Utah Scientific

A Look At The Transition From SDI To IP

“Through The Looking Glass”

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President & CEO

“Through The Looking Glass”

- Everything was backwards
- But only to Alice
- Things were normal to everyone on the other side
- SDI is right, IP is wrong or is IP right, and SDI is wrong
- Depends on the side you come from

Television evolves

- Black & White to Color (NTSC/PAL)
- Analog to Digital (SDI, SMPTE 259)
- SD-SDI to HD-SDI (SMPTE 292M)
- HD/3G-SDI to UHD
- SDI to IP

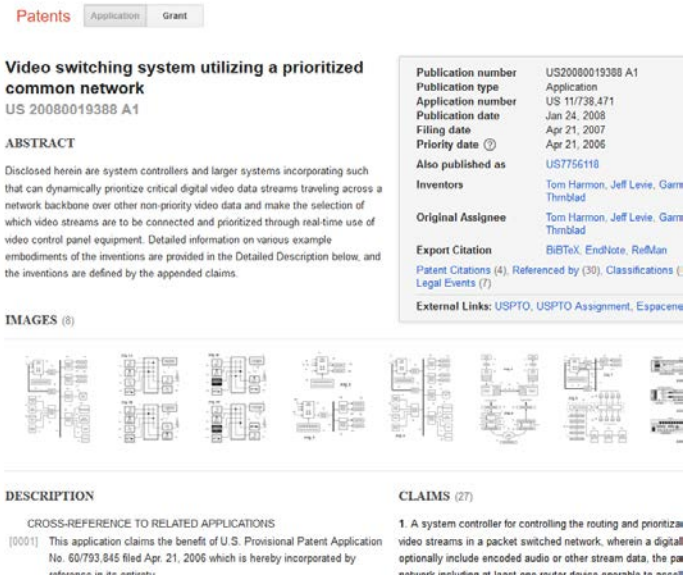
SDI vs. IP

- SDI = Coax
  - 3G/6G/12G/24G shows the maturation of the SMPTE SDI standards.
  - Advantage – leverages existing SDI technologies
  - Disadvantage – nearing the end of practical bandwidth
- IP = Fiber
  - 10 Gb to 400 Gb Ethernet topologies
  - Advantage – Uses COTS (Commercial-Off-The-Shelf) Enterprise IT equipment
  - Disadvantage - Currently more expensive but will rapidly decline

We are at a cross road

UTAH-400 IP

- Utah Scientific received patent for switching IP in real-time nearly 10 years ago
- Little interest in 2007 about uncompressed IP
- Gigabit switch ports limited bandwidth
- Utah Scientific manufactured the IP switch from available silicon



Patents Application Grant

Video switching system utilizing a prioritized common network

US 20080019388 A1

ABSTRACT

Disclosed herein are system controllers and larger systems incorporating such that can dynamically prioritize critical digital video data streams traveling across a network backbone over other non-priority video data and make the selection of which video streams are to be connected and prioritized through real-time use of video control panel equipment. Detailed information on various example embodiments of the inventions are provided in the Detailed Description below, and the inventions are defined by the appended claims.

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Publication type	Application
Application number	US 11/738,471
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Priority date	Apr 21, 2006
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Inventors	Tom Harmon, Jeff Levie, Garn... Thimblad
Original Assignee	Tom Harmon, Jeff Levie, Garn... Thimblad
Export Citation	BiBTeX, EndNote, RefMan

Patent Citations (4), Referenced by (30), Classifications (... Legal Events (7)

External Links: USPTO, USPTO Assignment, Espacene...

IMAGES (8)

DESCRIPTION

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 60/793,845 filed Apr. 21, 2006 which is hereby incorporated by

CLAIMS (27)

1. A system controller for controlling the routing and prioritiza... video streams in a packet switched network, wherein a digital... optionally include encoded audio or other stream data, the pa...

IP = The Future topology

- Most agree that IP is the next step
- IP isn’t exactly a perfect match to Studio Video
- Rather complicated compared to SDI
- Studio Video over IP is Ethernet
- IT MUST BE INTEROPERABLE

AIMS

- Alliance for IP Media Solutions
- Formed December 2015
- Support for implementation of TR-03
- Foster adoption of TR-03 (SMPTE 2110)

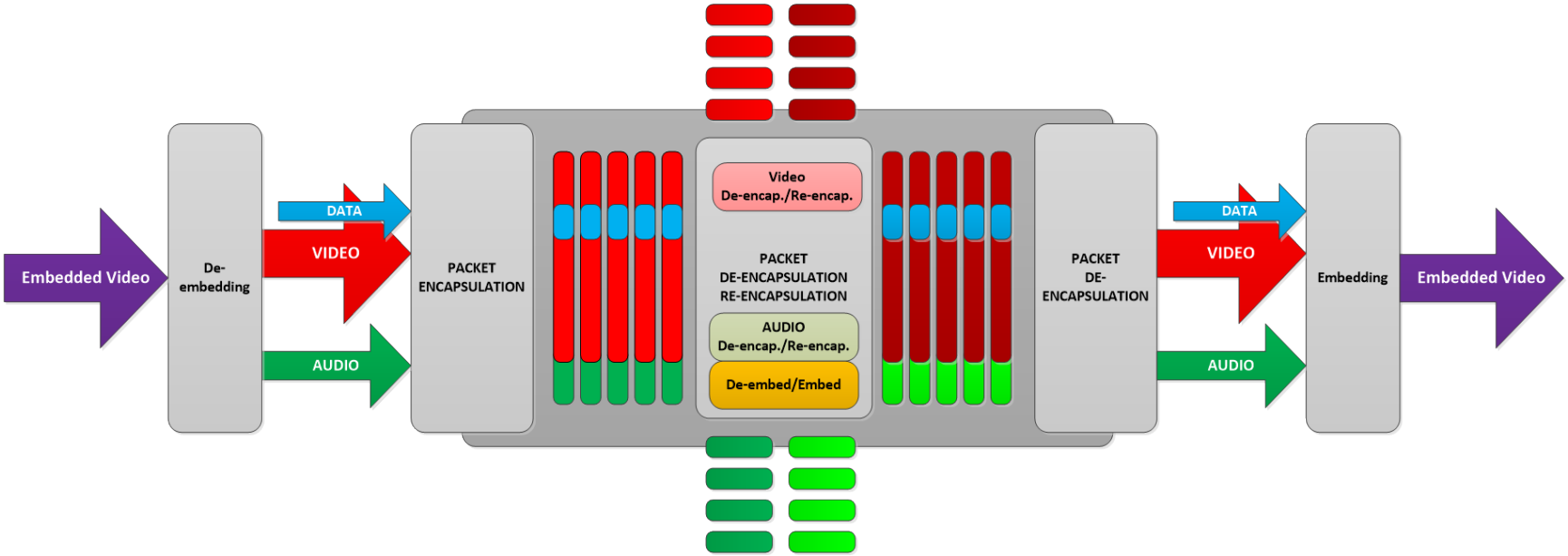
Interoperability drives the move to IP

AIMS leads the way…

SMPTE 2022-6

- Direct encapsulation of Embedded SDI
- Works with Commercial Off-the-Shelf (COTS) Ethernet switches
- SDI Synchronization captured in the stream

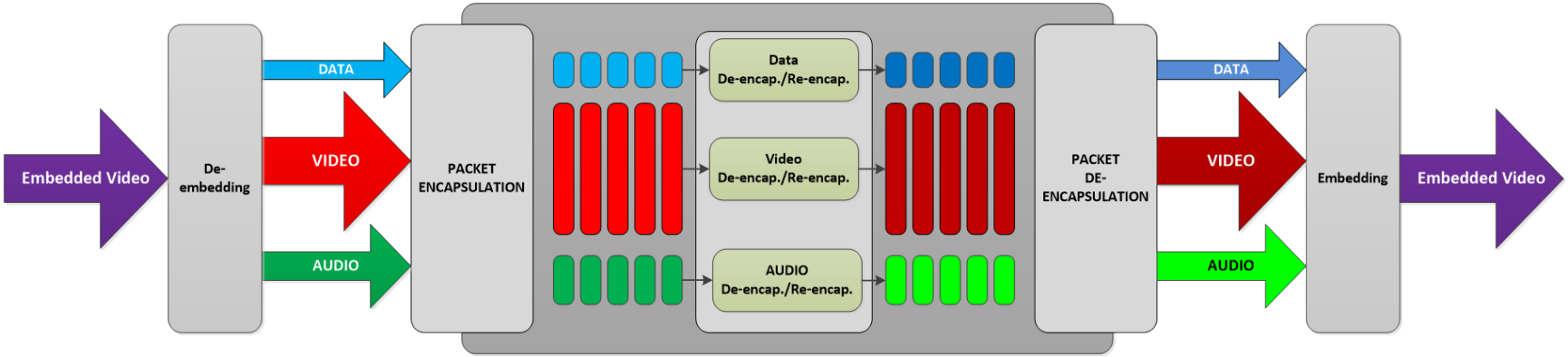
SMPTE 2022-6


Embedded Video
De-embedding
DATA
VIDEO
AUDIO
PACKET ENCAPSULATION
Video De-encap./Re-encap.
PACKET DE-ENCAPSULATION RE-ENCAPSULATION
AUDIO De-encap./Re-encap.
De-embed/Embed
PACKET DE-ENCAPSULATION
DATA
VIDEO
AUDIO
Embedding
Embedded Video

SMPTE 2110

- SMPTE 32NF60 Draft Group began April 2016
- Uses TR-03 as the template for SMPTE 2110
- AIMS supports the 2110 Draft Group
- SMPTE 2110 core becomes standard
- NAB “IP Showcase” demonstrated 2110 interoperability

TR-03 (SMPTE 2110)



The Pillars of SMPTE 2110

- 2110-10 System Timing
- 2110-20 Video
- 2110-30 Audio
- 2110-40 Data
- 2110-50 TR-04 (2022-6 video + 2110 audio + PTP)

2022-6 vs. 2110

- 2022-6 uncompressed may support long-haul needs
  - Inter-Facility uses that may require FEC and ***hitless*** options
  - Similar to ASI for containing all the program elements in one address

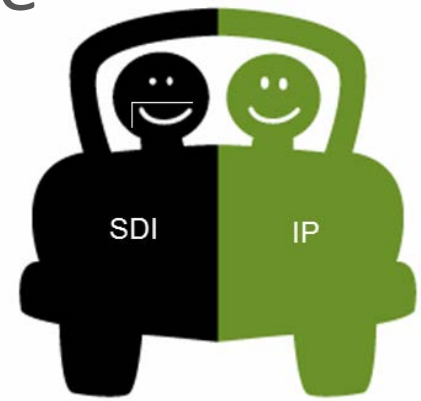
- 2110 supports Studio needs
  - Intra-Facility uses that require separation of video, audio and data
  - More like separate AES Audio and HD-SDI Video with separate VANC
  - Separate IP addresses for each essence
    - Audio
    - Video
    - Data

How many coax connections?

- Do you have in your facility?
- How many full bandwidth uncompressed IP streams?
- All coax connections need a complimentary IP device before we can fully transition

IP + SDI = Hybrid Environments

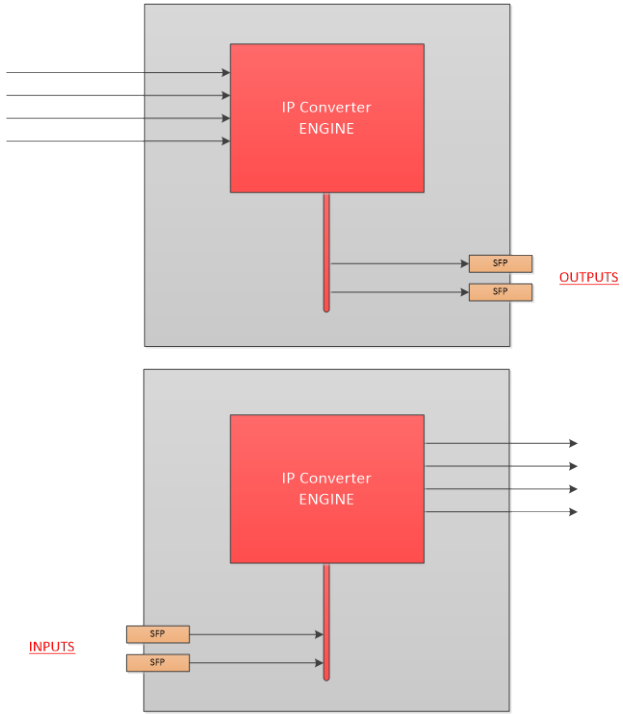
- The migration from SDI to IP will not be sudden
- SDI and IP will work together for years
- Hybrid Islands will appear
- Utah Scientific endeavors to lead the way



External Conversion

- SDI inputs converted to IP outputs
- IP inputs converted to SDI outputs
- Flexible signal selection
- Modular architecture

SDI to IP / IP to SDI

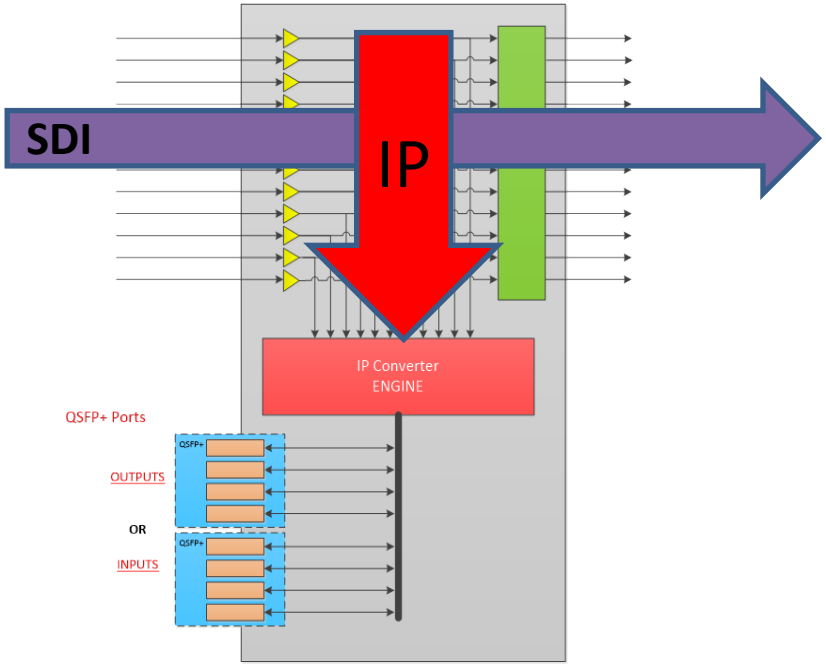


Internal Conversion

- Router based Conversion (12 3G signals /card)
- Replace input or output cards with new cards that supply IP conversion and allow SDI to pass-through
- 40Gbe QSFP+ Connections allow maximum conversion
- MAINTAIN all current 3G/HD router inputs and outputs

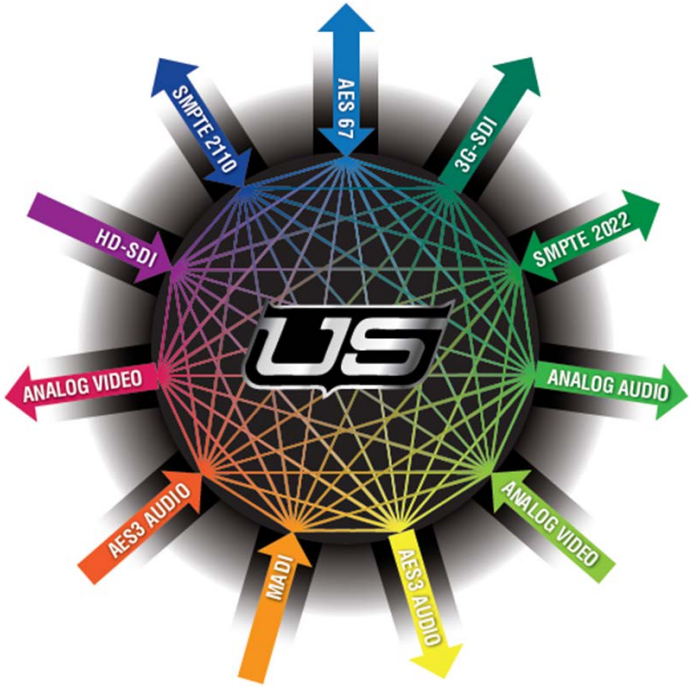
New Utah Scientific ‘Pass-Through’ I/O card

- SDI passes just like normal I/O cards
- Signal is SPLIT
  - Split 1 goes to SDI
  - Split 2 goes to IP
- QSFP allows 40 Gb/s ports
- SDI + IP inside the router



Hybrid Applications

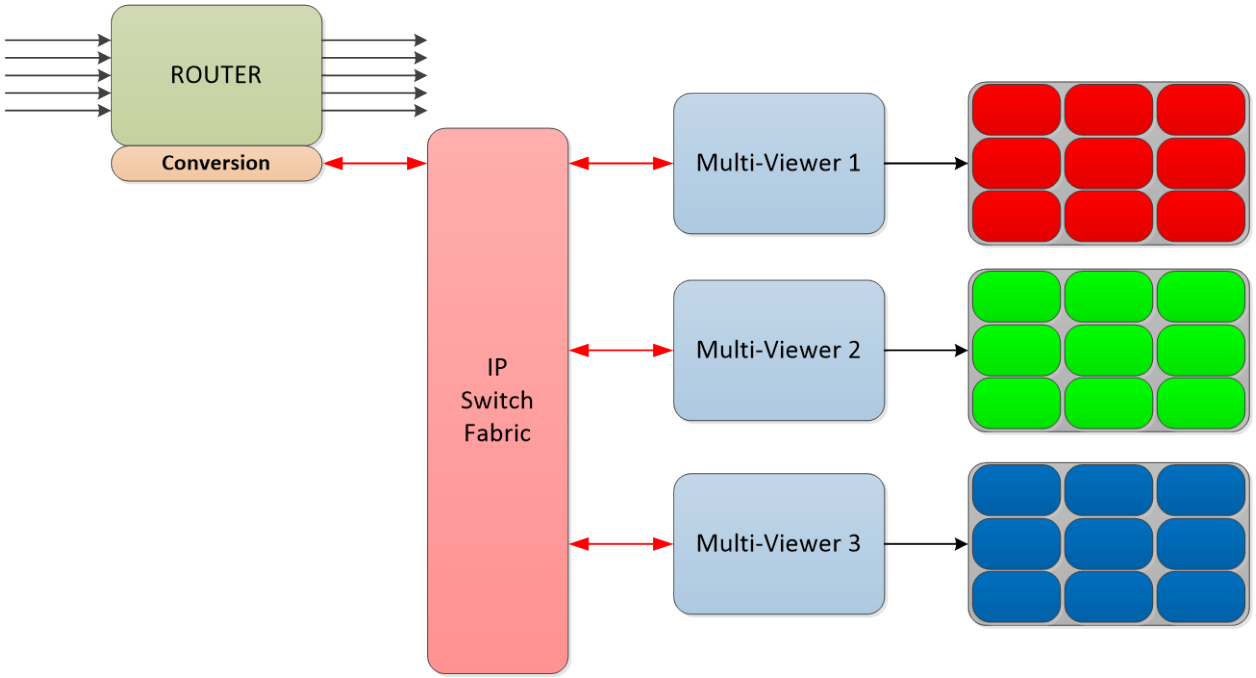
- Multi-Viewing
- SDI-IP Tie Lines
- Long Haul, Compression, Tie Lines



IP Monitoring

- Low Latency the key for Live Production monitoring
- IP becomes a ‘pool’ of source signals
- Relieves congested SDI router outputs
- Low risk ‘sandbox’

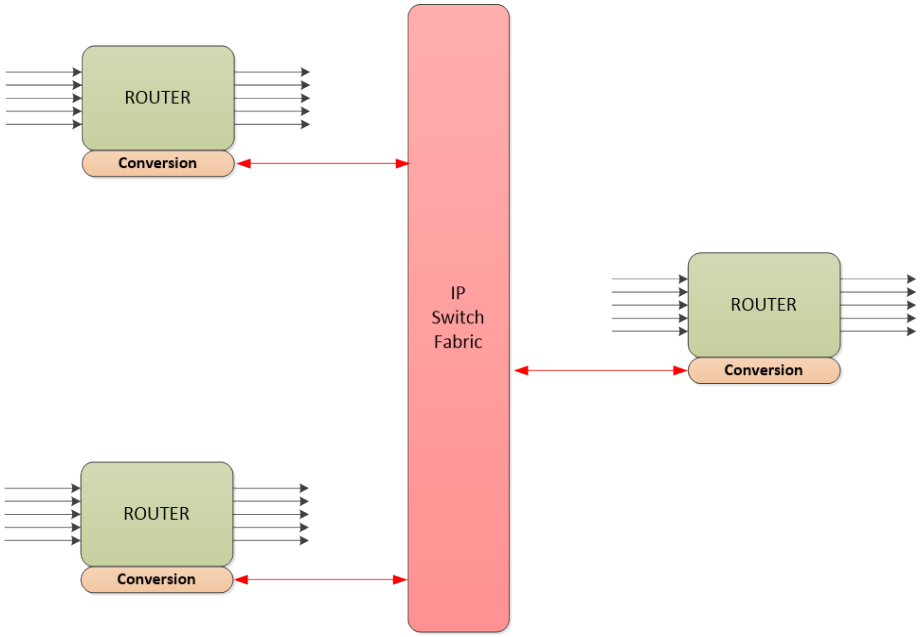
Multi-View Monitoring Application



IP Tie-Lines

- Tie-Lines can bridge between multiple SDI routing platforms
- IP becomes the means to large aggregation sources
- Allows smaller SDI routing cores

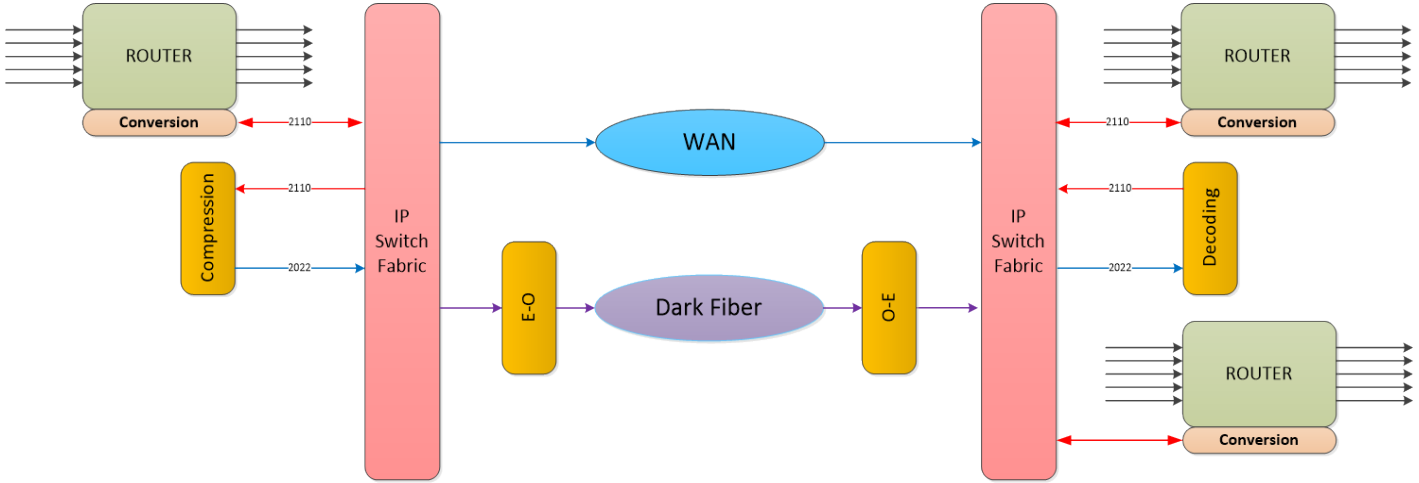
Tie-Line Application



IP Compressed/Uncompressed + SDI

- Long Haul may use IP
  - Uncompressed 2110 or 2022-7 hitless
  - Compressed using 2022-2
- Ability to switch IP formats
- Convert to and from SDI
- Hybrid will most likely dictate the next decade

Tie Lines and Long Haul Applications



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Thank You!

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