



Simplifying Super-Slo Workflow

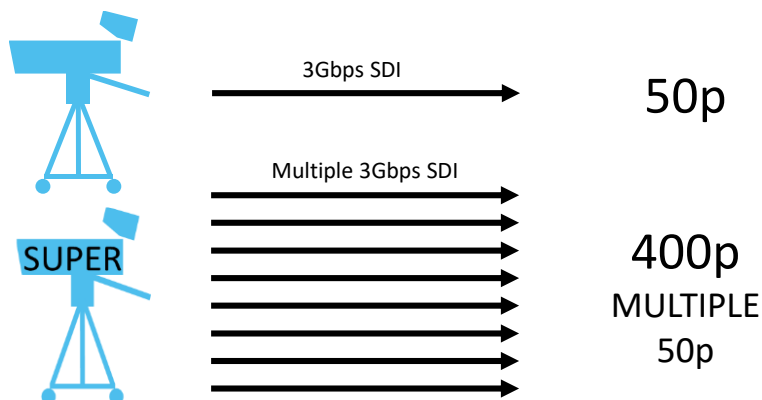
Mike Cronk, VP of Core Technology, Grass Valley
James Stellpflug, VP Global Product Marketing, EVS



IP SHOWCASE THEATRE AT IBC - SEPT. 14-18, 2018

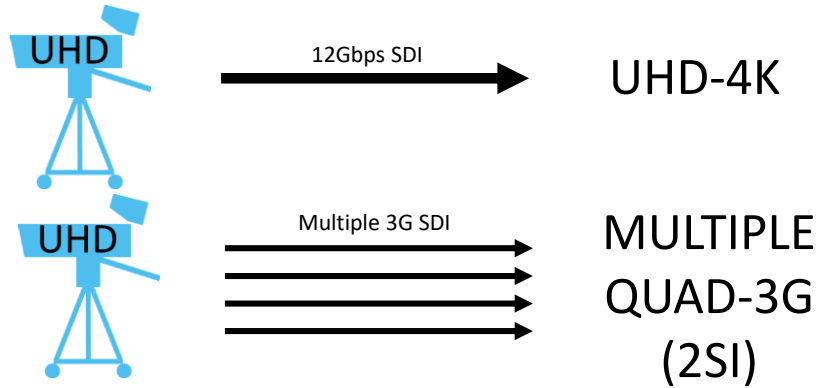


High Bandwidth Flows? What are we talking about



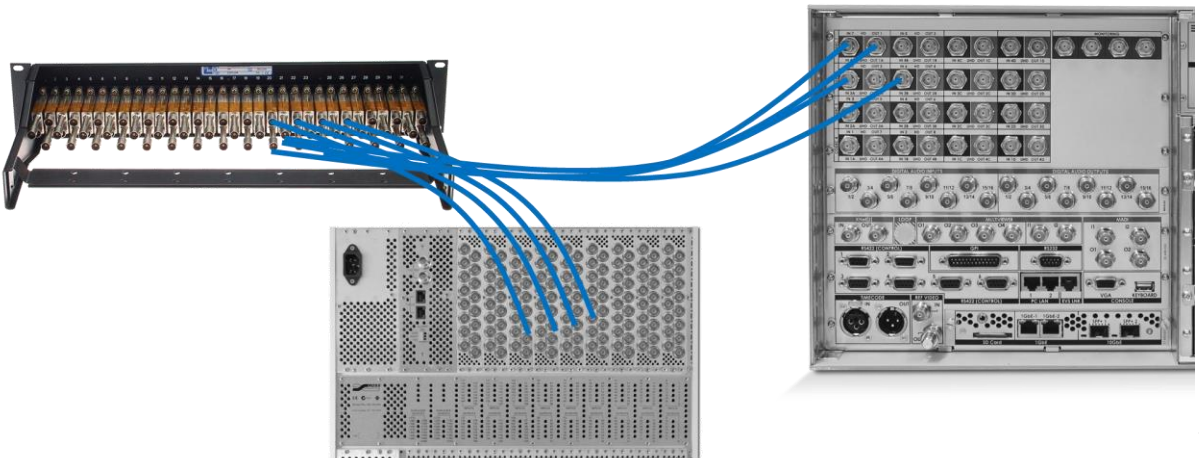


High Bandwidth Flows? What are we talking about



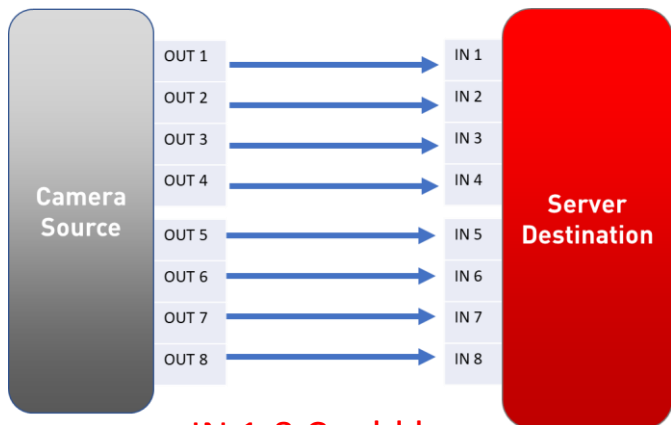
SDI IS EASY...right?

1 WIRE per signal, point-to-point





PLUG AND PLAY?



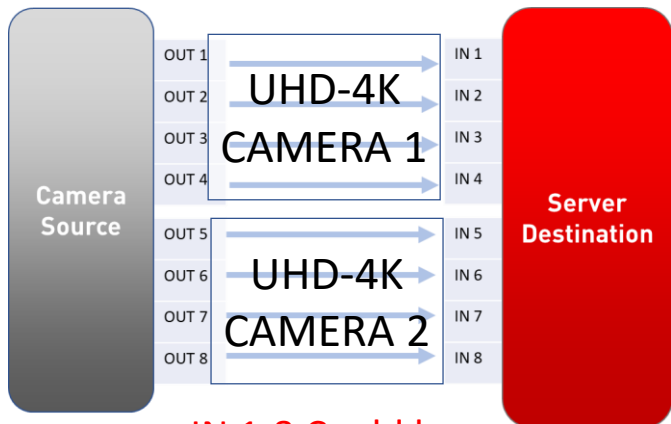
IN 1-8 Could be...



-> Lots of configuration time!
-> Lots of troubleshooting



PLUG AND PLAY?



IN 1-8 Could be...

2 cameras of UHD-4K



-> Lots of configuration time!
-> Lots of troubleshooting





PLUG AND PLAY?



IN 1-8 Could be...



-> Lots of configuration time!
-> Lots of troubleshooting



PLUG AND PLAY?



IN 1-8 Could be...

1 cameras of 8x SuperMo



-> Lots of configuration time!
-> Lots of troubleshooting





SDI IS MANUAL

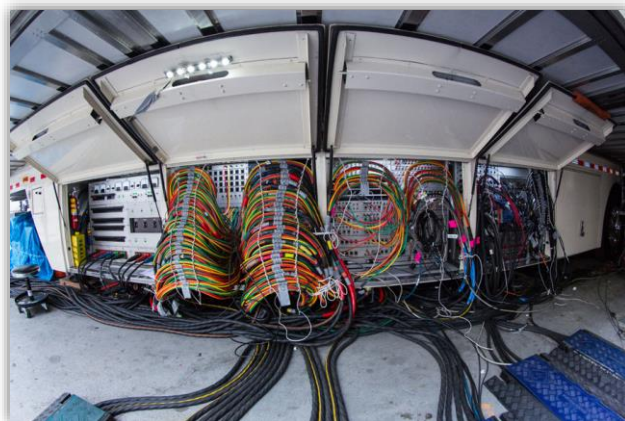



STATIC
CONNECTION LISTING
IP CAN BE MUCH BETTER!



Additional Problems with the SDI Legacy

- **Re-cabling** is required for every event
- Cameras switching from 4K to high frame rate mode
- Video servers changing from various input/output configurations
- **TIME = MONEY**





IP BRINGS SIMPLIFICATION

Smart
IP
Endpoint

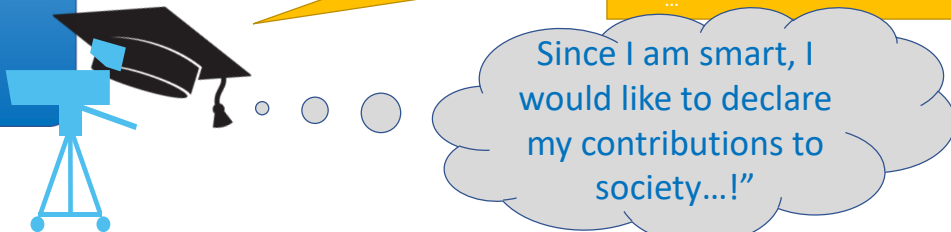
- SFP 1
- SFP 2
- SFP 3
- SFP 4

My data interfaces are :
XX and YY

Now, you know where I am
connected on the IP Fabric


DECLARATION:
Hello, I am endpoint CAMERA1
I am a Super Motion Camera
I expose the following active senders :

OUT 1:
Video : ST2110-20
Resolution, Framerate, HDR, etc...
Audio 1 : AES67
Label : International
...




Since I am smart, I
would like to declare
my contributions to
society...!"


11



These Problems Do Not Necessarily “Solve Themselves” in IP



10Gbps today



100Gbps tomorrow

- Most existing IP switches today are 10G/40G
 - UHD-1 does not fit on one 10G port
 - 8x Super-motion example does not fit on one 10G port

- Upgrading to 25G/100G
 - Might waste bandwidth/money in some cases
 - Need a solution that is flexible to upgrade when ready
 - High Speed UHD SuperMo may not fit in 25G



Open Protocols / Standards are the Tools!

- SMPTE ST2110
- NMOS
- PTP



SMPTE ST 2110 IS THE ENABLER



2110-10
SYSTEM



2110-20
Uncompressed
active video



2110-30
Uncompressed
PCM audio

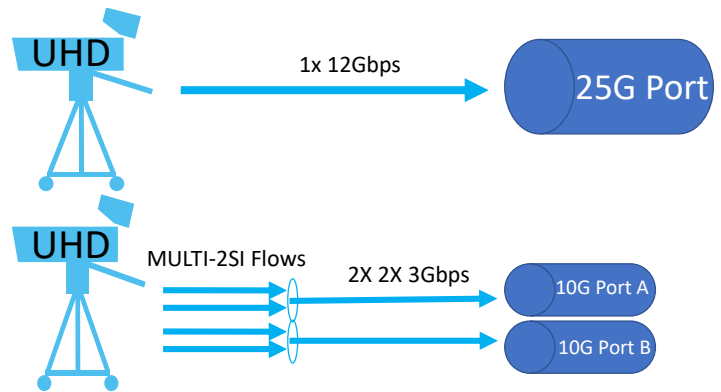


2110-40
Ancillary data



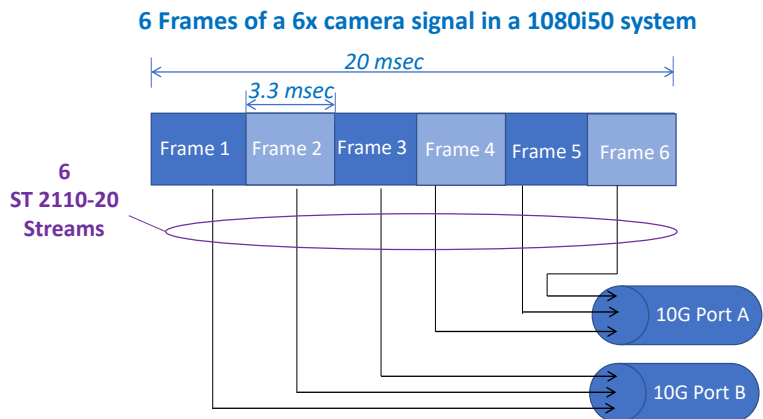
How does this work with ST2110?

- Divide higher bandwidth signals into separate **ST 2110-20** streams at the system data rate
 - For super-slo:
 - PHASES
 - For UHD:
 - MULTI-2SI



How does this work with ST2110?

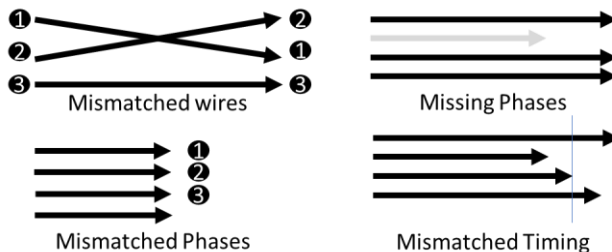
- SuperMotion Example
 - For super-mo: PHASES
- We temporal timeslice exactly as we did for SDI signals





By how would this be better than SDI?

- SDI was a mess!
 - Wrong wires mismatch
 - Missing a phase
 - Timing problems of wires
 - Mismatch between camera and servers
- Signal relationship between streams with Session Description Protocol (SDP)



Defining Signal Relationships with SDP

- Starting from a typical ST 2110-20 SDP declaration...
- Use the grouping mechanism defined in IETF RFC 5888
- And add new semantics*: PHASED, MULTI-2SI



```
m=video 30000 RTP/AVP 112
c=IN IP4 239.252.0.0
a=rtptime:112 raw/90000
a=fmt:112 sampling=YCbCr-4:2:2; width=1920; height=1080;
exactframerate=50; depth=10; TCS=SDR; colorimetry=BT709;
PM=2110GPM; SSN="ST2110-20:2017";
```

```
a=group
```

```
a=group:PHASED a=group:MULTI-2SI
```

*proposed, to be registered with IANA

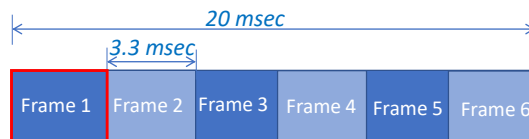


Defining Signal Relationships with SDP

- Identify the relationship of each ST 2110-20 stream to the original higher BW signal



ST 2110-20 SDP for phase "1"



```

a=group:PHASED 1 2 3 4 5 6
m=video 30000 RTP/AVP 112
c=IN IP4 239.252.0.0
a=rtpmap:112/raw/90000
a=fmtp:112 sampling=YCbCr-4:2:2; width=1920; height=1080;
exactframeate=50; depth=10; TCS=SDR; colorimetry=BT709;
PM=21106PM; SSN="ST2110-20:2017";
a=mid:1
    
```



Key Characteristics of this Approach

- Open Standard:**
 - Aligns with SMPTE 2110-20 and SMPTE 2110-10
 - Uses Standard SDP
 - Includes current, multi stream applications
- Flexible and Extensible**
 - Future System Frame Rates
 - Future High Speed Frame Rates
- Makes infrastructure Simpler** to troubleshoot
 - Simplifies Logical Broadcast Controller Operations
 - Enables self-description and accurate stream identification





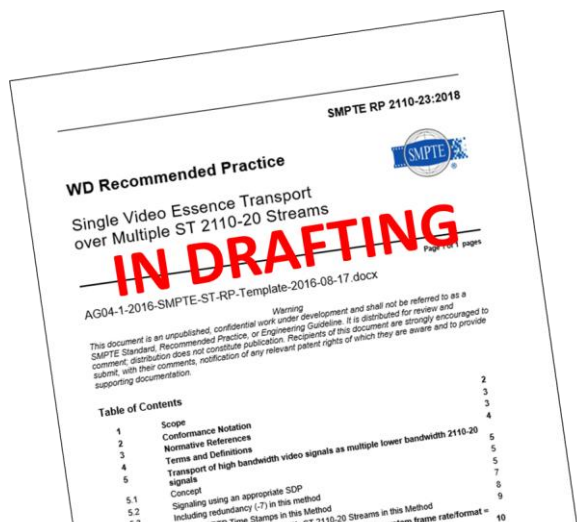
RP2110-23 being drafted within SMPTE 32NF-60

- Status
 - Scope largely agreed upon
 - Draft text available for review for SMPTE members who are members of the DG (drafting group)

TARGET:



Recommended Practice



IP Production Infrastructures become easy...

- Flexibly work with existing infrastructure like 10Gbps switches
- Reconfigure without re-cabling!! from UHD to HD to Super-Mo
- Optimize the bandwidth of your switch infrastructure
- Have a flexible IP network, and protect future investments?





Acknowledgements

EVS and Grass Valley wish to thank the many members of the AIMS Technical Working Group and the members of the SMPTE 32NF-60 (SVIP) group for their feedback and support.

