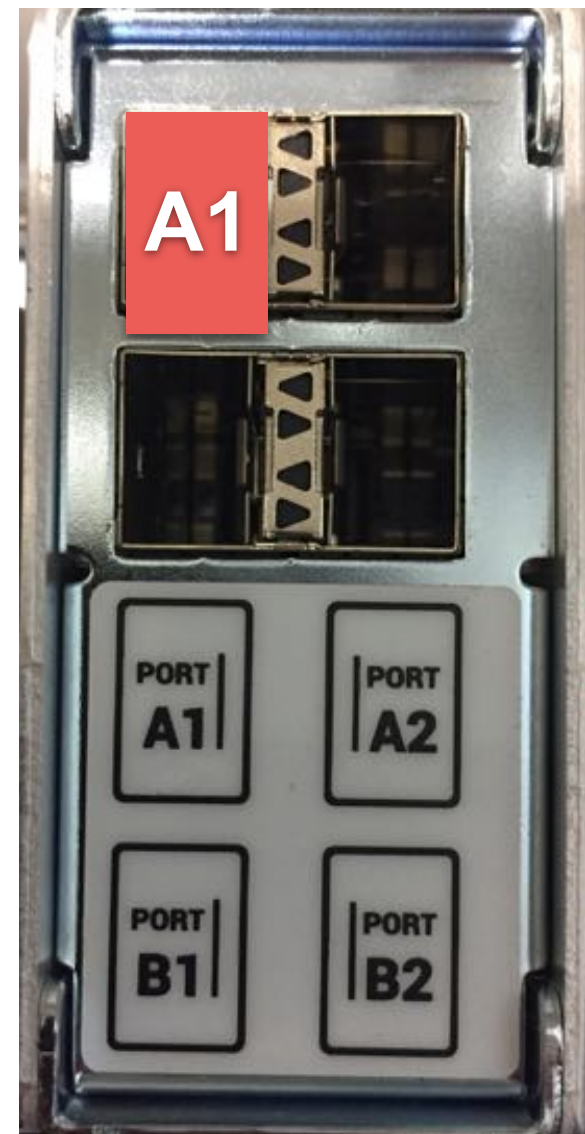
A1 A2 for different signals (live)

B1 B2 redundancy

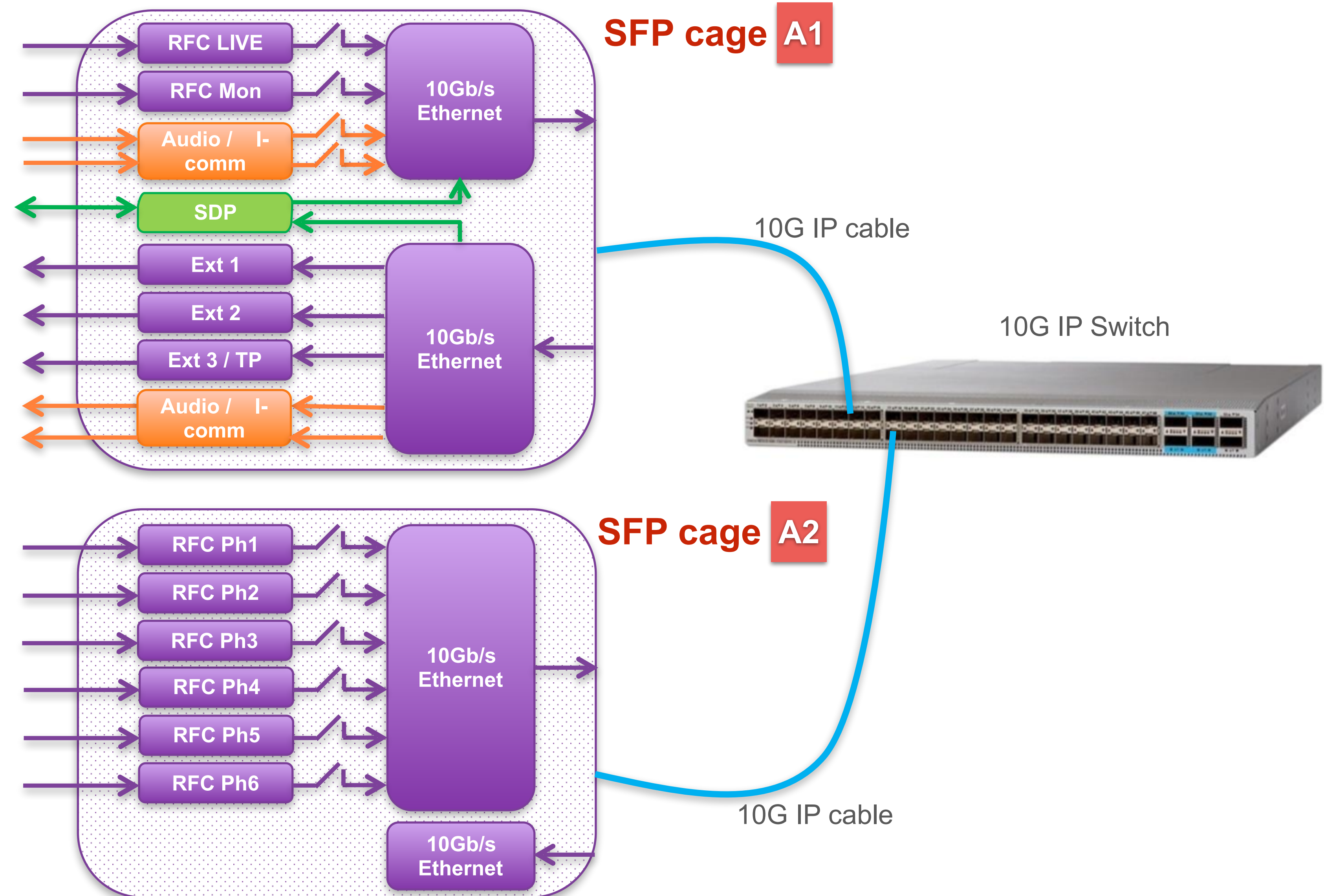
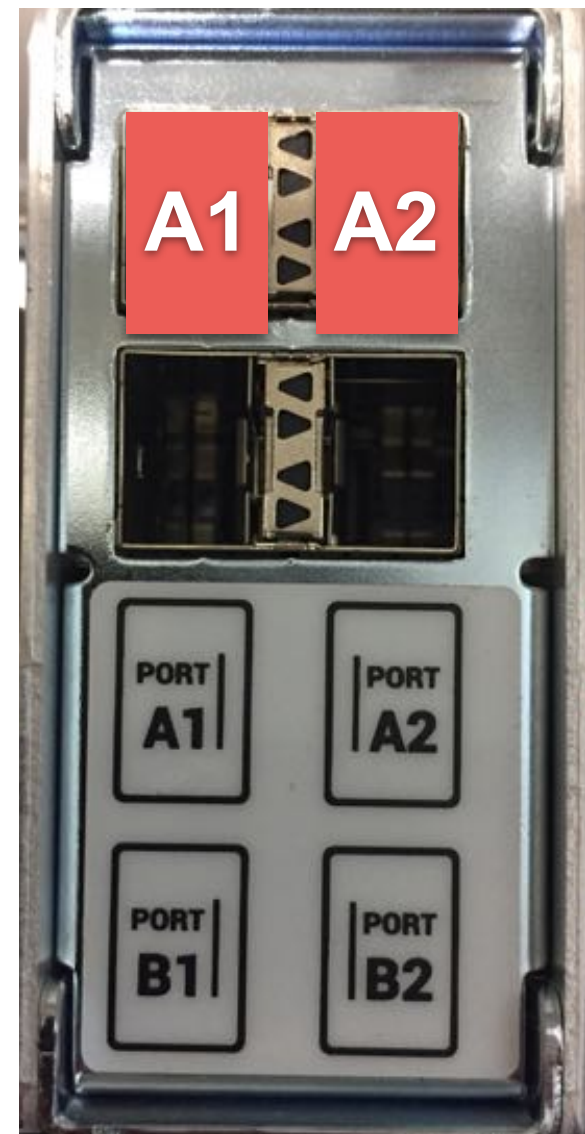
also 12G-SDI will be possible
with a Embrionix module



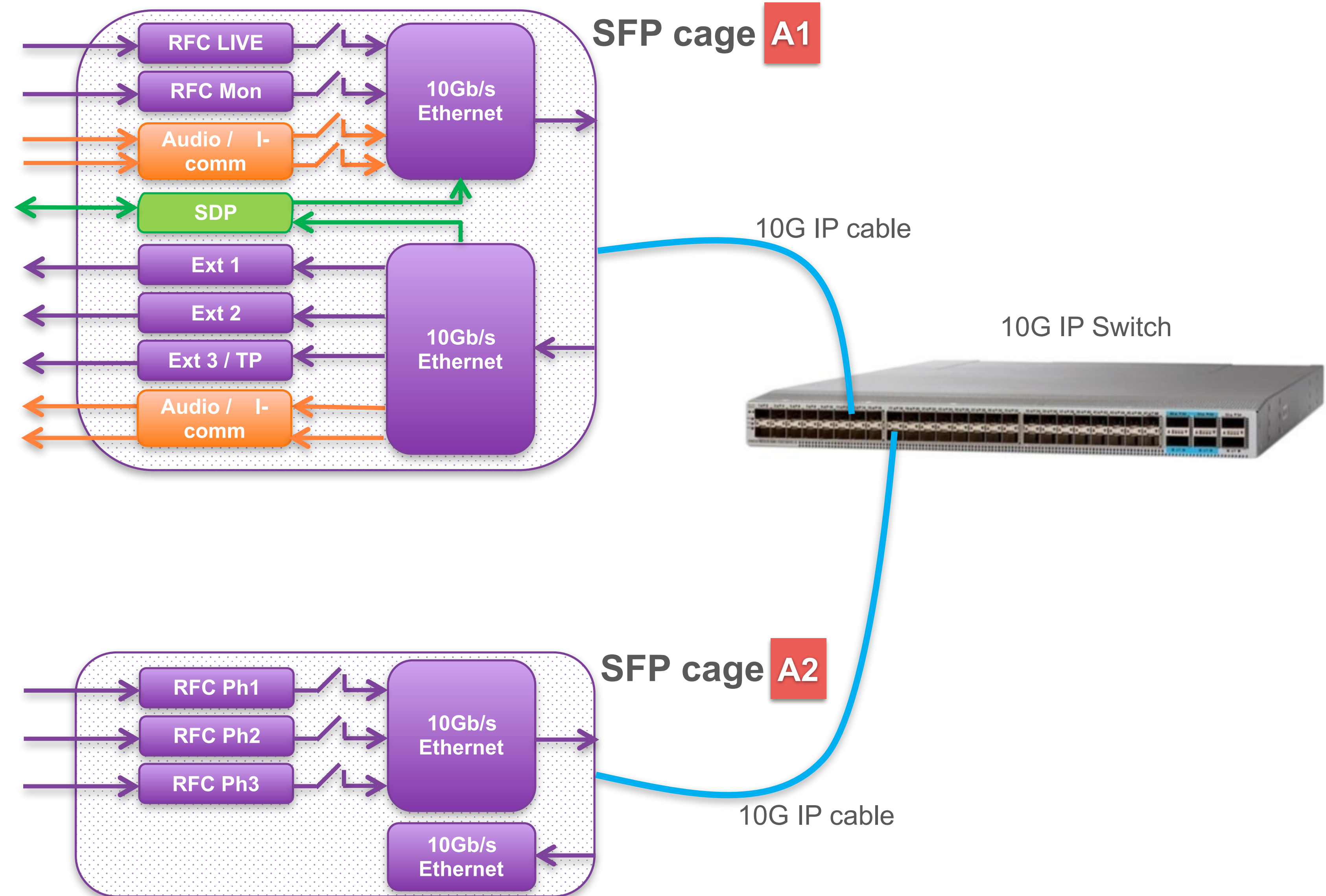
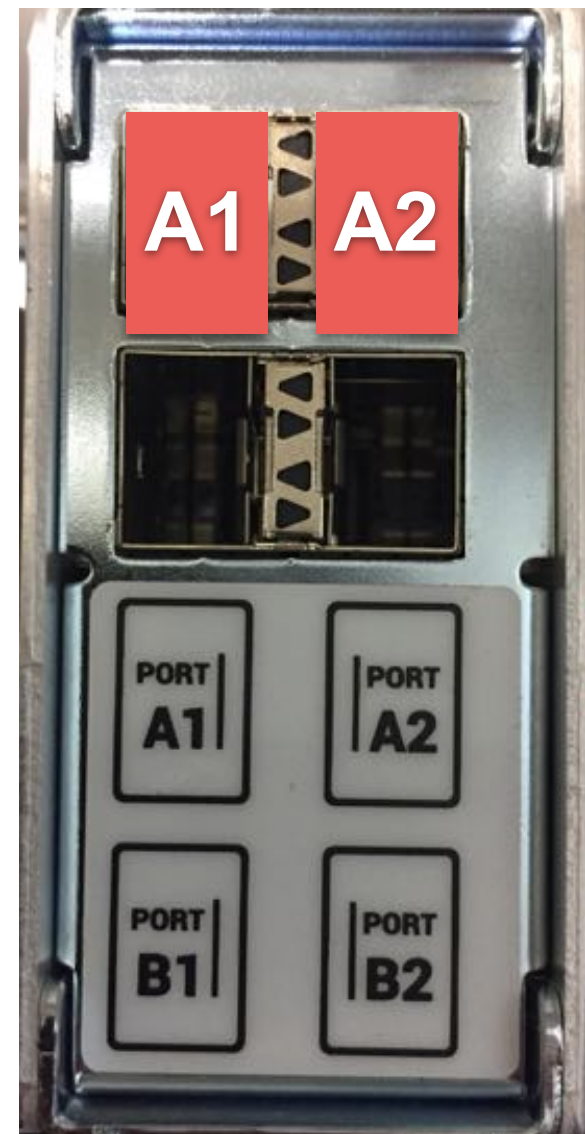
IP streams ; **1x speed** (1x 10G IP)



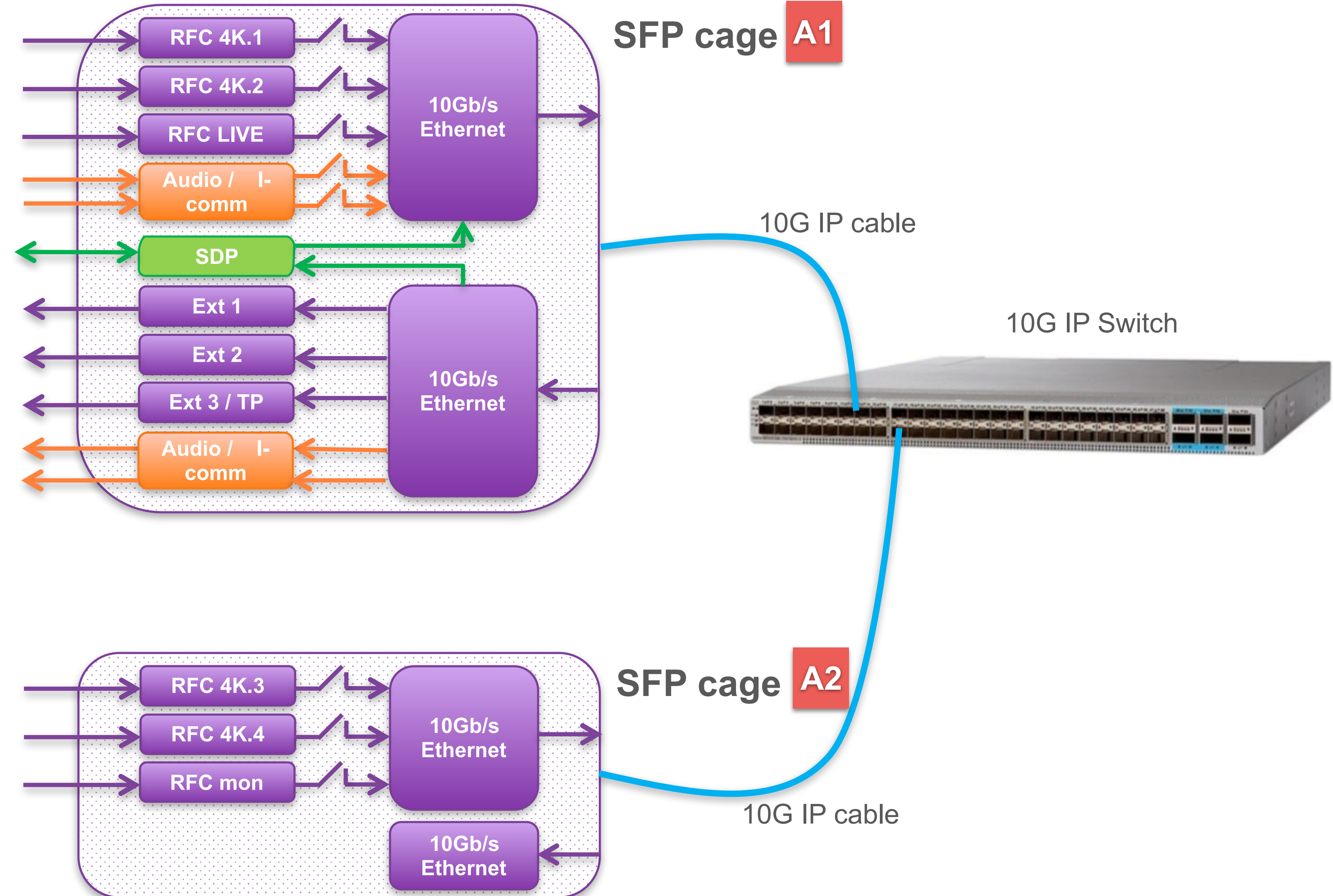
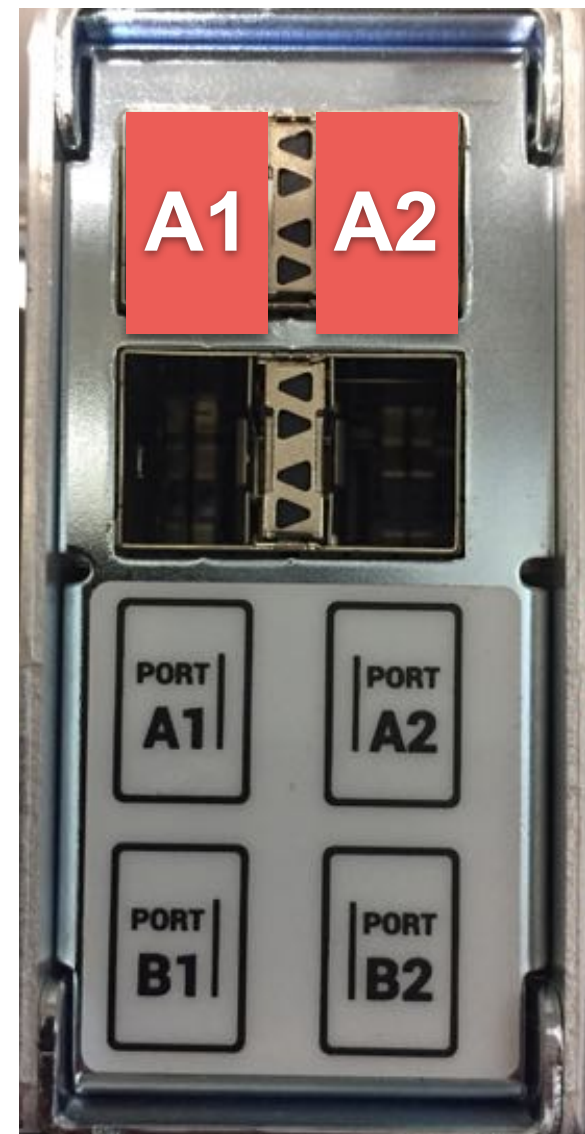
IP streams ; **6x 1080i** (2x 10G IP)



IP streams ; **3x 1080p** (2x 10G IP)

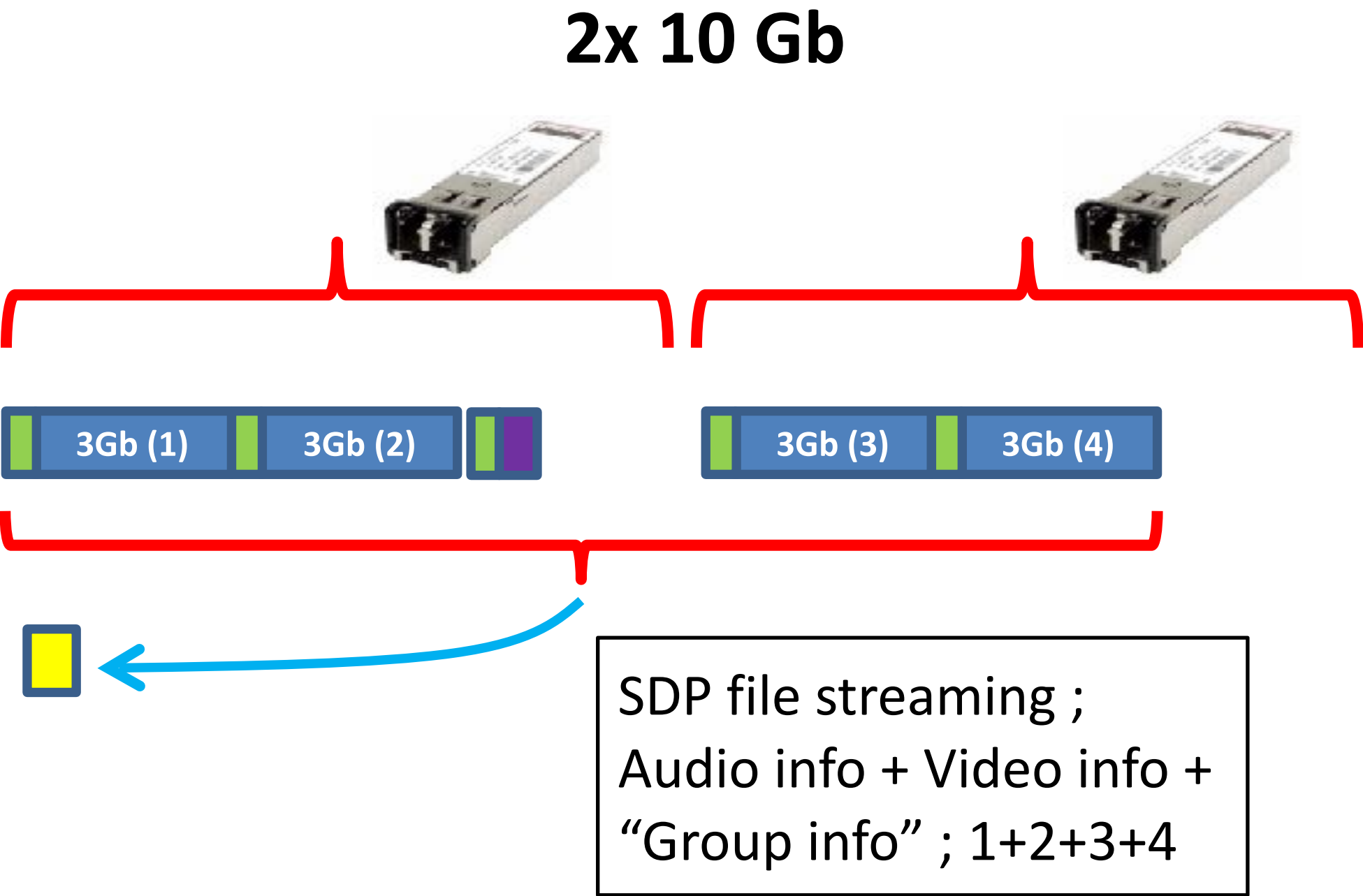


IP streams ; **4K uncompressed** (2x 10G IP)



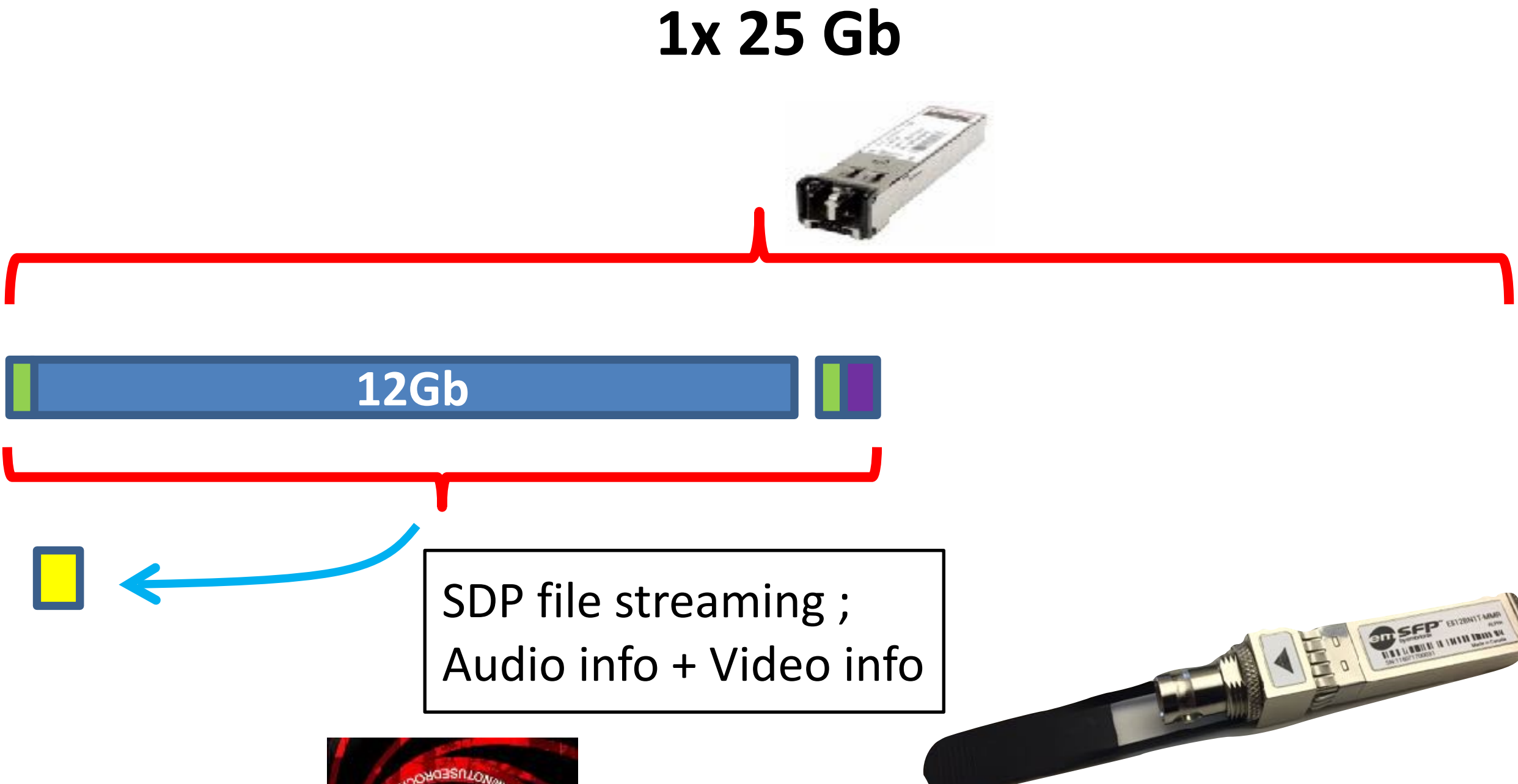
4K uncompressed
SMPTE 2110
(2 options)

IP header		
Video		2110 -20
Audio AES67		2110 -30
SDP-file		



4K uncompressed = 4x 2SI/SDQS stream ; 2110 -20)

3Gb (1) + 3Gb (2) + 3Gb (3) + 3Gb (4)



also 12G-SDI will be possible
with a Embrionix module

4K uncompressed = 1x stream ; 2110 -20)

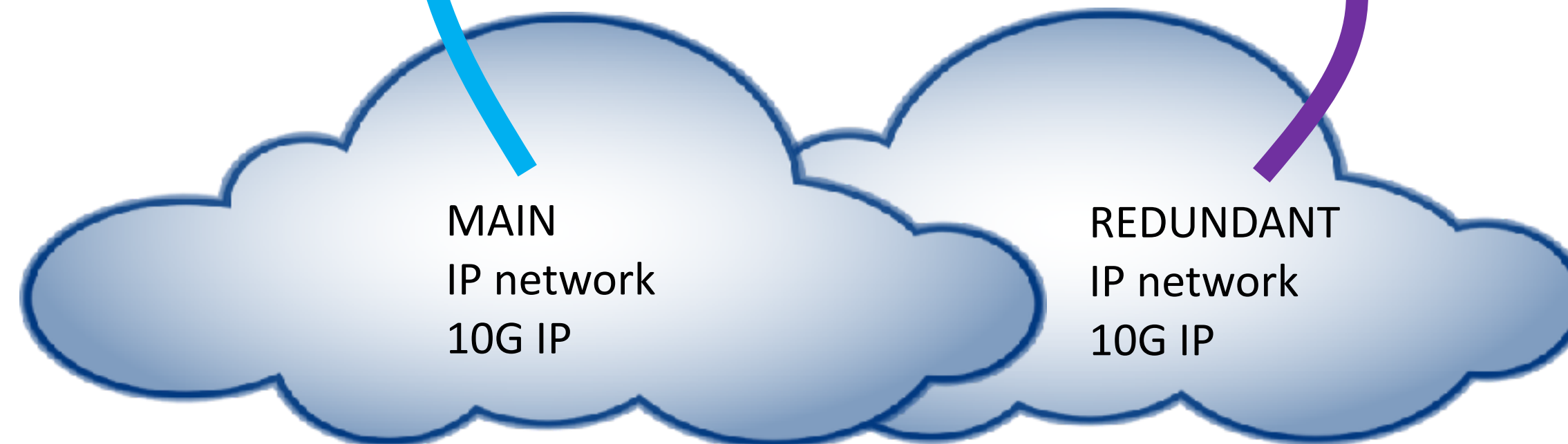
12Gb

Redundancy

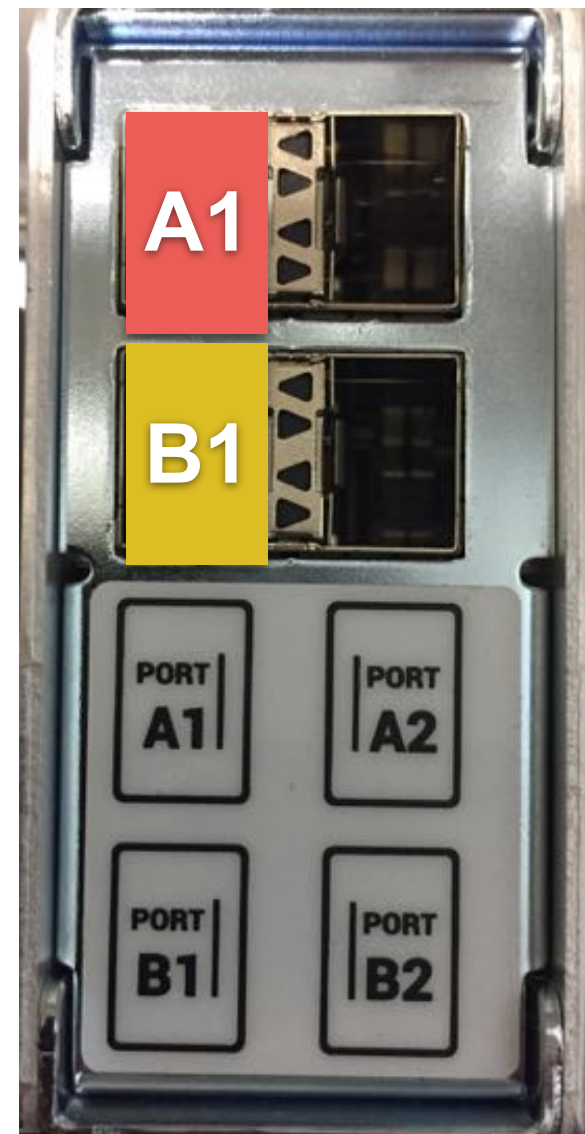
❏ What does it mean in practice ?

- ◆ 2x separate networks ; Seamless switching not necessary ?
 - Redundancy pure for back-up to make sure production can always continue...
- ◆ Seamless switching ?
 - Specific for receiver products
 - Camera outgoing video/audio streams can be easily “copied”
 - Not necessary for return signals, intercom, audio for cameramen
- ◆ Management network also redundant ?

Redundancy

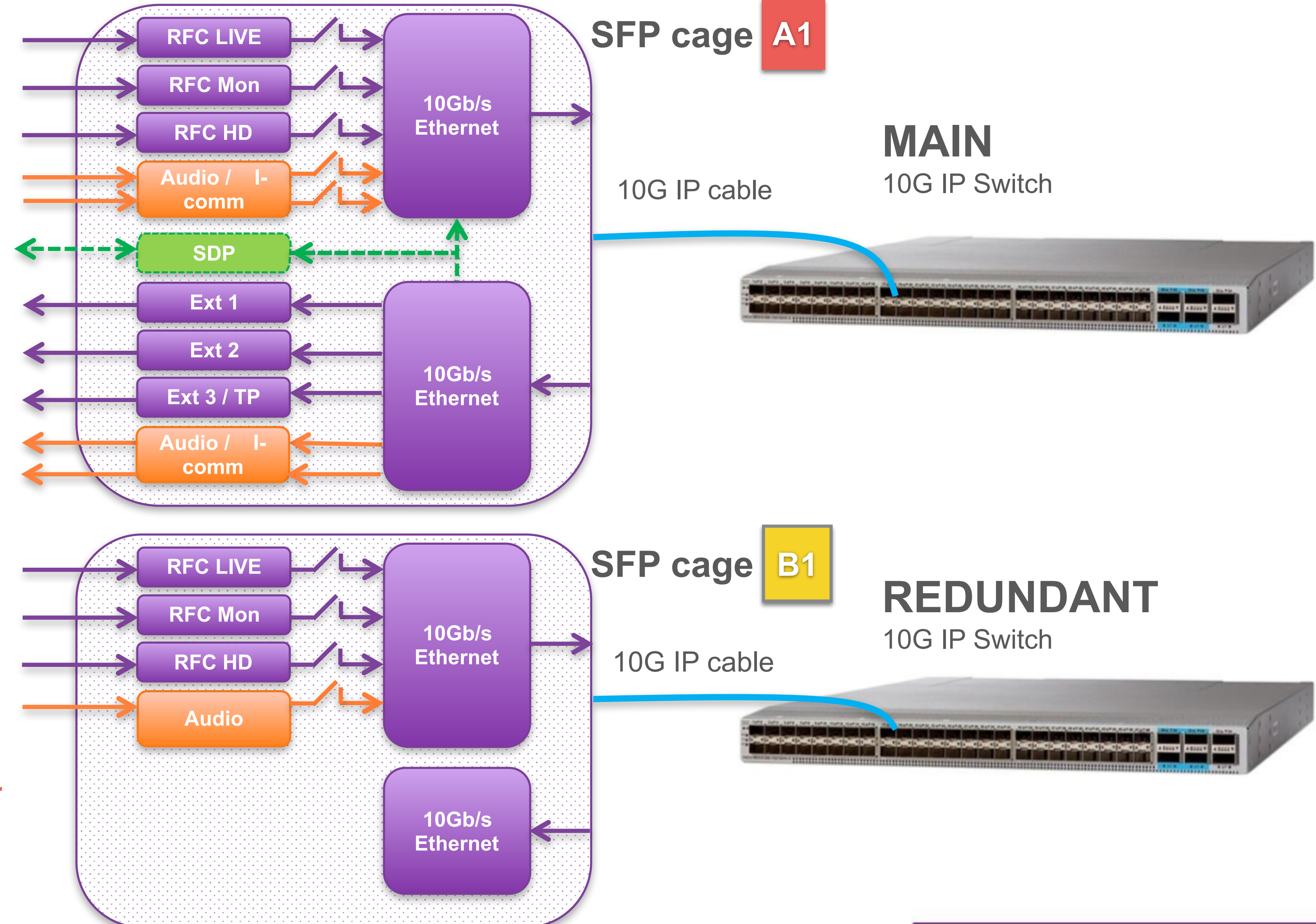


IP streams ; **1x speed** (2x 10G IP : REDUNDANT)



Redundancy for:
Video out
Audio out
PTP

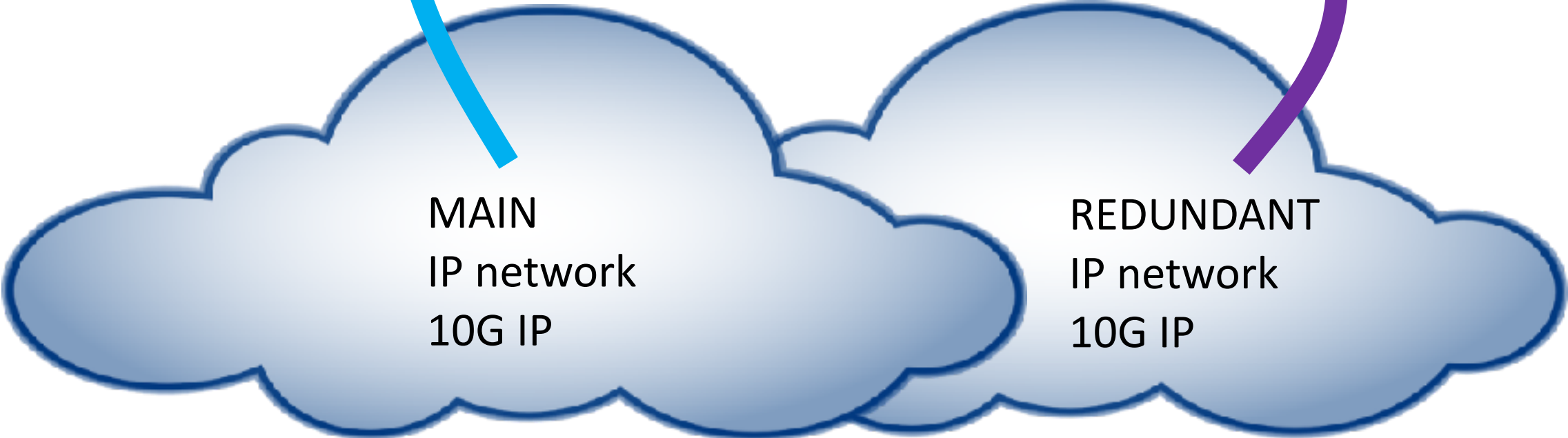
No redundancy for:
Return Video
Return Audio



Redundancy for cameras (Question)

- Is a “copy” of outgoing streams enough for cameras?
- ◆ Do we need the full 2022-7 ?
 - So also for incoming video / audio / Icom streams ?
 - YES, but also seamless switching?
 - PTP, implementation like in the IPG card, is planned
- ◆ Camera Control
 - Today C2IP is only accessible via 1x RJ45 connection
 - Necessary to have C2IP over 10G interface ? Requested by customers ?
- ◆ What are use cases for cameras
 - Which customers are ahead with redundancy that can be used for reference ?

NO Redundancy for C2IP



IP switch
10/100/1G



MCP450



OCP

Camera Control
network
(C2IP)

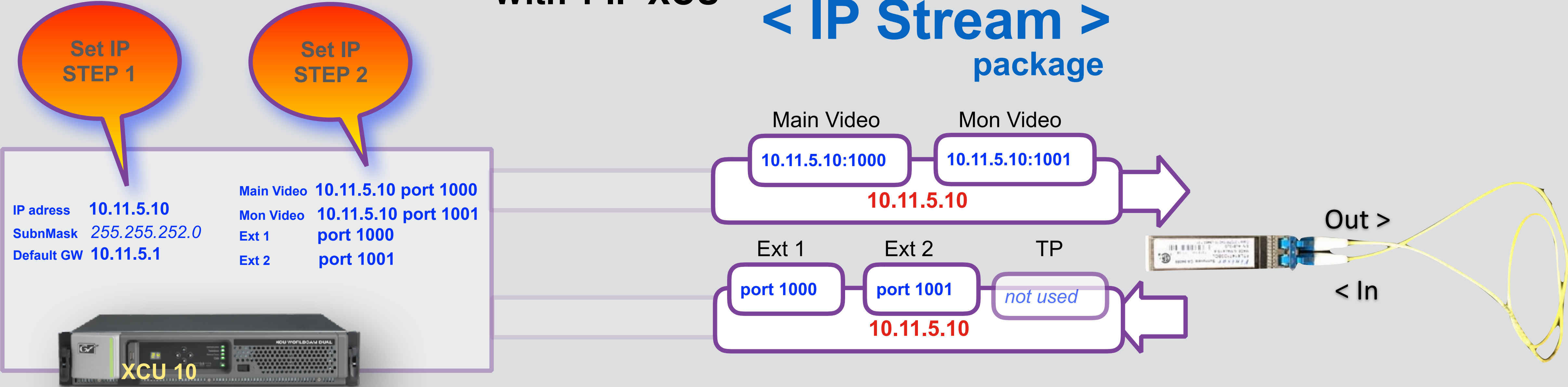
XCU HD/4K IP – Testing with 1 XCU

TEST Before connection to the world

This is an example
to test the system.
1 IP XCU needed.
All setting in UNICAST

With 1 IP XCU

< IP Stream >
package



- * Send Main and Mon Video to Ext 1,2
- * View on Camera Ext 1 (Main) and Ext 2 (Mon)

IP Basics and Operability GV products

Session

- ☒ **1: Introduction IP (Basic overview)** Basic knowledge for IP is mandatory
- ☒ **2: Introduction UXF XCU**
- ☐ **3: Setup with XCU Menu & Camera Connect** (Available as Video soon)





THE END

Thanks for your attention

