

# Telecast Fiber Systems

## 2018

Juli 2018

 FUTURE-READY

your host Jan Paul Campman



# Agenda

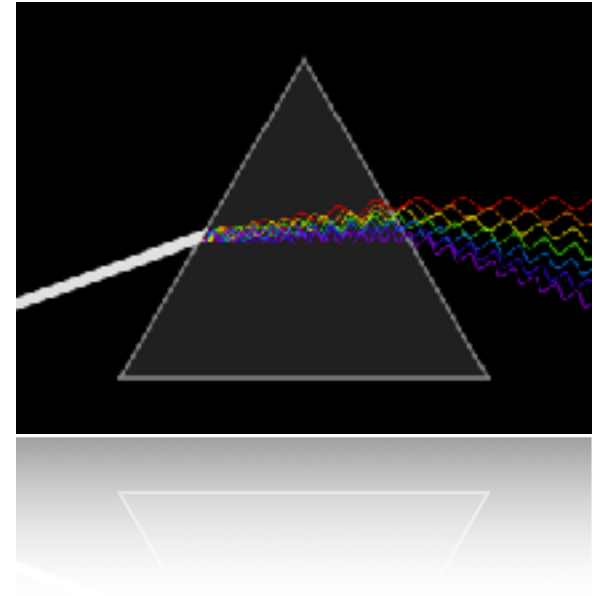
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## Camera Solutions

- CopperHead Systems
- T-POV Robotic Systems
- SHED/HDX
- MPS / Power Wafer
- Cobra 2DT*
- RCP-2050A*

## and New

- **T-POV 4K**
- **HDX plus / Power plus II**



# Agenda

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## Terminal Gear

- Rattler 4
- Terrapin
- *Python 3G*
- *Teleport*
- Telethon

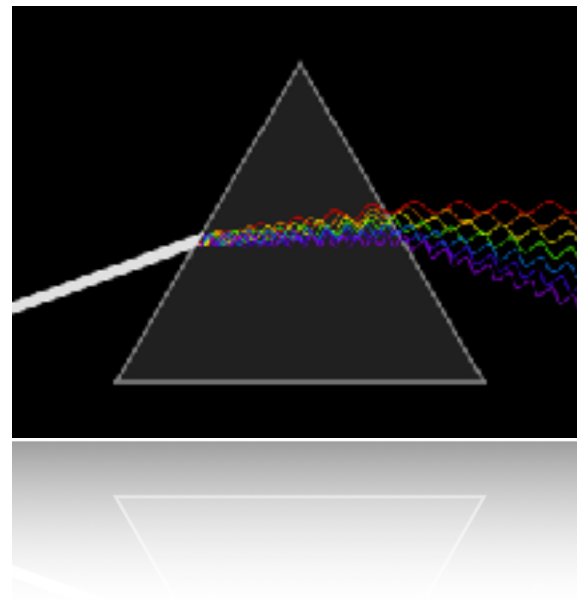
and **New**

- Viper XL and XXL

## Audio

- *Adder II*
- *Thunder (+data)*
- *Commlink 6442i (intercom)*

**Hands ON** (only when equipment available)



# Telecast Fiber

Marketplace

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# Fiber Optics for Television Production

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**Fiber optics are utilized in the two major aspects of television broadcast production**

## **Mobile TV Field Production**

- News
- Sports
- Entertainment

## **Fixed Systems**

- Inter- and Intra-Facility Cabling
- Studio-Transmitter Links
- Sports Venues
- Metropolitan Inter-facility Links



# Camera Solutions

CopperHead

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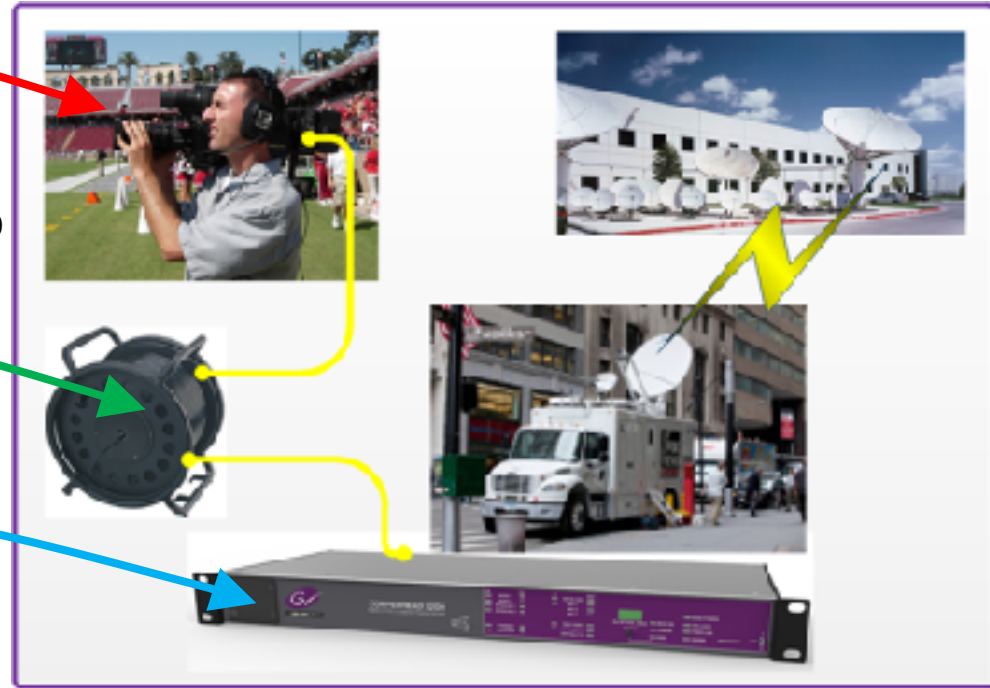
# CopperHead Camera-Mounted Fiber Optic System

Three basic elements:

**Camera unit** – a fiber-optic transceiver that mounts to high-end broadcast video cameras

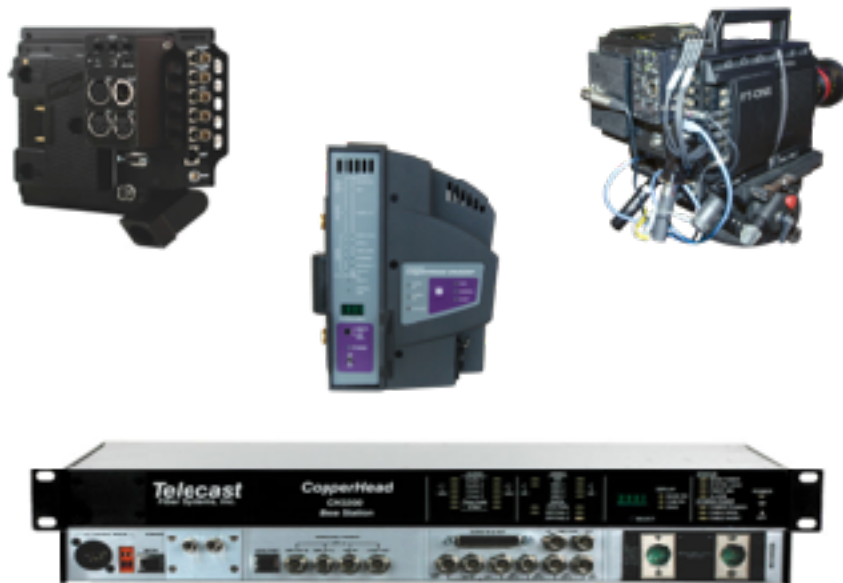
**Fiber spool** – a length of fiber-optic cable that connects the two transceivers

**Base station** - rack mounted transceiver that mounts easily in a truck, rack, or studio control room.



# CopperHead Camera Systems for ENG, News & more...

- All camera signals on lightweight fiber cable
- Market specific models for News, Production, Cinema, 3D, 2K & 4K
- Smaller size, thinner, lower cost
- More signals, including return HD and Ethernet
- Powerful diagnostics and monitoring features



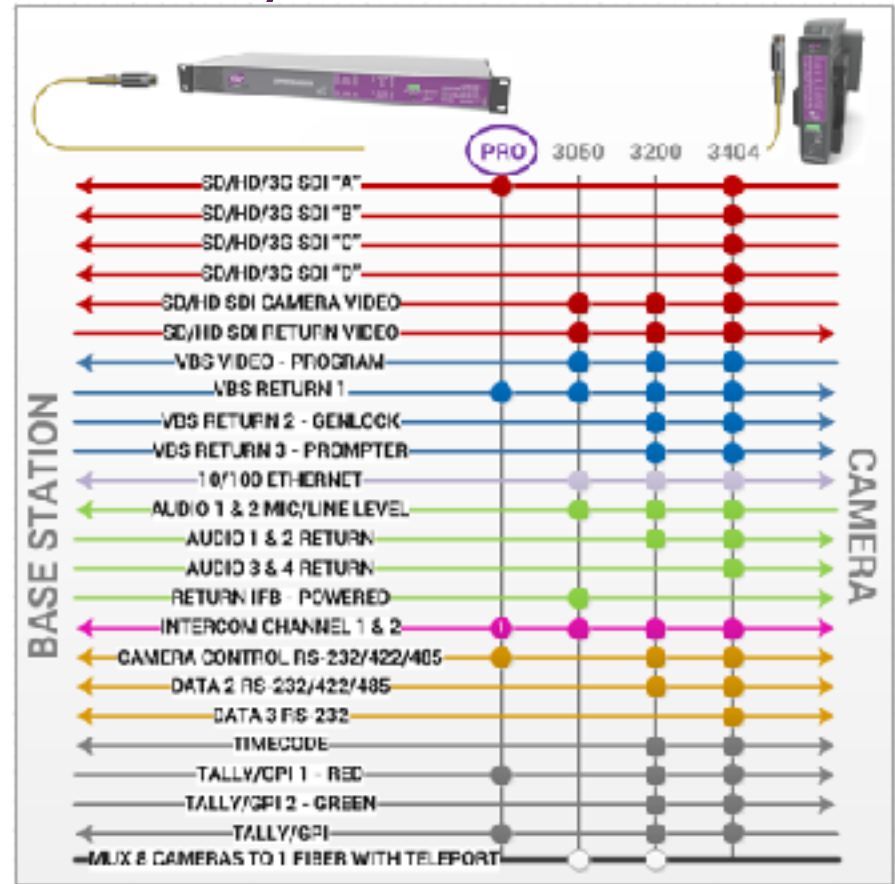
**Solution For Most Productions**



# CopperHead Series 3000 Family

## CopperHead Pro:

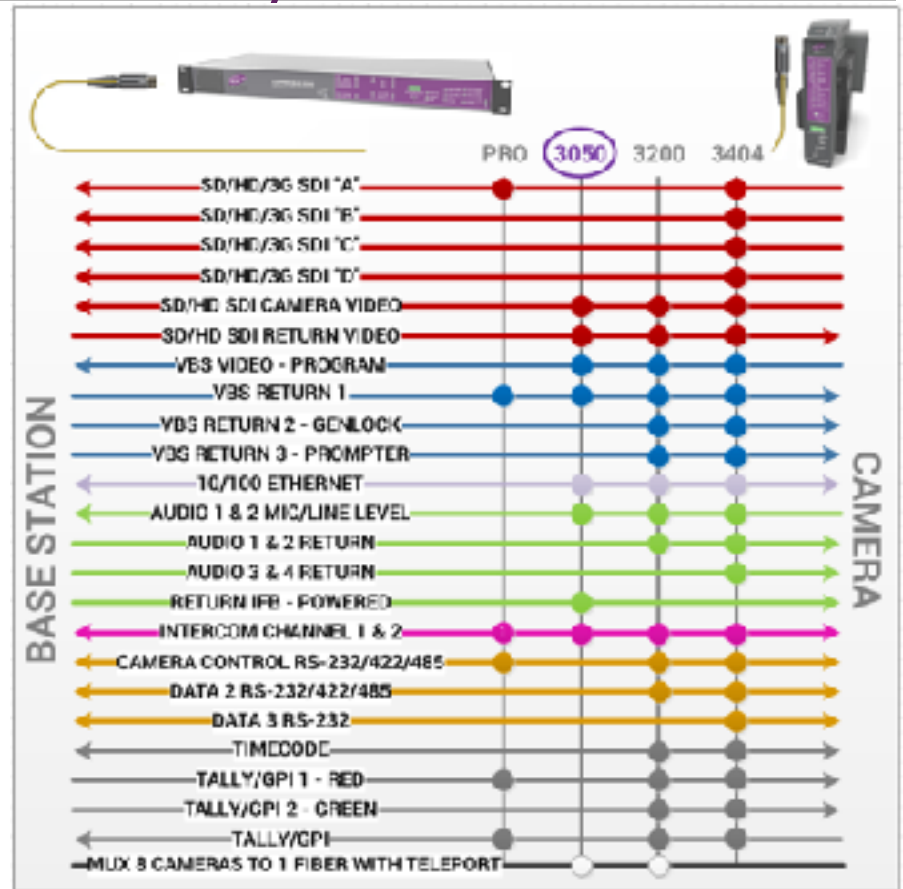
Low budget production/studios, live shows to  
“big screen” I-Mag = Image Magnification/Big  
Screen



# CopperHead Series 3000 Family

## CopperHead 3050:

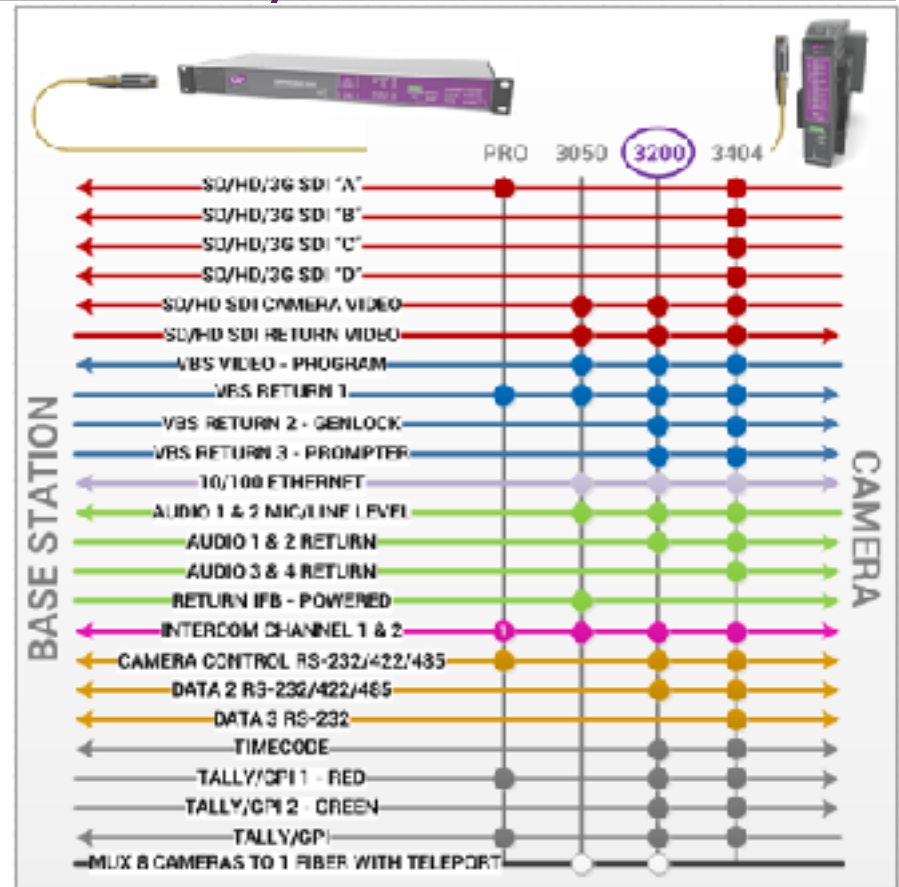
News Gathering (no camera control, powered IFB for talent earpiece)



# CopperHead Series 3000 Family

## CopperHead 3200:

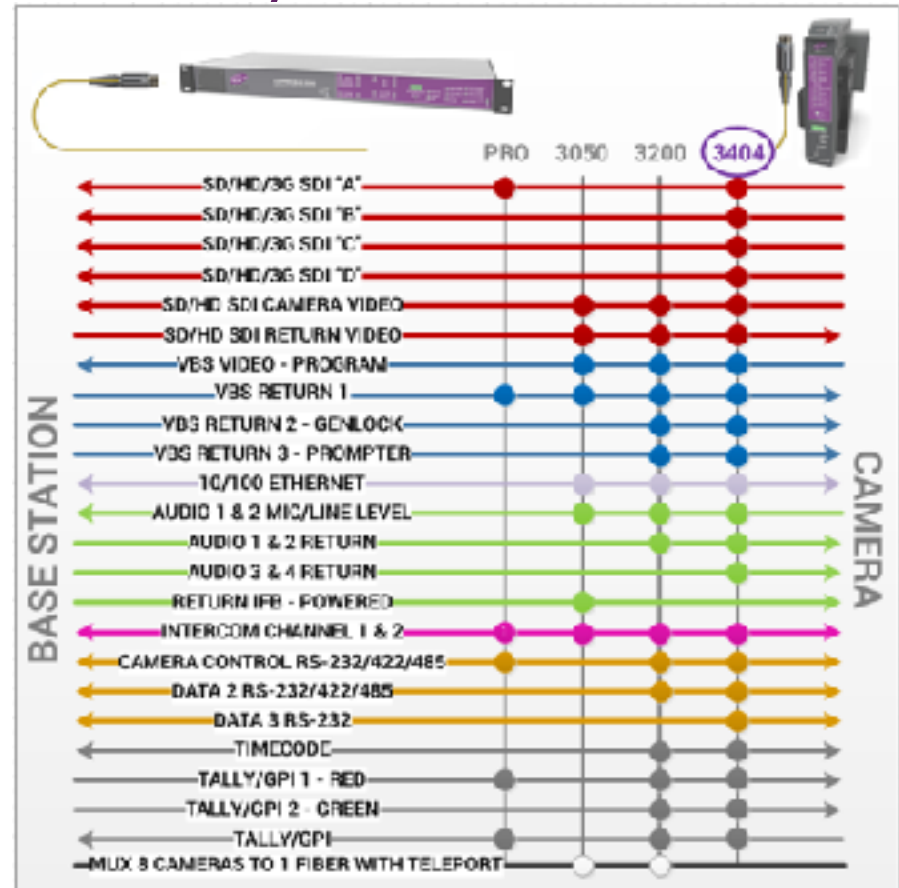
Live full scale production (studios and OB broadcasting). This gives any camcorder full capabilities of a “studio-style” systematized camera. The most popular CopperHead system. )



# CopperHead Series 3000 Family

## CopperHead 3404:

Live full scale 4K production. Capabilities of 3200 plus quad 3 Gig paths for 3D cameras, high speed, 4K E-cinema cameras.





# CopperHead

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## + Camera-Mounted Fiber Optic Transceiver

“Dual Purposes” any ENG Camcorder into a multi-camera workflow.

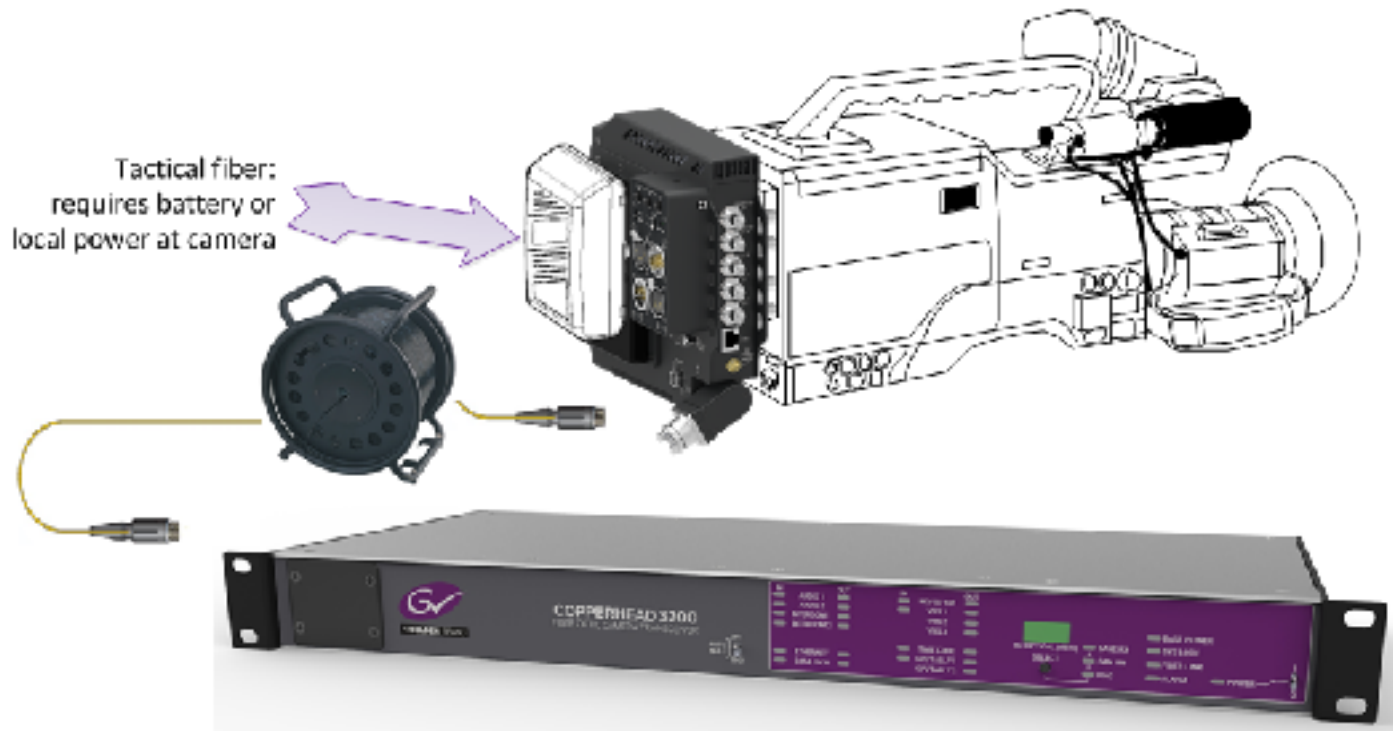
### Applications

- TV News Production
- Multi-Camera studio, truck and fly-pack field production
- Image Magnification (I-Mag)
- House of Worship
- Electronic Cinematography
- Sports Production
- Inter/Intra campus cameras
- Government & Military Video



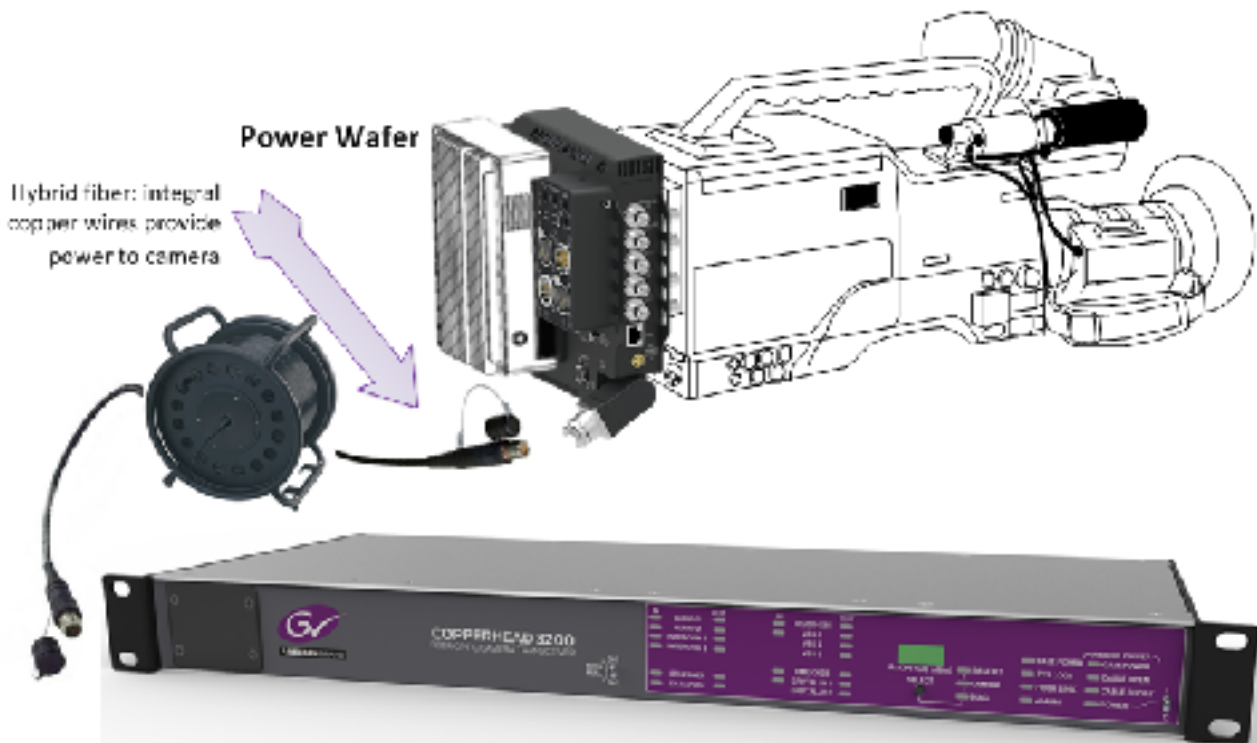
# CopperHead Series 3000 Family

## ❖ Fiber Option #1: Tactical Fiber & Local Power



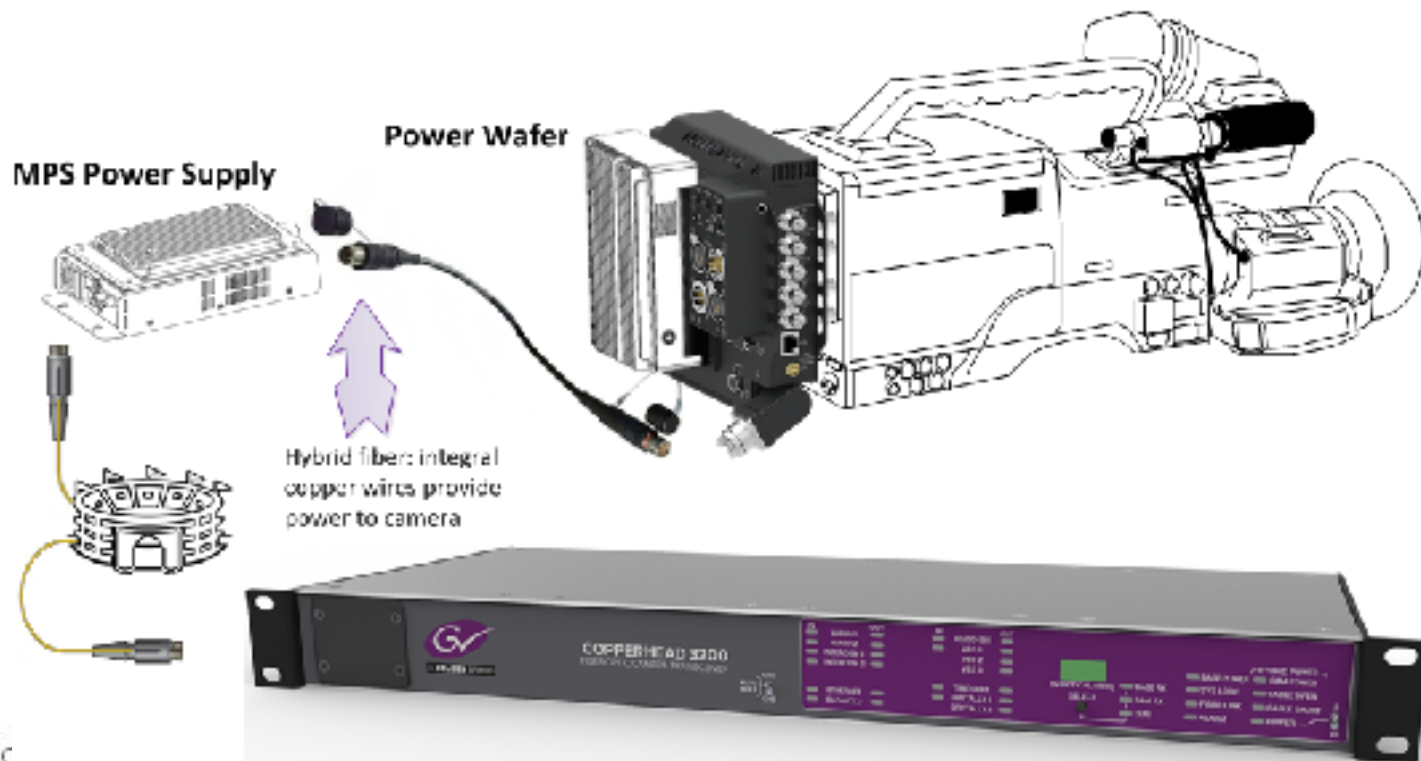
# CopperHead Series 3000 Family

## ❖ Fiber Option #2: PowerWafer & SMPTE Hybrid Cable



# CopperHead Series 3000 Family

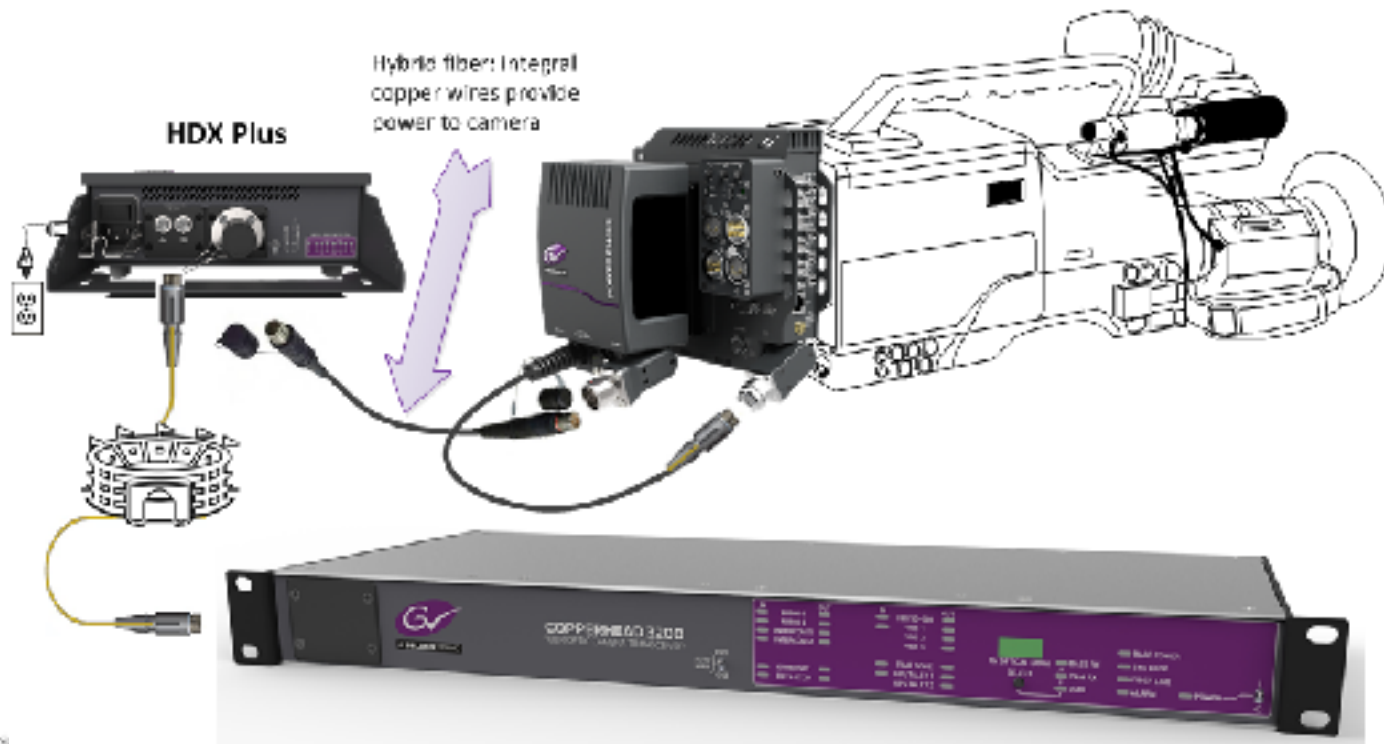
## ❖ Fiber Option #3: PowerWafer & MPS Power Supply



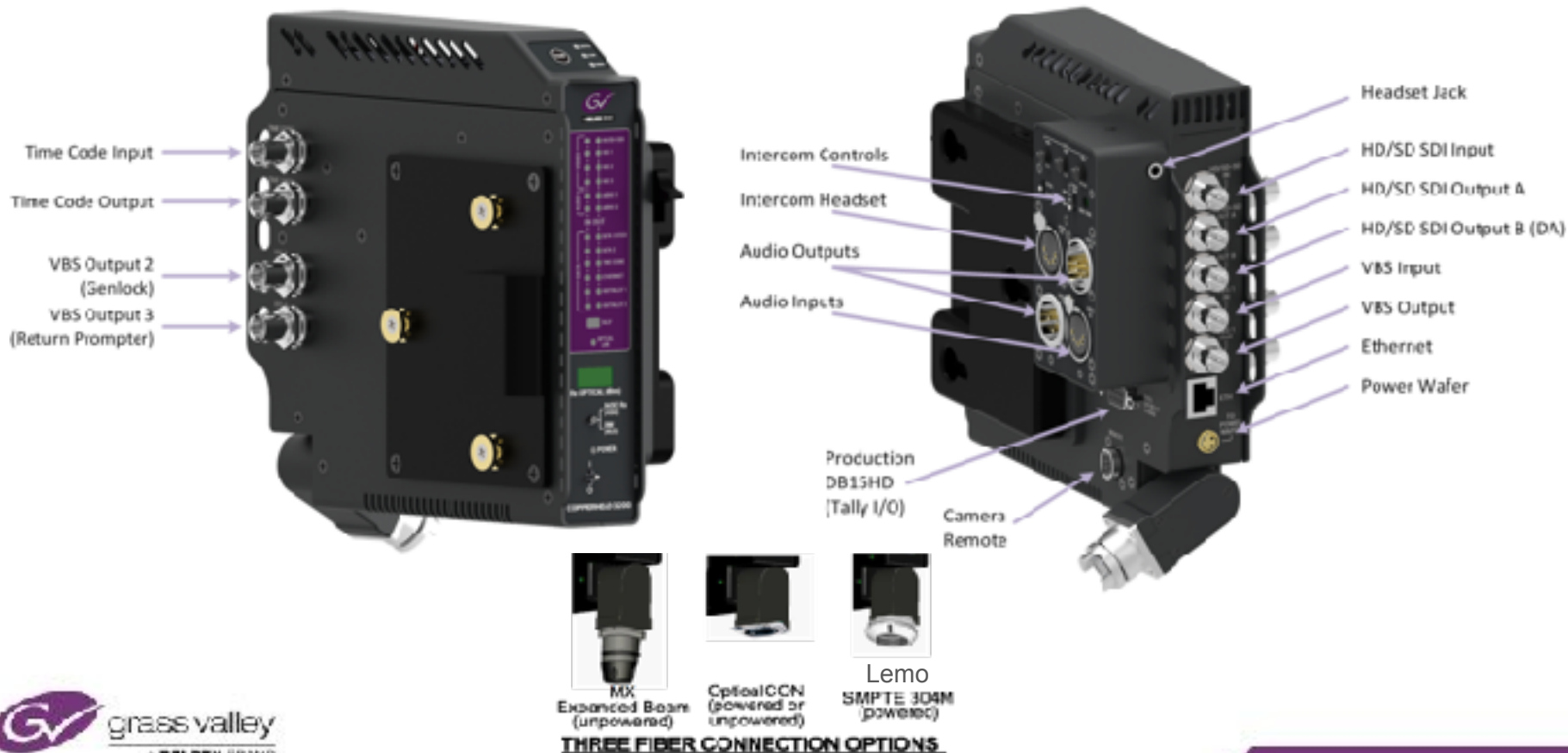


# CopperHead Series 3000 Family

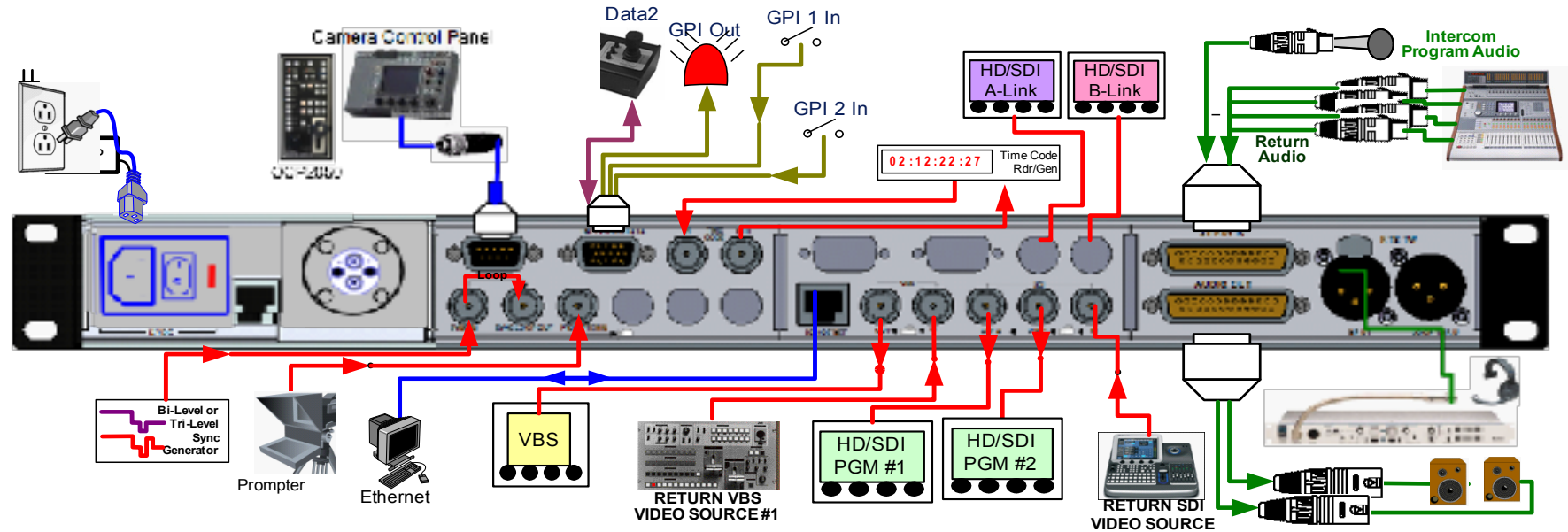
## Fiber Option #4: PowerPlus & HDX



# Camera Unit Connectors



# CopperHead 3200 Base Station Connections

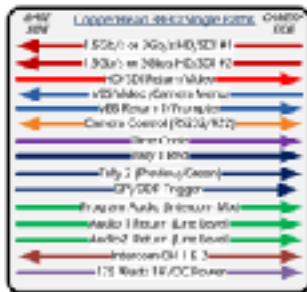


# CopperHead 3430 Arri Alexa/ JVC OEM



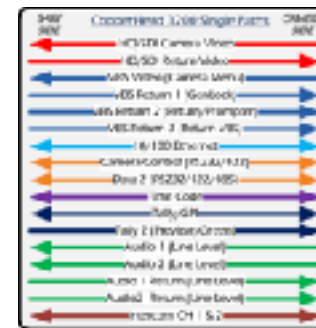
## Arri Alexa CopperHead 3430

- Specific Signal Set for Arri Alexa
- Power Plus built within Camera Unit (175 watts)
- HDX Required



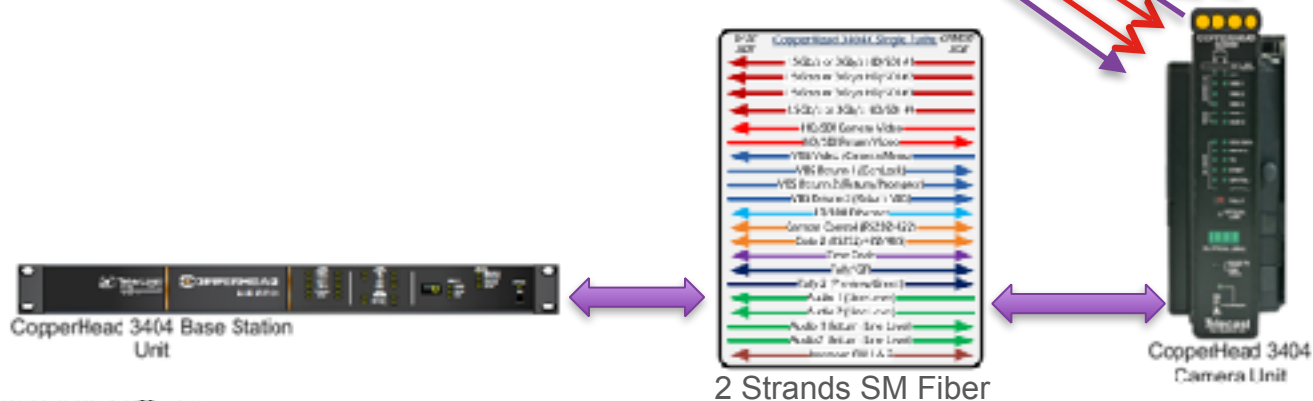
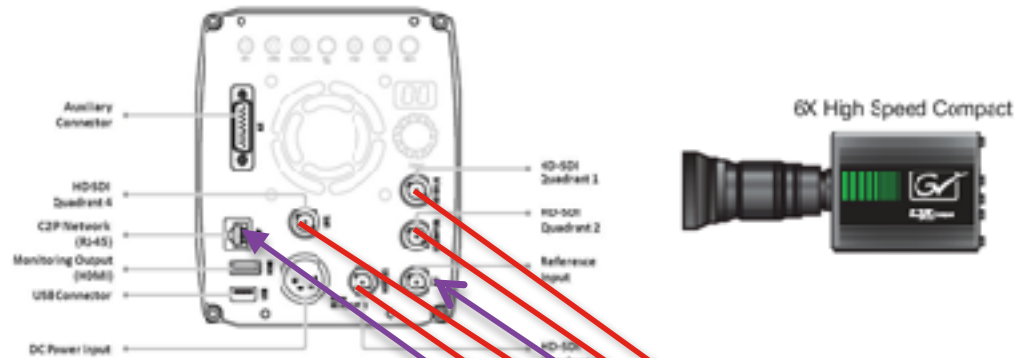
## JVC CopperHead ProHD

- GY-HM790 ProHD camera, FS-790 fiber optic multiplexing system
- CopperHead 3200 Signal Compliment
- OEM, Sold exclusively through JVC
- Service/Support through JVC



# CopperHead 3404 with LDX Compact 6X or 4K

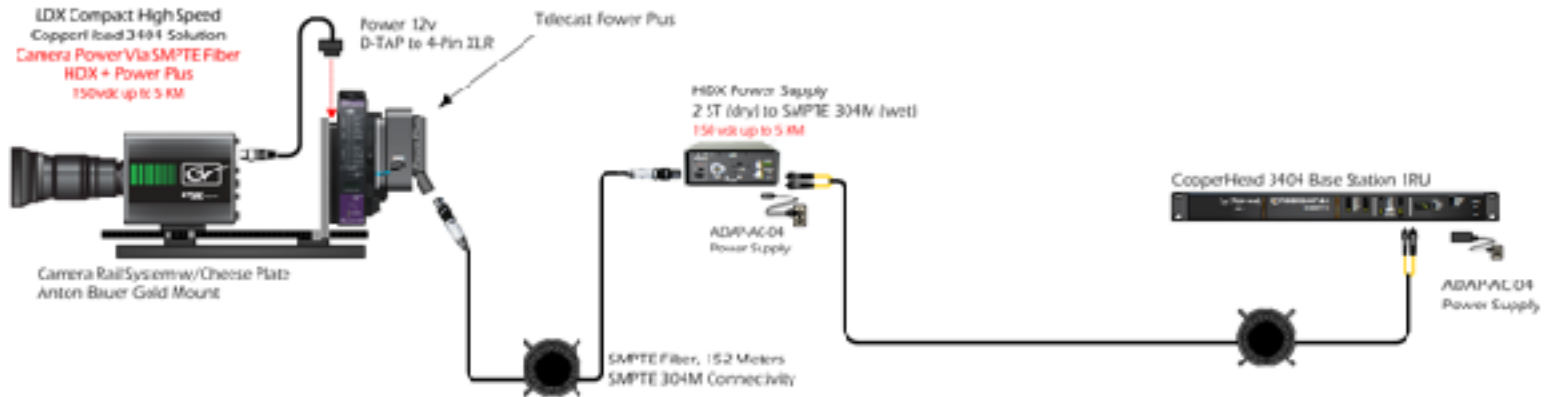
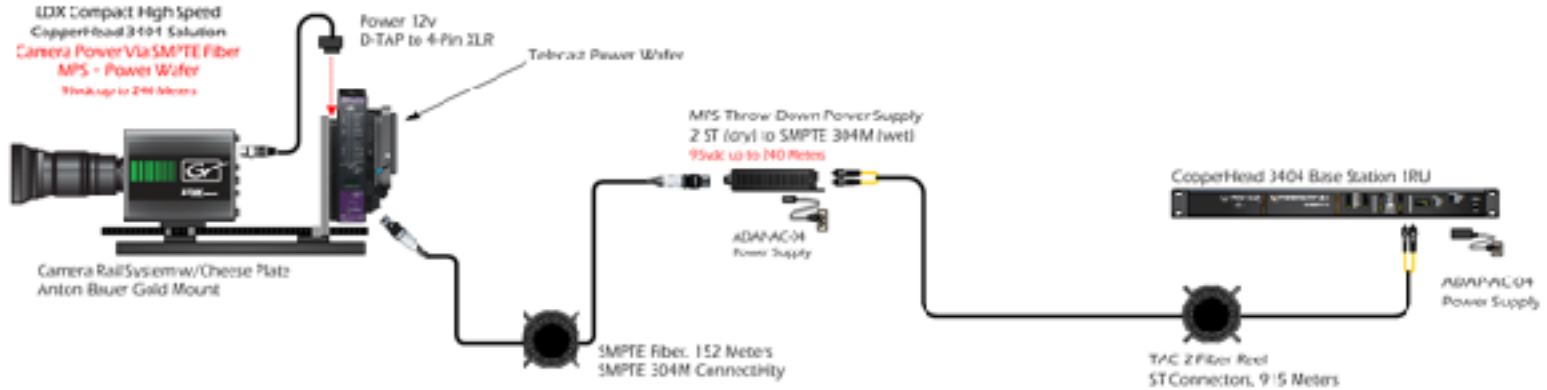
# MiniDin set 4x maken



## Block Diagram



# CopperHead 3404 with LDX Compact 6x or 4K



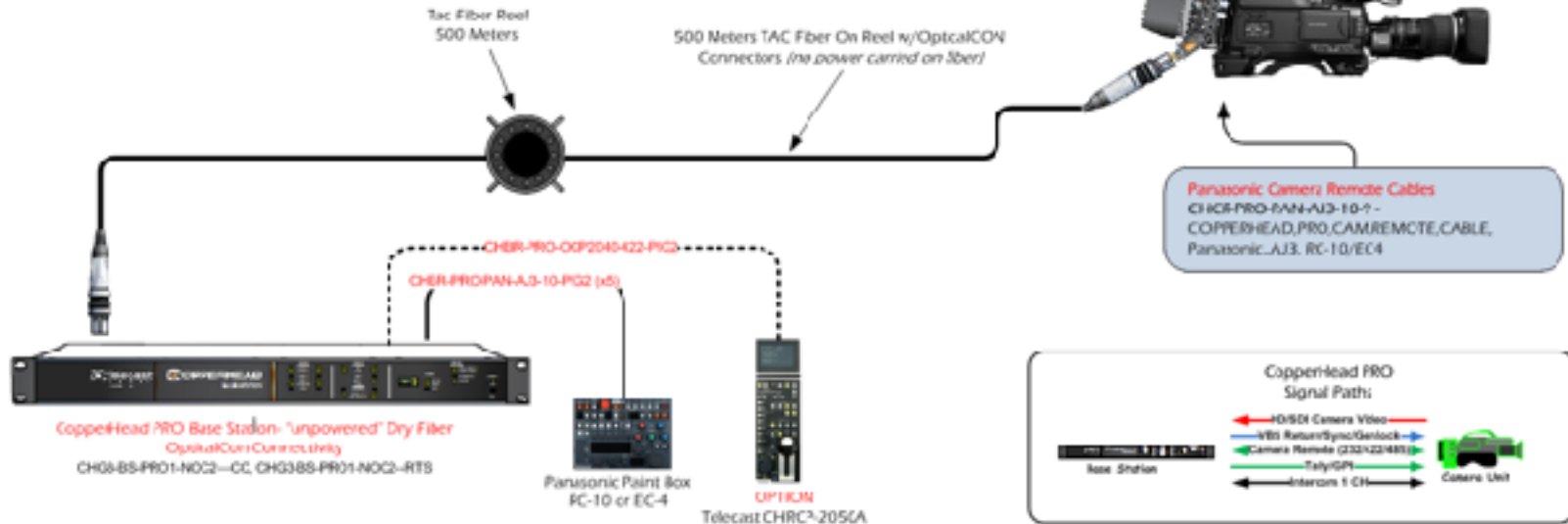
# CopperHead Pro – TAC Fiber

With Panasonic

CopperHead PRO System  
PANASONIC  
Tac 2 Fiber, OpticalCON Connectivity

## POSSIBLE OPTIONS

1. MPS Thru-down Power Supply (95vdc @ 240 meters)
2. Power Wafer
3. SMPTE Fiber w/OpticalCON Connectors





# CopperHead 3200 – Internal Power + Power Wafer (95vdc@240Meters)

With Panasonic

**Panasonic system Configuration**  
CopperHead 3200 Base Station  
Internal Power (95 vdc @ 240 meters)  
Neutrik OpticalCon Connector  
Panasonic RC-10/ EC-4 + Telecast CHRCP-2050A  
Camera Control

## Possible options

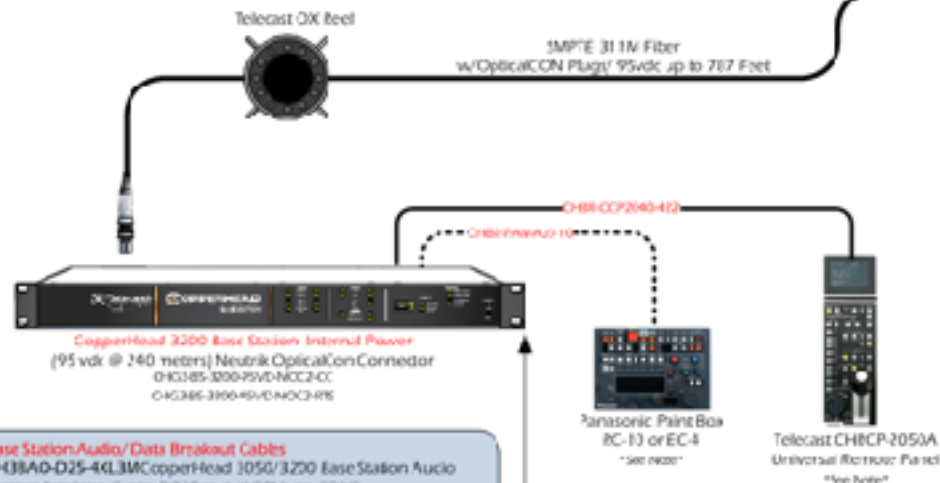
- MP3 Tri-Track Power Supply
- Tactical Fiber

**CopperHead 3200 Camera Unit/Power Wafer**  
CHG3-CAM-3200-MOC2-A8-A8  
CHG3-PA-45VEG6-A8



**Panasonic Camera Remote Cables**  
CHCR-FANAJ3-10-0 Camera remote cable for Panasonic AJ3-style cameras (using RC10-4 control), such as HDX900, HPX500/2000/2300/3000/3700

**Camera Data Cable**  
CHBC5-3200-80-BF1-C9F1 CHG3200 Camera Signal breakout cable: Universal Intercom Trigger (BNCF) Tally i/c (B09F). No data



**CopperHead 3200 Base Station Internal Power**  
(95 vdc @ 240 meters) Neutrik OpticalCon Connector  
CHG3-BS-3200-95VD-MOC2-CC  
CHG3BS-3200-95VD-MOC2-RS

**Base Station Audio/Data Breakout Cables**  
CH3BA0-D25-4GL3M CopperHead 3050/3200 Base Station Audio Output Breakout Cable: 25x5 to 4 XLR3M, no COM6  
CH3BAID25-SX33F CopperHead 3200 Base Station Audio Input Breakout Cable: DB25 to 5 XLR3F.  
CH3BS-3200-80-GH-DNAF CopperHead 3200 Base Station Breakout Cable for Data 2 and all tally i/c

**\*Note:** CopperHead System can be used with either Panasonic's RC-10 or EC-4 Paint Boxes or Telecast's CHRCP-2050A Universal Remote Control Panel. The appropriate base station control cables must be purchased for camera control



# CopperHead 3200 – Tac+ MPS + Power Wafer (95vdc@240Meters)

With Panasonic

**Panasonic System Configuration**  
CopperHead 3200 Base Station  
Throwdown MPS (45 vdc @ 240 meters)  
Neutrik OpticalCon Connectors  
Panasonic RC-10/ EC-4 + Telecast CHRCP-2050A  
Camera Control

CopperHead 3200 Camera Unit/Power Wafer (95vdc at Camera)

CH33-CAH-3200NCC2-AB-AB  
CH33-PM/MS/EGG-AR



**Panasonic Camera Remote Cables**

CHCR-PANAU3-10-0 Camera remote cable for Panasonic AU3-style cameras using RC-10-control, such as HLRV90, HFRX90, ZUW9, ZFW9, SUW9, 3 AU9

**Camera Data Cable**

CH3CS-3200-EO-EF1-09F ICHG-1200 Camera Signal breakout cable Universal/Intercom Trigger (BNC), Tally (U) (BNC), No data

TAC 2 Fiber w/OpticalCON Connectivity  
TAC Fiber Reel or Infrastructure Fiber (10km)

MPS Power Throwdown Unit  
95vdc up to 240 meters

500 SWPTE 311M Fiber  
w/OpticalCON Plugs

AC Meters



CH3A-OP240-422



**CopperHead 3200 Base Station "Unpowered"**  
Neutrik OpticalCon Connector  
CH3B-BS-3200-NCC2-CC  
CH3B-BS-3200-NCC2-MS

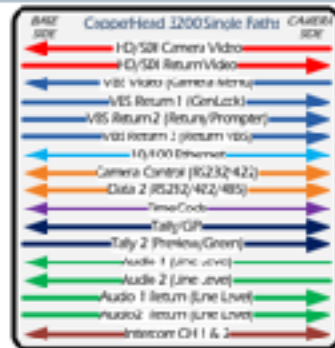
**Base Station Audio/ Data Breakout Cables**

CH3BAO-025-40L3M CopperHead 3053/3100 Base Station Audio Output Breakout Cable: DB25 to 4 XLR1M, no COM5  
CH3BAH-025-5XL3F CopperHead 3200 Base Station Audio Input Breakout Cable: DB25 to 5 XLR3F  
CH3BS-3200-EO-GP-0A AC CopperHead 3200 Base Station Breakout Cable for Data 2 and all tally/UO

Panasonic Power Box  
RC-10 or EC-4

Telecast CHRCP-2050A  
Universal Remote Panel  
\*See Note\*

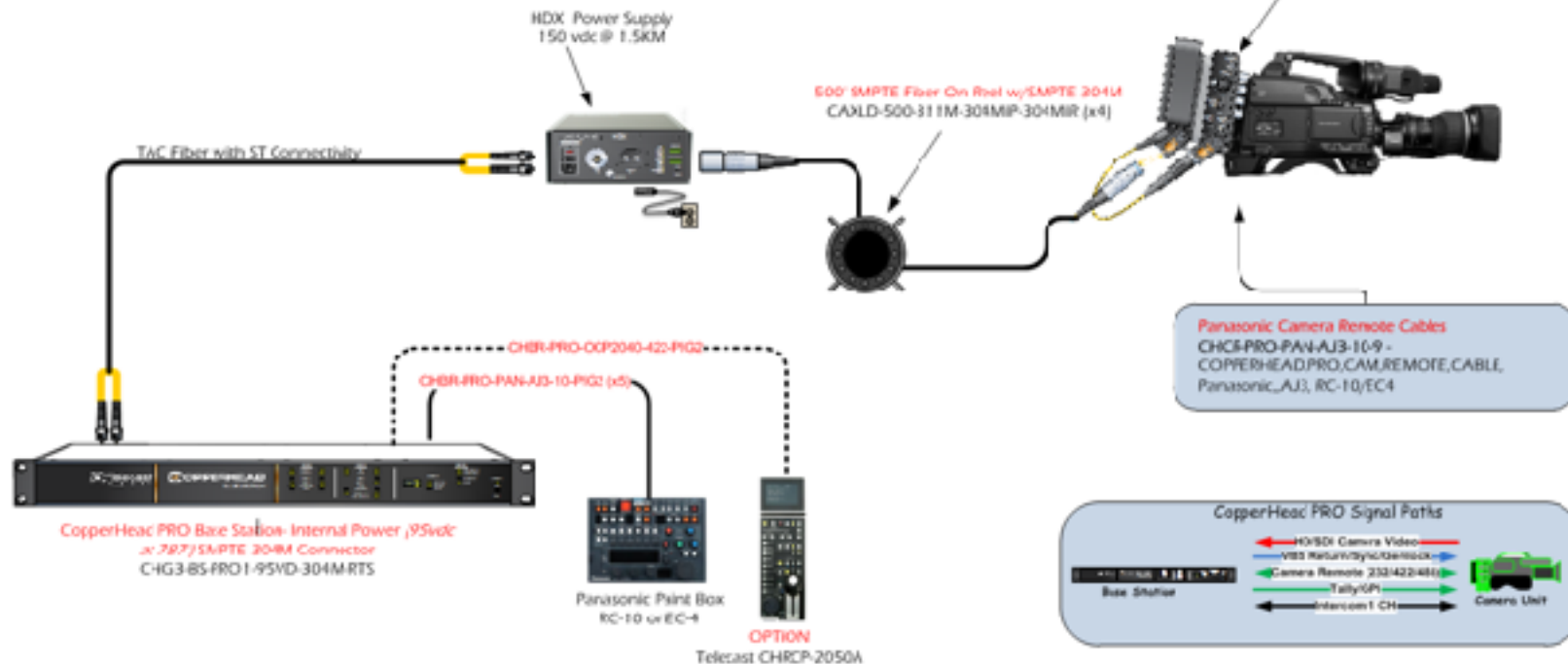
**\*Note:** CopperHead system can be used with either Panasonic's RC-10 or EC-4 Paintboxes or Telecast's CHRCP-2050 Universal Remote Control Panel. The appropriate base station control cables must be purchased for camera control.



# CopperHead Pro – Tac+ HDX + Power Plus (150vdc@1.5KM)

With Panasonic

CopperHead PRO System  
HDX + Power Plus  
150vdc up to 1.5KM  
SMPTE 304M Connectivity



# Telecast CHRCP 2050A

## Telecast Universal Remote Control Panel

Works with Telecast's  
CopperHead systems

Optional 3.5 inch (89mm)  
LCD video/OSD picture  
monitor. Tilttable 0 - 45°  
(Model CHRCP-LCD1)

On Screen Display (OSD)  
video output is standard for  
LCD and external monitor  
(PAL or NTSC)

SD card transportable scene  
file storage

Internal scene file storage



### ONLY with:

Hitachi - RC-Z1 /Z2/Z21

Ikegami - MCP-388, OCP-40/45/388, RCU-240/390/400, RM-10/11

JVC - RM-LP35/37/38/55/80U/25U

Panasonic: AJ-EC1/EC2/EC3/EC4, AJ-RC10G, WV-CB700AE

Sony: RM-M7G, RM-P9, RCP-TX7, RMB-150/170/750, RCP700  
series, MSUs,

# Camera Solutions

T-POV

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# Application – T-POV Links

## Applications:

- Sports
- Broadcast
- Military
- Government
- Security
- Education





# Application – T-POV Links



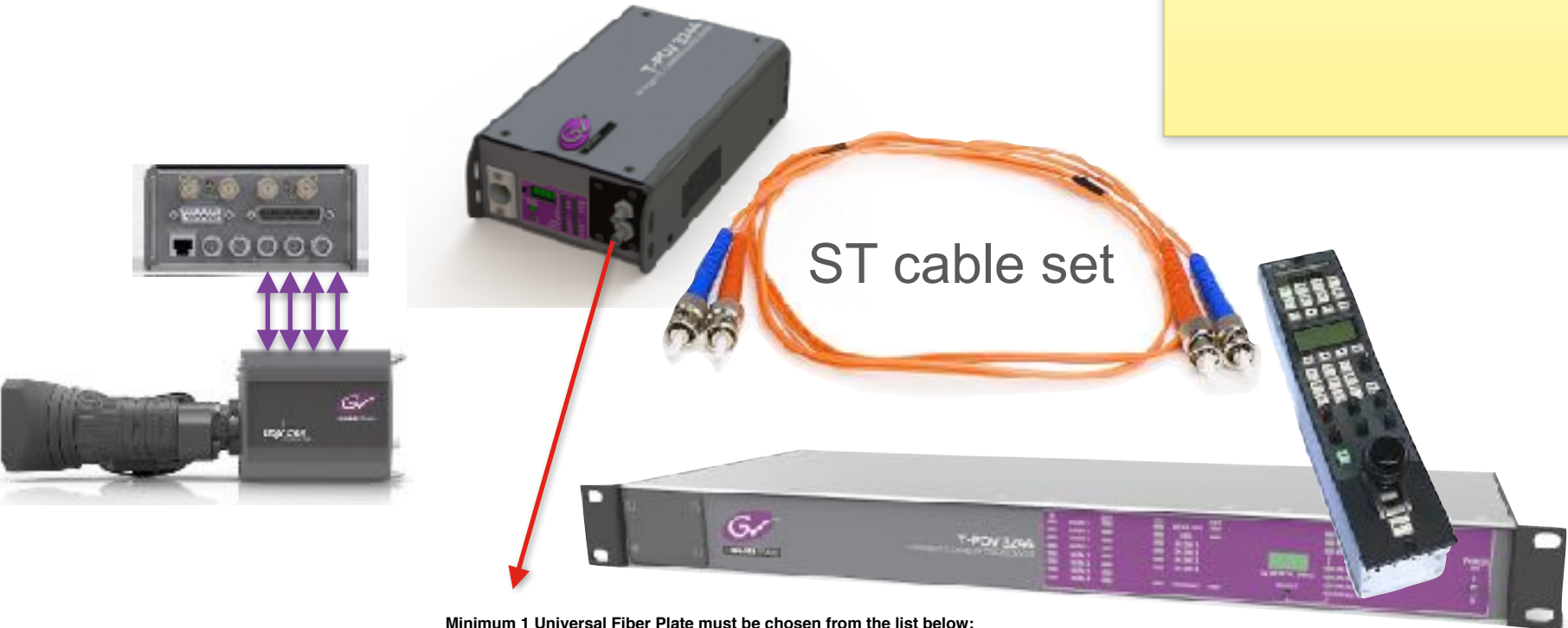
# Fiber Solution – T-POV Links for Robotic Cameras

- Camera Multiplexer
- Standalone and Rackmount
- All Camera Signals on Two Fiber Strands (one cable)
- Tactical Fiber or Hybrid Fiber Cable
- High Performance
- Affordable
- Up to 3 cameras support from 1 1RU Base Station





# Fiber Solution – T-POV Links LDX Com



**Minimum 1 Universal Fiber Plate must be chosen from the list below:**

- UFP-2LC Universal fiber panel – Dual LC fiber, single mode, ultra polished
- UFP-2SC Universal fiber panel – Dual SC fiber, single mode, ultra polished
- UFP-2SCA Universal fiber panel – Dual SC fiber, single mode, angle polished
- **UFP-2STSM** Universal fiber panel – Dual ST fiber, single mode, ultra polished
- UFP-MX2 Universal fiber panel – MX dual expended beam connector
- UFP-NOC2 Universal fiber panel – Neutrik OpticalCon Duo (for tactical/unpowered fiber cables)
- UFP-NOC4 Universal fiber panel – Neutrik OpticalCon Quad (for tactical/unpowered fiber cables)

# Fiber Solution – T-POV Links LDX

95 V version power used (local)

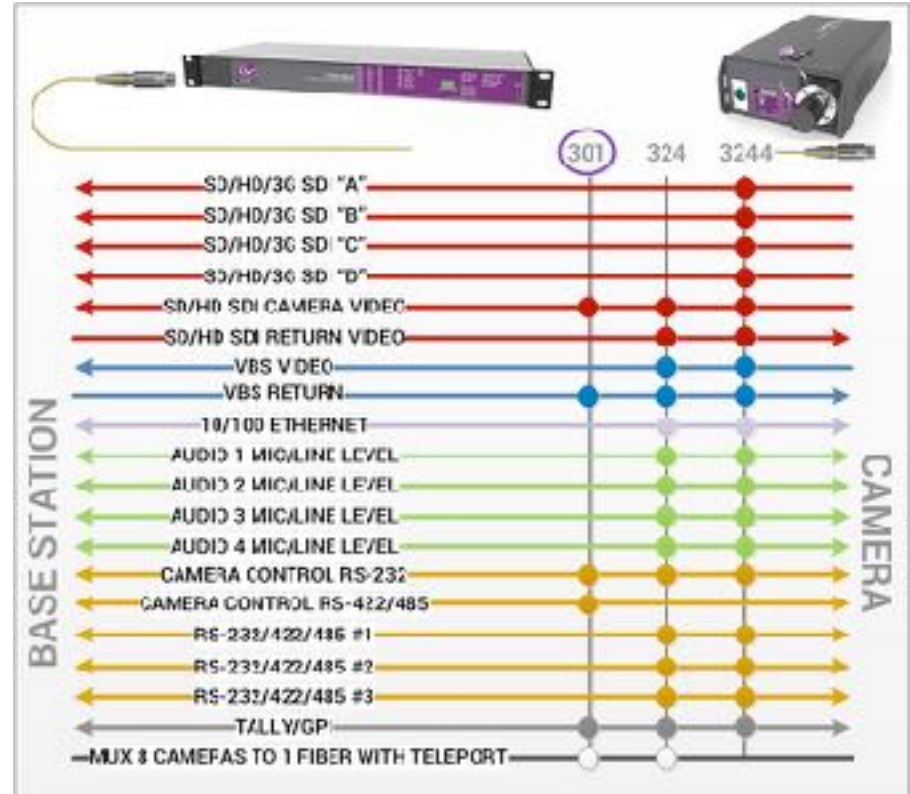
T-POV with heatsink



# Fiber Solution – T-POV Links for Robotic Cameras

## T-POV 301 Model

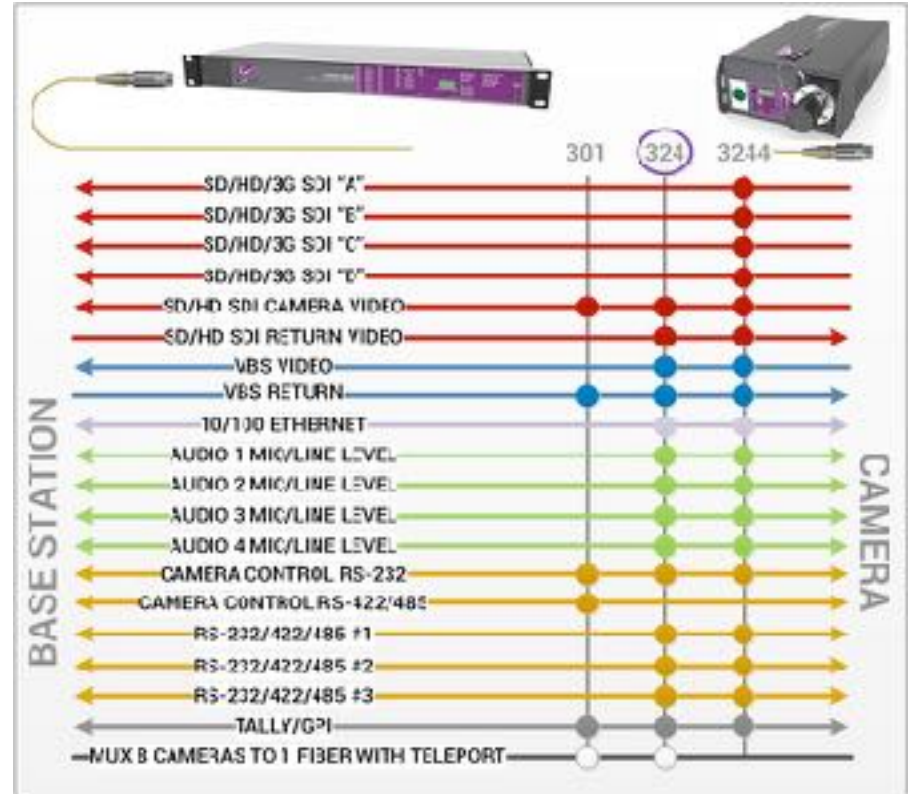
Low budget production/studios, live shows solution with extra data for camera control.



# Fiber Solution – T-POV Links for Robotic Cameras

## T-POV 324 Model

More advanced model with HD return,  
Ethernet port and bi-di 4 Audio channels.

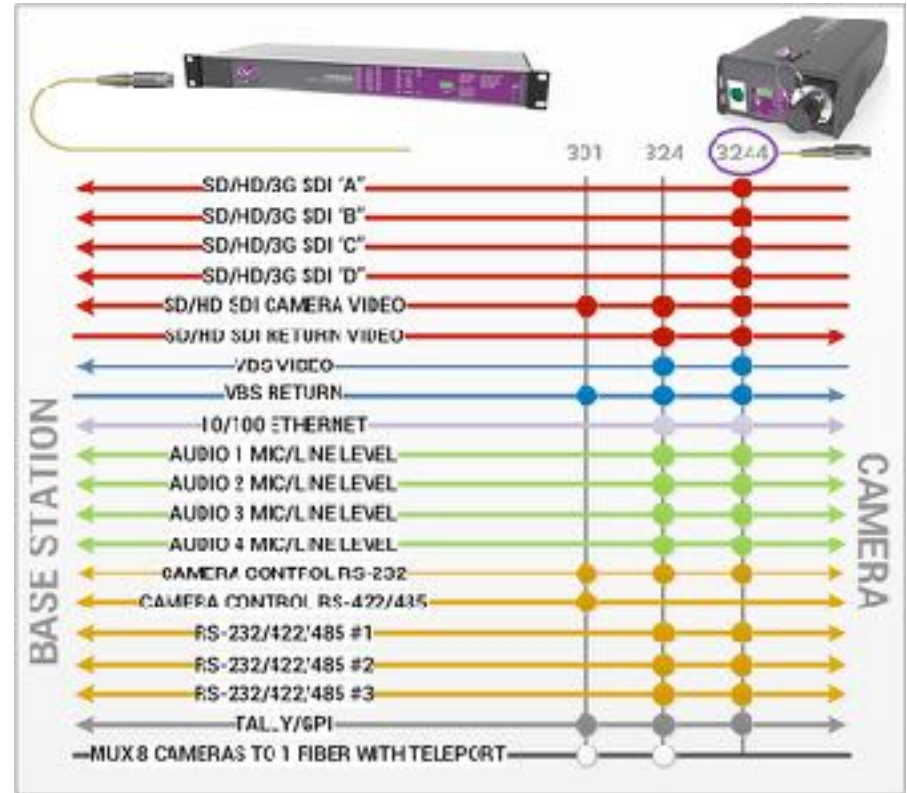




# Fiber Solution – T-POV Links for Robotic Cameras

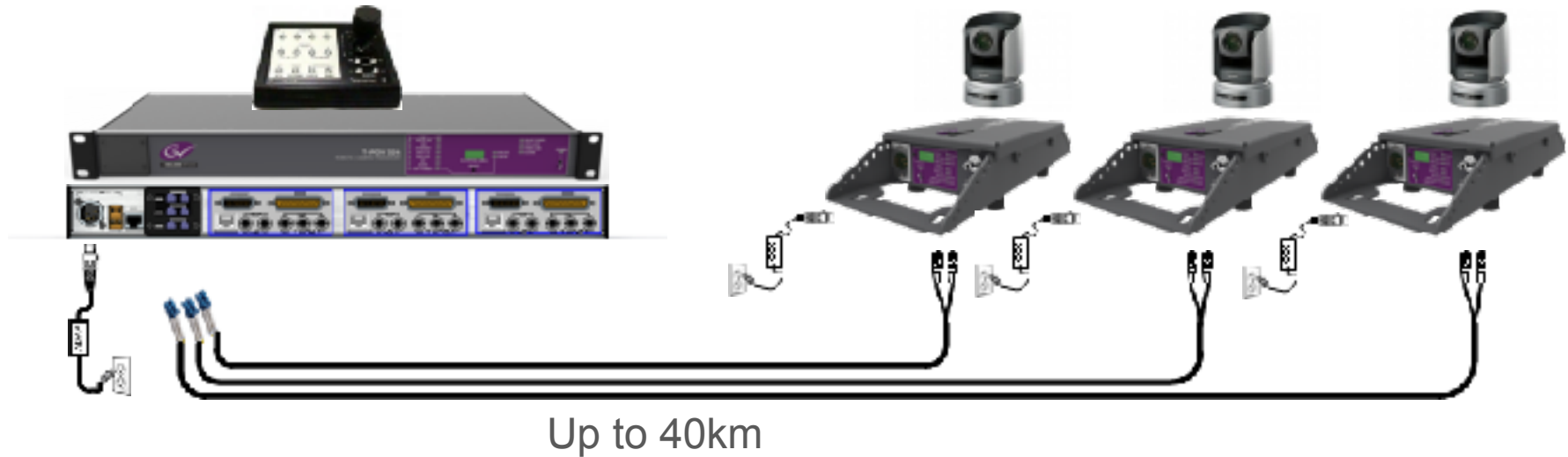
## T-POV 3244 Model :

For any POV robotic/unmanned 4K cameras.



# Examples – T-POV Links for Robotic Cameras

- Options: Example #1: 324 Model Unpowered, 3 Cams Configuration (up to 3 unpowered links support from 1RU Base Station)



# Examples – T-POV Links for Robotic Cameras

- Options: Example #2: 324 Powered System  
(up to 2 powered links support from 1RU Base Station)



# T-POV – Camera Connectors 301 & 324

## 301



Data  
RS-232  
RS-422/485

VBS Output 2

VBS Output 1

HD/SD SDI Input

## 324



Data RS232/422/485/GPI

Ethernet

VBS Output

VBS Input

HD/SD SDI Input

HD/SD SDI Output A

HD/SD SDI Output B

Audio I/O





# T-POV – Camera Connectors 3244

3244



4x 3G/HD/SD SDI  
(4K) input

Audio I/O  
HD/SD SDI Output A  
HD/SD SDI Output B  
HD/SD Input  
VB5 Output  
VB5 Input  
Ethernet  
Data RS232/422/485/GPI



# Camera Solutions

HDX Plus

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# HDX Plus

Programmer for Software update

- ✚ **Positioning:** Grass Valley, a Belden Brand, is a technology company committed to delivering the latest solutions and technologies to keep you Future-Ready, with a glass-to-glass solution for remote production.
- ✚ **Value Statement:** HDX Plus/Power Plus2/Shed solution for broadcasters needing to extend the operating distance of professional television cameras up to 10km using lightweight optical fiber, while also providing a remote power source through SMPTE cable up to 5km in locations where local power is unavailable.
- ✚ **Proof Points:** For a complete broadcast link with power, HDX Plus & Shed-BS modules require only two interconnections to be used with customer equipment; a tactical fiber from CCU/Shed-BS to HDX Plus, and a SMPTE hybrid fiber cable from HDX Plus to the Grass Valley or Sony cameras, providing both signal communication and power to the camera rig. In a case of other camera manufacturers Power Plus 2 is introduced instead of battery. With 200W available at up to a 3km distance, Power Plus2 proves to be the most powerful and reliable remote power solution available.
- ✚ **Current Product Line up:** Power Solution Extension
- ✚ **Specs/Features:** • Long range, 200W cont / 3 km or 150W con / 5 km • Aux 12V DC Output for accessories on Power Plus 2 • Bidirectional on two fibers • Dual cooling mechanism • LEDs for fault, overload, optical power, HV enable reporting and diagnostics • Weather proved, to be used in a controlled environment.
- ✚ **Expected Release date:** Available



# HDX Plus and SHED- SMPTE Hybrid Elimination Device

**Allows the use of SMPTE-equipped cameras over conventional single mode fiber cables**

- **SHED-BS** (BS = Base Station)
- Unpowered Option SHED-C (Camera)
- Powered Option- HDX (150vdc up to 1.5KM)

**SHED-BS**



**Power Plus 2**

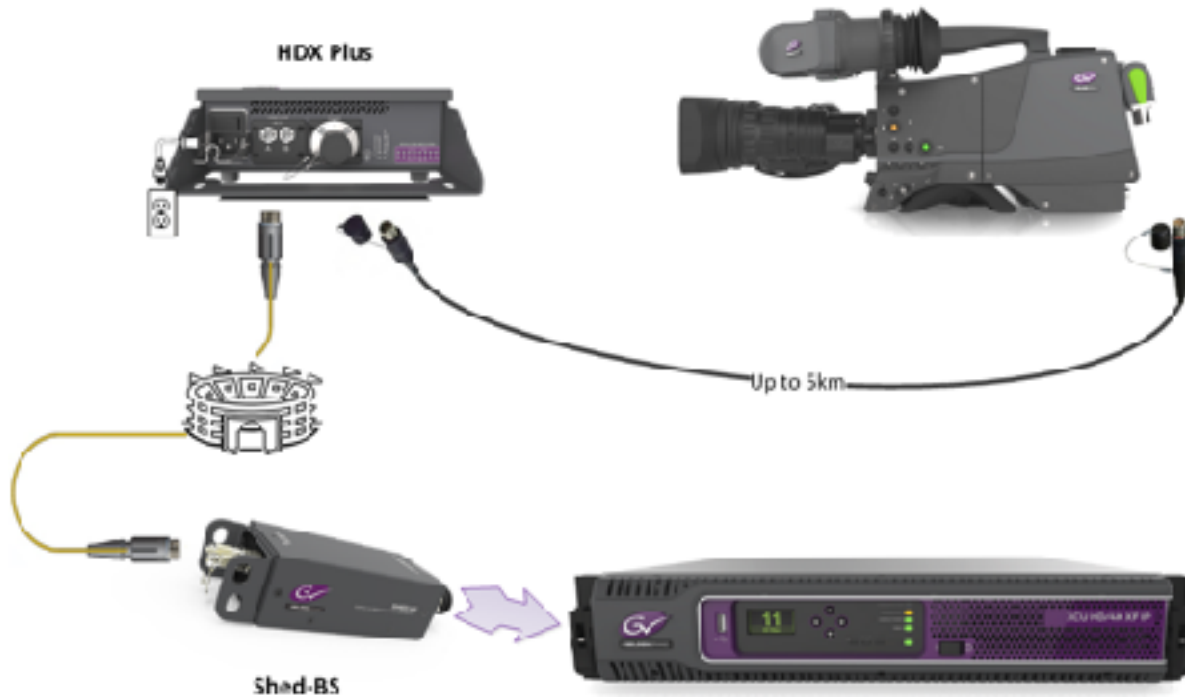


**HDX Plus**



# HDX Plus with LDX Camera and XCU

Yellow label !!!



# Cobra 2DT – Digital Triax to Fiber

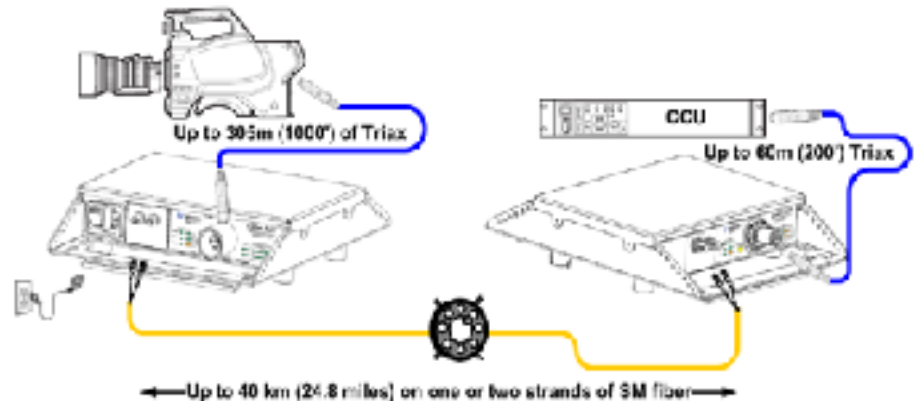
Fiber optic camera interface for Sony digital triax camera systems

**Extends the reach of Sony's**

- HXC 100
- HSC 300

**Configuration Options**

- Single Mussel Shell (Base + Camera End)
- Single Rack Mount- (Base Only)
- Dual Rack Mount- (Base Only)



# Camera Solutions

Terminal Solutions

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# Rattler 1.5 Gig

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## HD & SD SDI Solution in your Pocket!

- Portable, lightweight units
- Cool, efficient, reliable
- Quick, easy installation
- LED indicators show you:
  - Power on
  - HD/SDI data presence
  - RX Optical power levels
- 19.4 Mbps to 1.5 Gb/s (Rattler)
- Compatible with SMPTE 310M, 292M, 259M & 297M
- Supports embedded audio
- Up to 30 km distance
- Low system jitter
- Power from 5-16 VDC
- USB power capable
- High durability design



# Rattler 4 – 3G

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## 3 Gig HD & SD SDI Solution

- 19.4 Mbps to 3 Gb/s
- Singles
- Doubles
- Transceivers
- LED indicators show you:
  - Power on
  - HD/SDI data presence
  - RX Optical power levels
- Supports embedded audio
- Robust ST connectors
- CWDM Wavelengths
- Power from 5-16 VDC
- High durability design

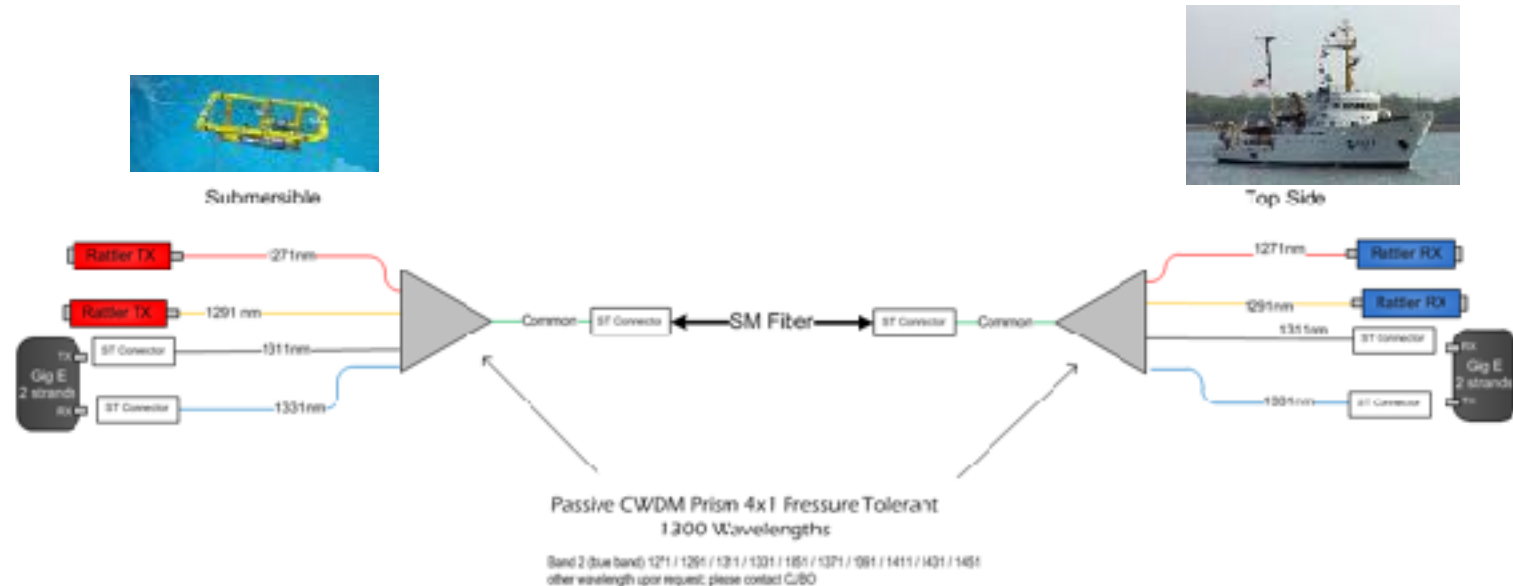


# Rattler CWDM

250nm spacing is cut up into 20nm increments

Band 1 (red band) 1471 / 1491 / 1511 / 1531 / 1551 / 1571 / 1591 / 1611

Band 2 (blue band) 1271 / 1291 / 1311 / 1331 / 1351 / 1371 / 1391 / 1411 / 1431 / 1451



# Rattlers and Terrapin

## Rattler - Ultra-miniature Single Link, Dual Link, and Bidirectional Fiber Optic Media Converters

- Portable, lightweight devices
- Five models, 19.4 Mb/s to 3 Gb/s
- Standard formats internally reclocked
- 18 CWDM wavelengths
- Up to 50 km (31 mi.) distance
- Supports embedded audio



## *The “HD Problem Solver in your Pocket”*

## Terrapin – Configurable 3 Gb/s Fiber Transceiver with Integral Six Output Distribution Amplifier

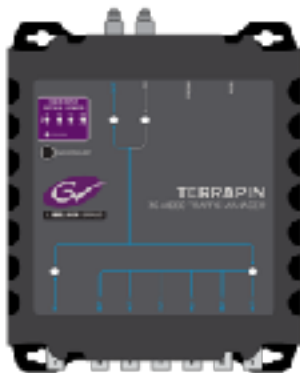
- Fiber optic transmitter and receiver (transceiver)
- Integral 6-output digital distribution amplifier
- 4 user-selectable optical/electrical modes
- Intuitive LED indications and signal flow arrows



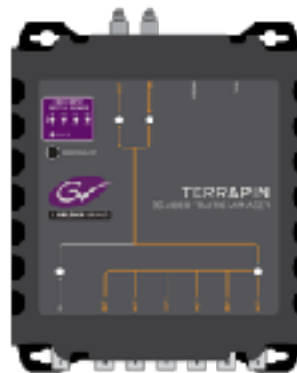
# Rattlers and Terrapin

Terrapin – Configurable 3 Gb/s Fiber Transceiver with Integral Six Output Distribution Amplifier

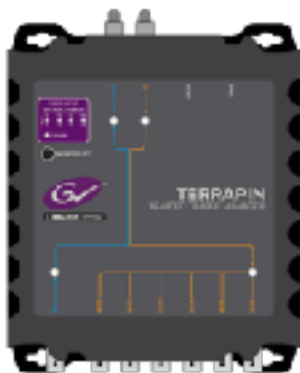
**MODE 1**  
Transmit and DA



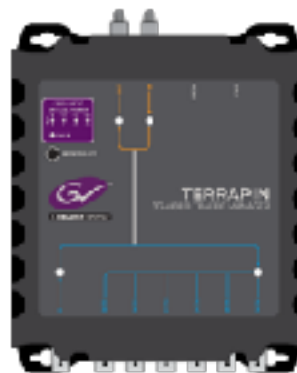
**MODE 2**  
Receive,  
Re-Transmit  
(Tap and Drop)



**MODE 3**  
Transceiver with  
6 BNC Outputs



**MODE 4**  
SDI DA and  
Fiber Booster



# Python (2) 3G

## Multichannel Digital Video System

- Supports 19.4 Mbps to 3G Uncompressed
- Embedded Audio

### Can be ordered as:

- 4,8,12,16 Channels in 1RU
- All Transmit
- All Receive
- Bidirectional (4x4,8x8,12x4)

### Non CWDM Versions (not available?)

- 4 channels = 4 Strands
- 16 channels = 16 Strands

**Multiplexed** onto **ONE** or **TWO** Strands



**Python** = 3G BNC In / out

**Teleport** = Fiber In/ Out

**Telethon** is combination Python +Teleport

# Python

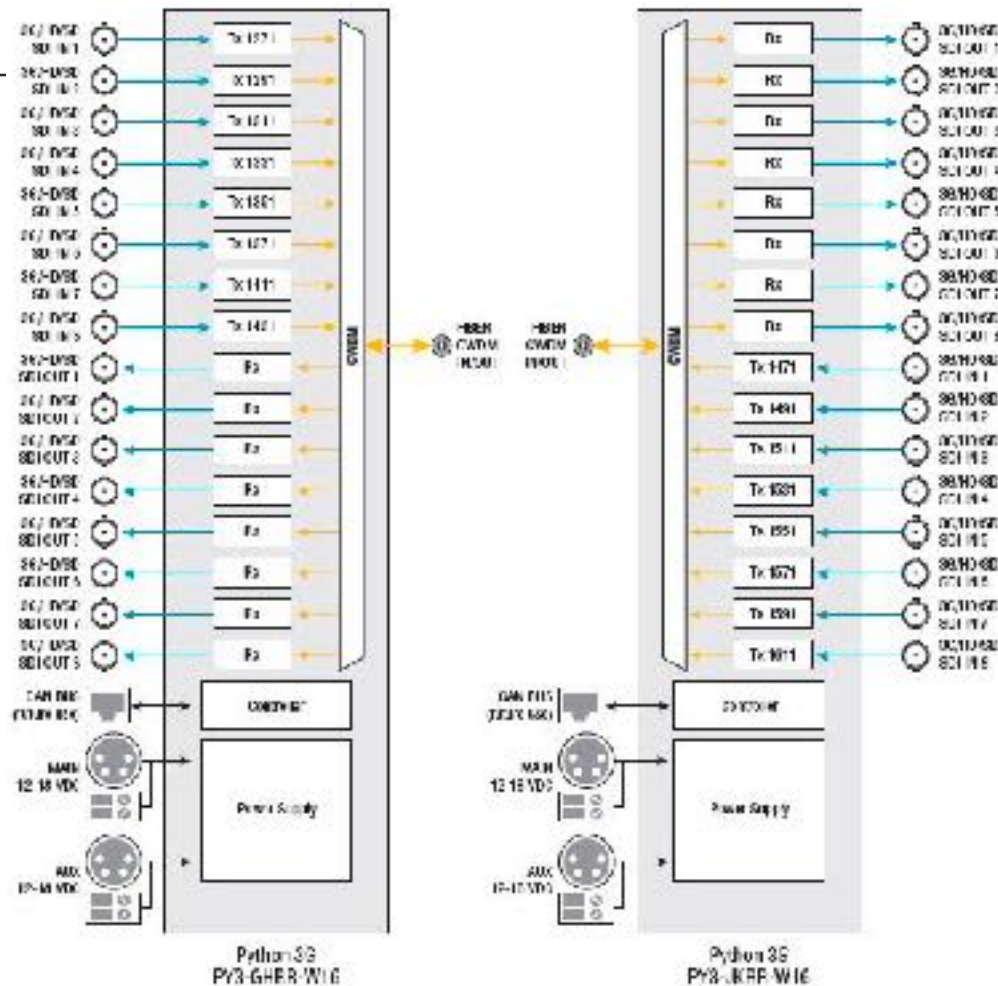
## ■ Multichannel Fiber Optic 3G/HD/SD-SDI Transport System with CWDM Multiplexing

- 4 to 16 channels per 1 RU
- Wide range of digital formats
- 19.4 Mb/s to 3 Gb/s transport
- Compatible with digital TV standards SMPTE 292M, 259M and 424M
- Handles DVB/ASI signals
- Immune to pathological data errors
- Equalizes coax up to 3 Gb/s
- BNC I/O
- Wide optical budget
- Low system jitter
- Low power consumption
- High reliability, durable design
- CWDM multiplexing options
- Compatible with other Telecast Series HD/SD-SDI transport systems





# Python

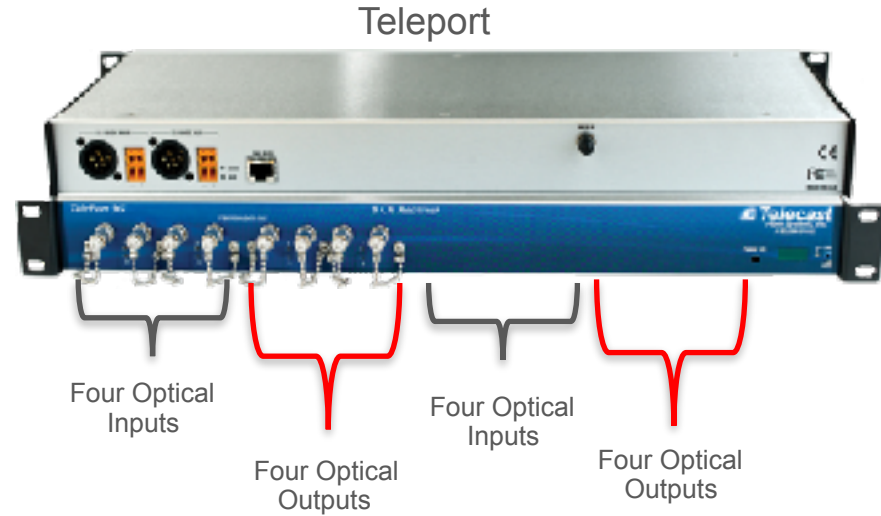


# Teleport

## Multichannel Active CWDM Management System

### Features

- Turns any optical signal into CWDM
- Mux up to 16 digital laser signals on 1 fiber
- Up to 3Gbps on each channel
- Re-amplifies up to additional 25km
- Re-amplifies up to 50km with APD option
- Standard 1300nm or 1550nm inputs
- Available Dual or Single CWDM single fiber outputs
- Front panel monitoring of all I/O
- Redundant power supplies
- Fast plug-and-play operation



# Teleport

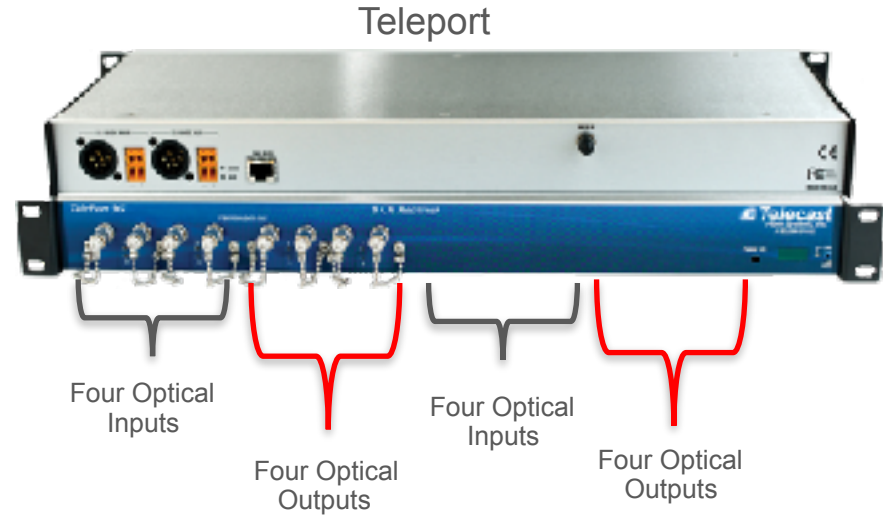
## Multichannel Active CWDM Management System

### Benefits

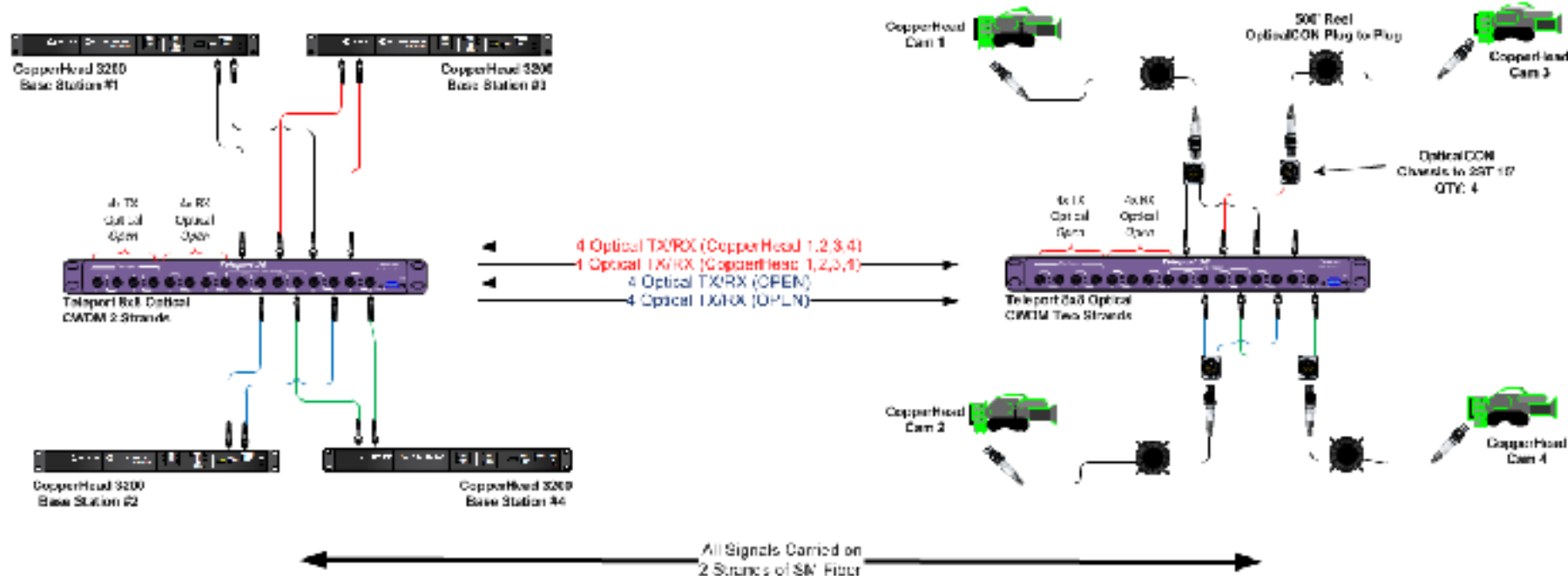
- *No wavelength-specific spares needed*
- *Lower labor & cable life cycle costs*
- *Easier access to infrastructure fiber*
- *Easier reconfiguration of signals*
- *Extended life for existing equipment*

### Applications

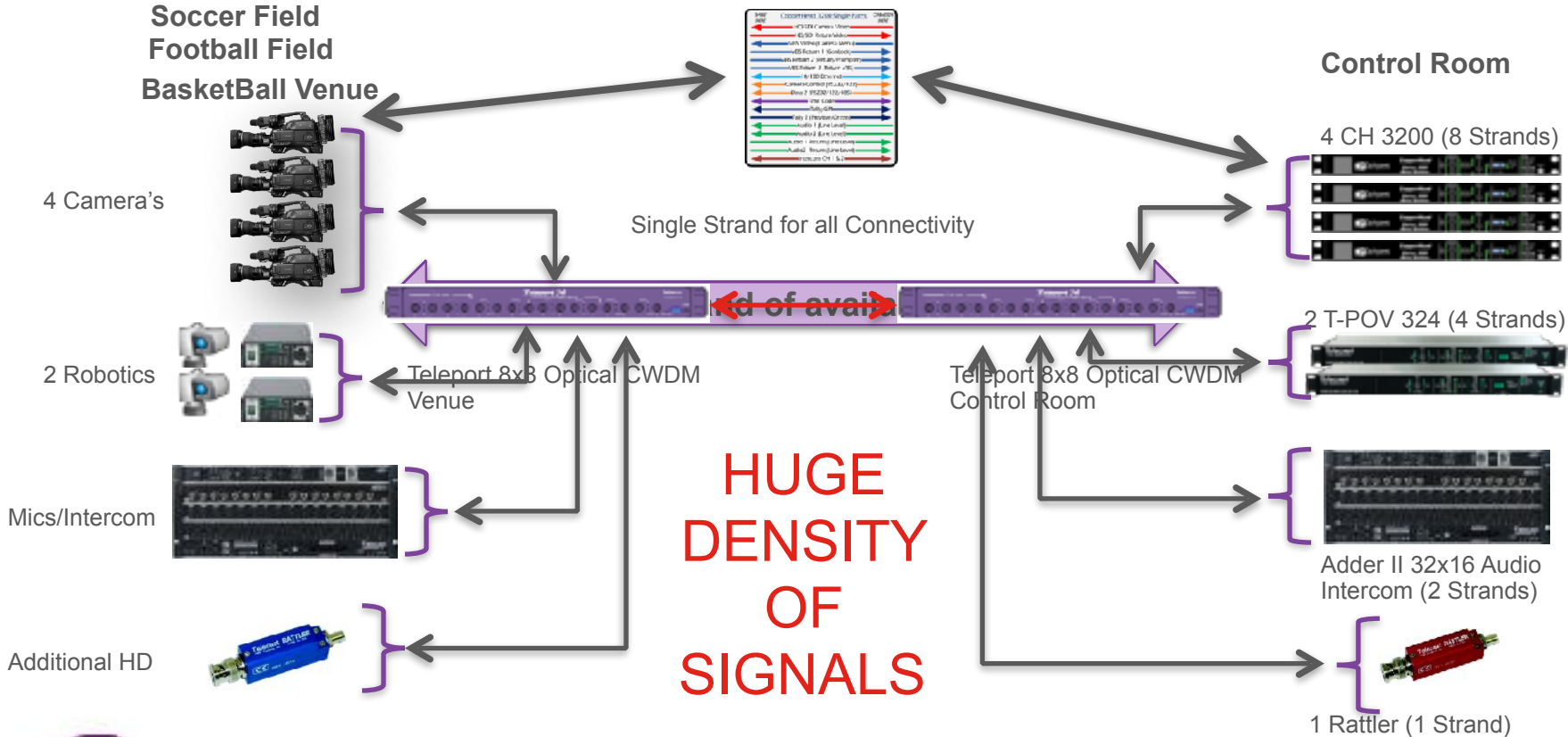
- *Outside broadcasting*
- *Metropolitan video transport*
- *Studio-transmitter links*
- *Interfacility communications*



# Teleport



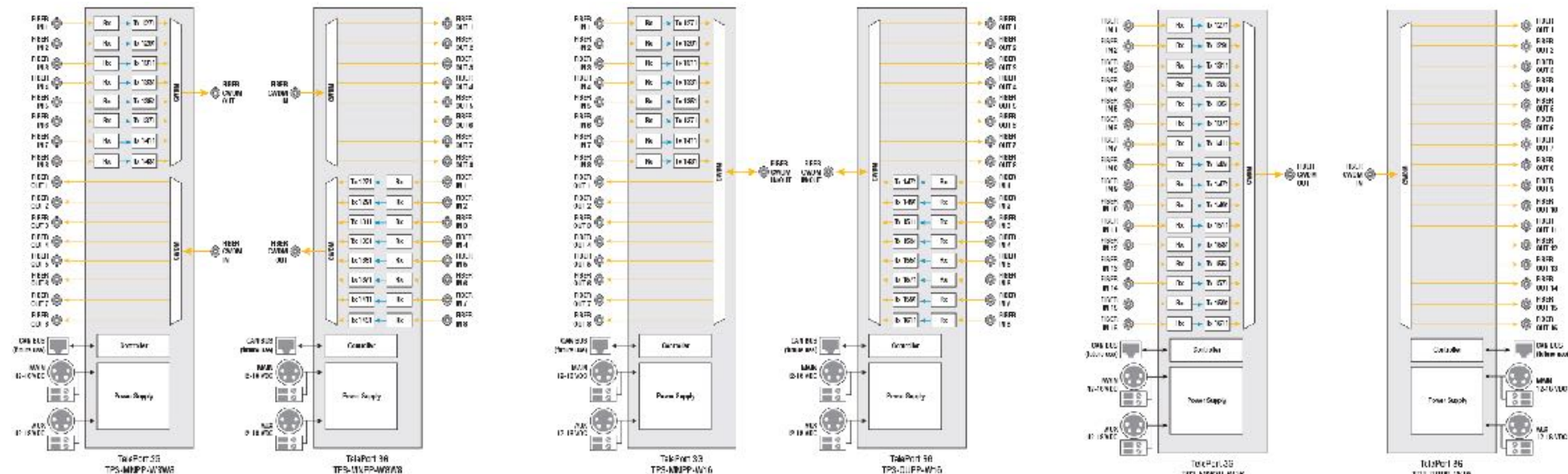
# Teleport in Action



# Teleport Diagram



TelePort 36 Functional Block Diagram



# Telethon (is Python + Teleport)

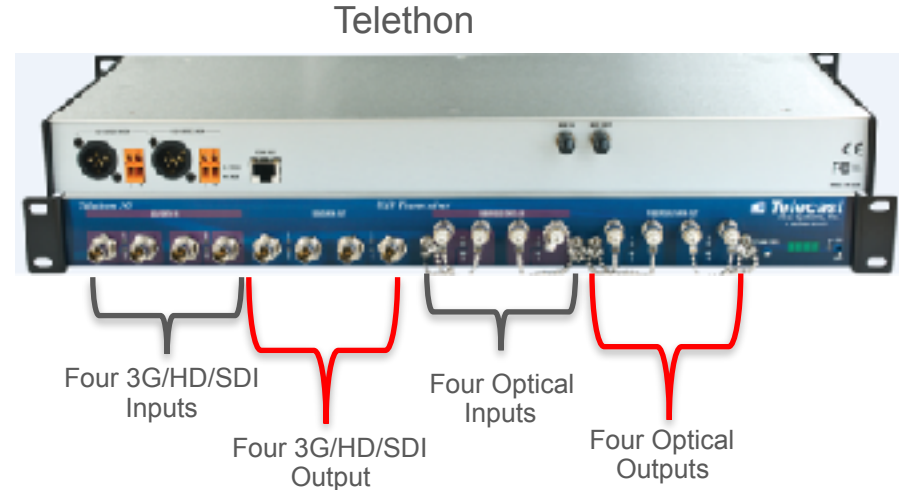
## Multichannel Wavelength Manager / 3G HD/SDI Transport

### Features - Python II Side

- Up to 8 Channels per 1 RU chassis
- Wide range of digital formats
- 19.4 Mbps to 3Gbps transport
- Compatible with digital TV standards SMPTE 292M, 259M & 424M
- Handles DVB/ASI signals
- Immune to pathological data errors
- Equalizes coax up to 3Gbps

### Features - TelePort Side

- Turns any optical signal into CWDM
- Mux up to 8 Optical signals on one fiber
- Up to 3Gbps on each optical channel
- Optically repeats signals - extending range





# Telethon

## Multichannel Wavelength Manager / 3G HD/SDI Transport

### Features - System

- *Economical, low profile packaging*
- *Front panel monitoring of optics and signals*
- *Redundant power inputs*
- *Option for optical redundancy*
- *Wide optical budget*

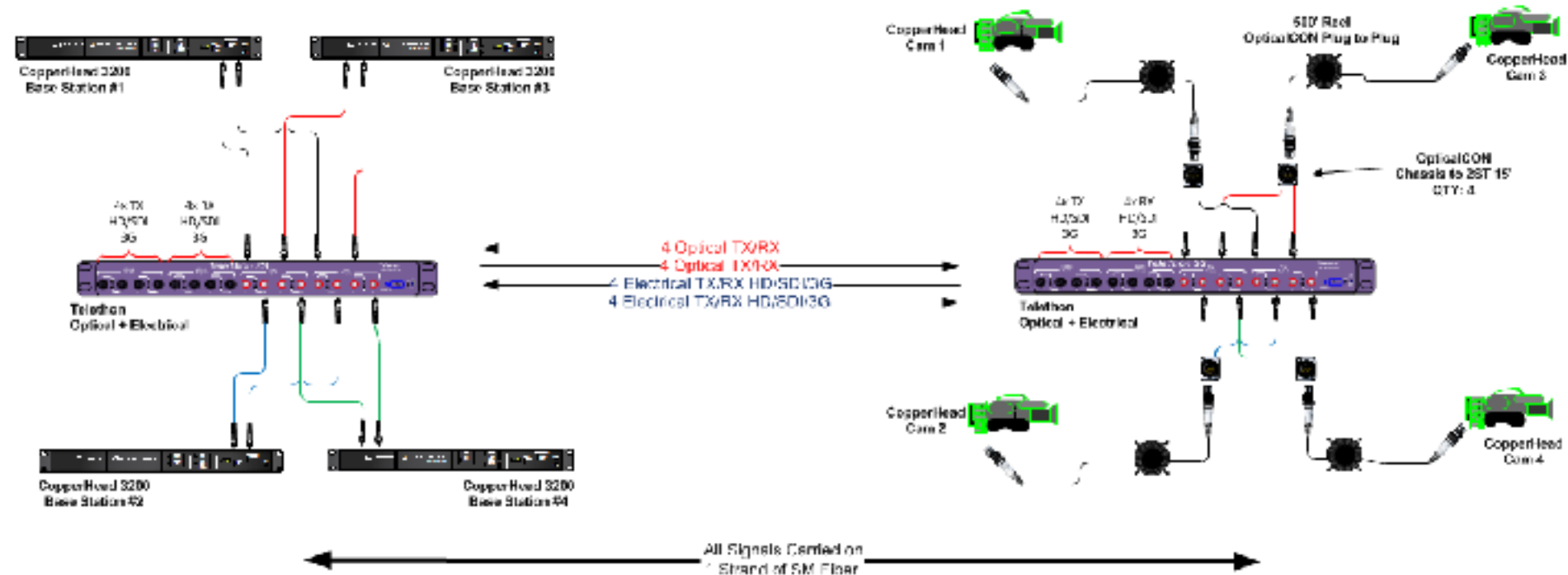
### Applications

- *Studio Infrastructure*
- *Sports & Field Production*
- *HD Tie Lines*
- *Campus/Metro HDTV distribution*
- *ATSC or HDTV STL*
- *Telco last mile and local loop*

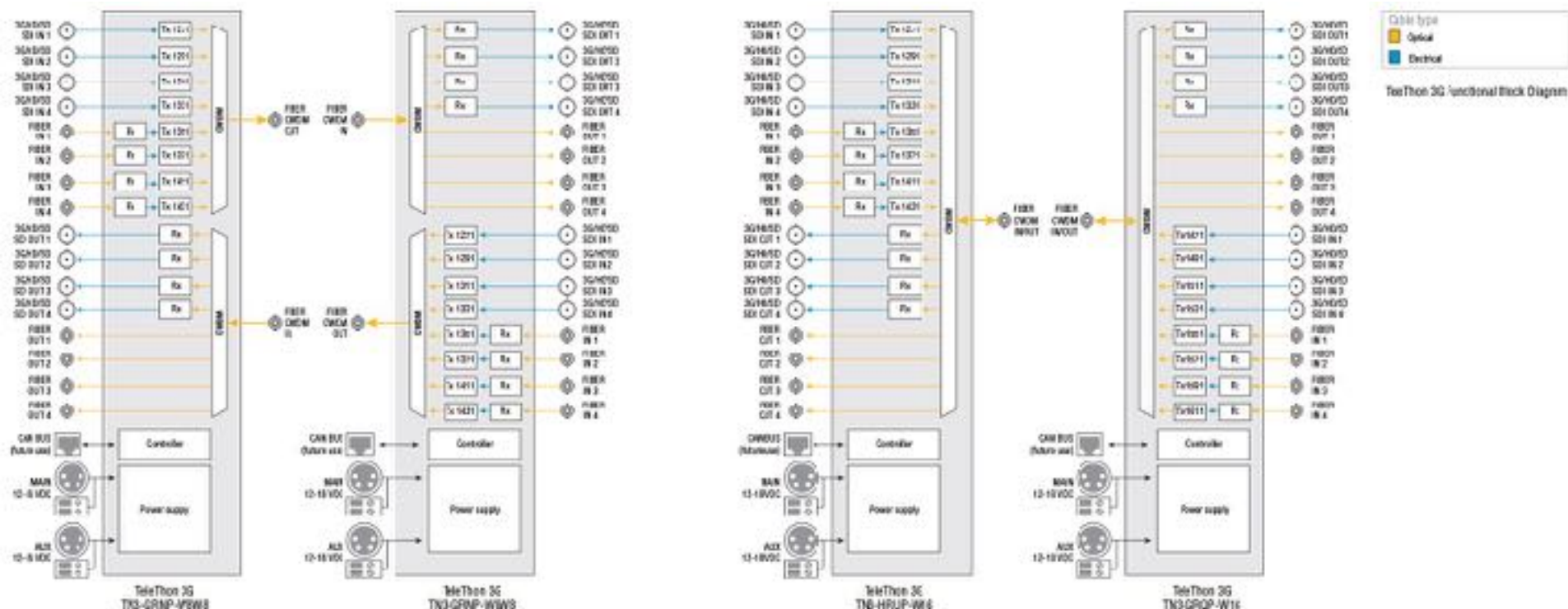
Telethon



# Telethon



# Telethon Diagram



# Camera Solutions

Viper II => XL

 FUTURE-READY



grass valley

A **BELDEN** BRAND

# Viper II

## Modular 3RU Frame System (Video / Audio)

### Features

- 16 Slots - 3 RU
- Hot Swappable
- Convertible Modules: Rack mount or Throw-Down

### Modules

- 6292 Cards-HD/SDI, TX/RX (single strand)
- 6292 AE – Bidi HD/SDI (single strand)
- 6080 Card- 8 Channels Audio (single strand)
- Commlink 6442i Intercom
- WDM Multiple signals over one fiber via wavelength division multiplexing

### Applications

- Studio and campus facilities Room to room / Floor to floor / Building to building
- Pre-fibered Facilities Sports venues, airports, malls, government buildings, etc.
- Studio-Transmitter Links
- CATV/Telco Video Backhaul
- Metropolitan Video Links



Throw down

# Viper I Mussel Shell and Viper II Frame



## Viper I

- Legacy Mussel Shell and News Gathering ENG/SNG Solution for Video, 8x Audio, ENET, Intercom & Serial Data
- Viper "Mussel Shell" used by TV network news worldwide
- Portable system handles 3-camera shoot on one TAC-4 cable

Note: Viper I is available in North America only

## Viper II => Viper XL

- Universal 16-slot card cage
- Rack modules or standalone
- Multichannel video and audio
- Transition to Densite Frame almost completed





# Viper XL Bidirectional Fiber Optic Transmission System (combination Thunder / Commlink)

XXL toevoegen ??

**Supports up to eight 3G cameras, including ancillary data and intercom.**

Viper XL from Grass Valley, a Belden Brand, is a portable transmission system consisting of two identical end units, linked by fiber optic cable and designed to transport a variety of broadcast production signals bidirectionally between two locations.

Viper XL addresses the diverse needs of users ranging from news networks to sports coverage and even 4K UHD production. The system can simultaneously support up to eight 3G cameras with related audio and control data signals while also providing multichannel intercom capability and 100/1Gig Ethernet connectivity.



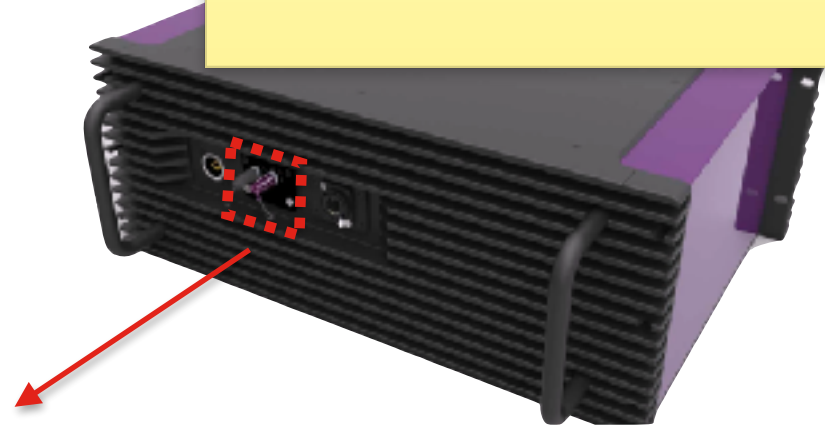
# Viper XL Bidirectional Fiber Optic Transmission System

Block Schema Sebastian vragen  
USER manual



Initial system will support:

- 8x8 SD/HD/3G SDI Video
- 8x8 Analog Audio with Gain Control,
- 1G Ethernet, and
- 4 channels of configurable Intercom.



**Minimum 1 Universal Fiber Plate must be chosen from the list below:**

- UFP-2LC Universal fiber panel – Dual LC fiber, single mode, ultra polished
- UFP-2SC Universal fiber panel – Dual SC fiber, single mode, ultra polished
- UFP-2SCA Universal fiber panel – Dual SC fiber, single mode, angle polished
- UFP-2STSM Universal fiber panel – Dual ST fiber, single mode, ultra polished
- UFP-MX2 Universal fiber panel – MX dual expended beam connector
- UFP-NOC2 Universal fiber panel – Neutrik OpticalCon Duo (for tactical/unpowered fiber cables)
- UFP-NOC4 Universal fiber panel – Neutrik OpticalCon Quad (for tactical/unpowered fiber cables)

# Camera Solutions

Adder / Thunder

 FUTURE-READY



grass valley

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# Adder II => Thunder

## Multiplexing Audio, Intercom & Data

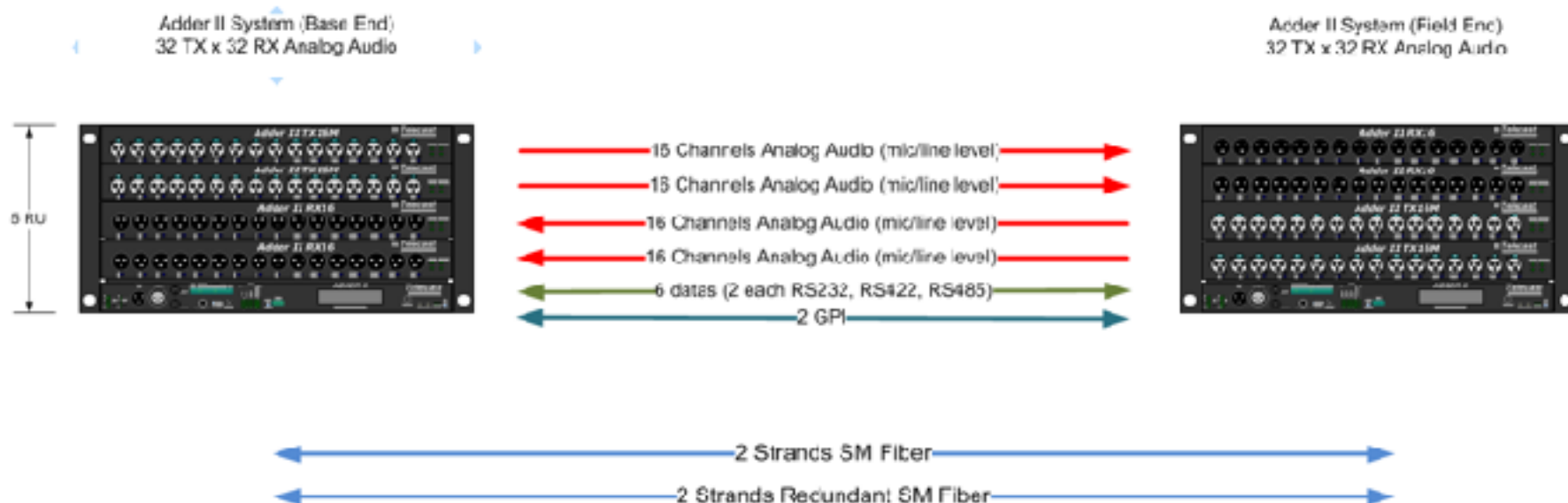
- Up to 64 Audio on 1 or 2 Strands
  - 20-bit Digital
  - Mic or Line inputs
  - Phantom bias power
- Modular Configuration
- Auxiliary Communications
  - Intercom (RTS, C/C, 4W)
  - Data (RS422/232)
  - Switch Closures (Tally)
- Auto-switchover on redundant fiber path
- On-the-fly AES digital audio conversion, and back
- Remote microphone gain control and diagnostics



### Channel Strips

- 8x8 Analog (line Level)
- 16 Ch. Analog (mic, line, +48v, 50db gain)
- AES
- RTS, Clear-Com, 4-Wire Intercom

# Adder II => Thunder Common Configuration



# Thunder

---



- 40KM range (20dB link budget) on one or two Single Mode fiber strands
- Up to 80 audio or data paths, configurable in 8-path groups (10 groups)
- Clock input for AES synchronization
- Excellent audio quality
- 1 RU “Tupa” Master plus 1 RU and 1.5 RU breakout panels
- 8 or 16 channels per breakout panel
- 1 RU Master carries two channels of data (232/422/485) plus 1 bi-di GPI
- Breakout panels can be mounted in front or behind Master via DB25 cables (8 channels each)
- Optional redundant fiber inputs and outputs
- Integral optical power monitoring for local and remote signal strength

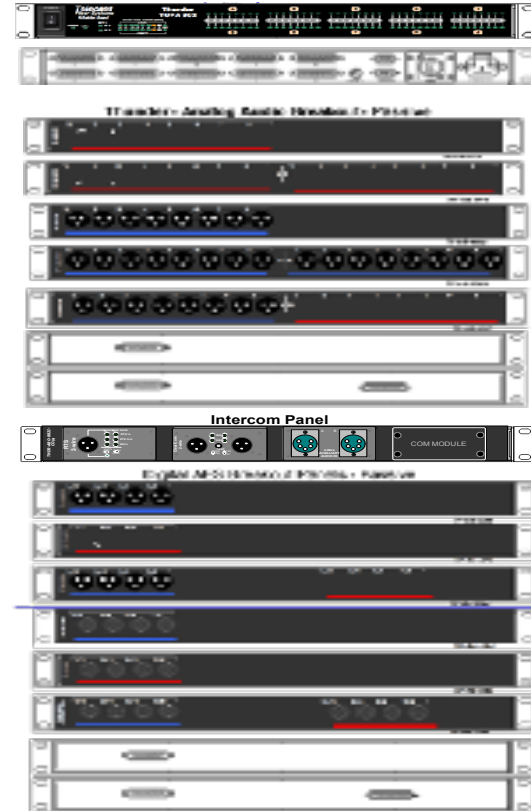
# Thunder

## ■ Benefits

- Quick and easy set-ups
- Increased reliability
- Noise-free, electrically isolating
- Long distance
- Broadcast quality at any range

## ■ Applications

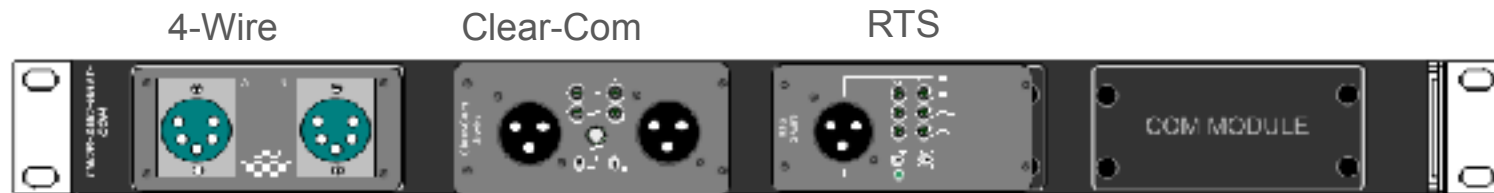
- Stadiums and Arenas
- Mobile Trucks (OB's)
- Pro Audio/FOH
- Convention facilities
- Campus Facilities
- Broadcast Centers/Studios
- Government, Military & Security





# Active Thunder Panel

## Intercom Channel Strip

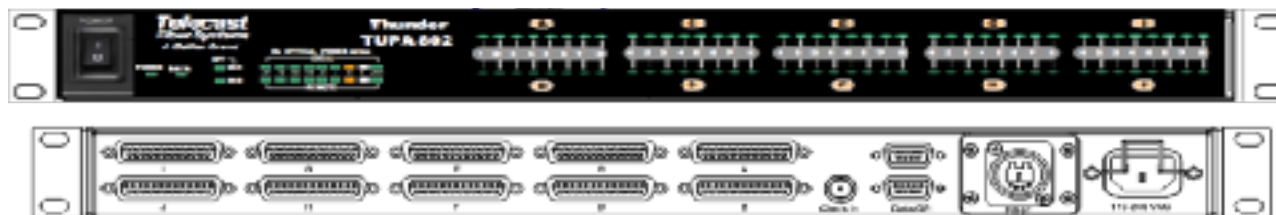


## 16 Channel Pre Amp Channel Strip



# Thunder

## TUPA Frame



Analog In  
8 channels



Analog Out  
8 channels



AES In  
4 ST channels



AES Out  
4 ST channels



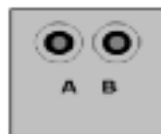
Data  
4 bi-di paths



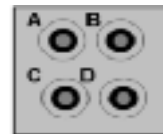
GPI  
8 bi-di paths



1 ST



2 STs



4 STs

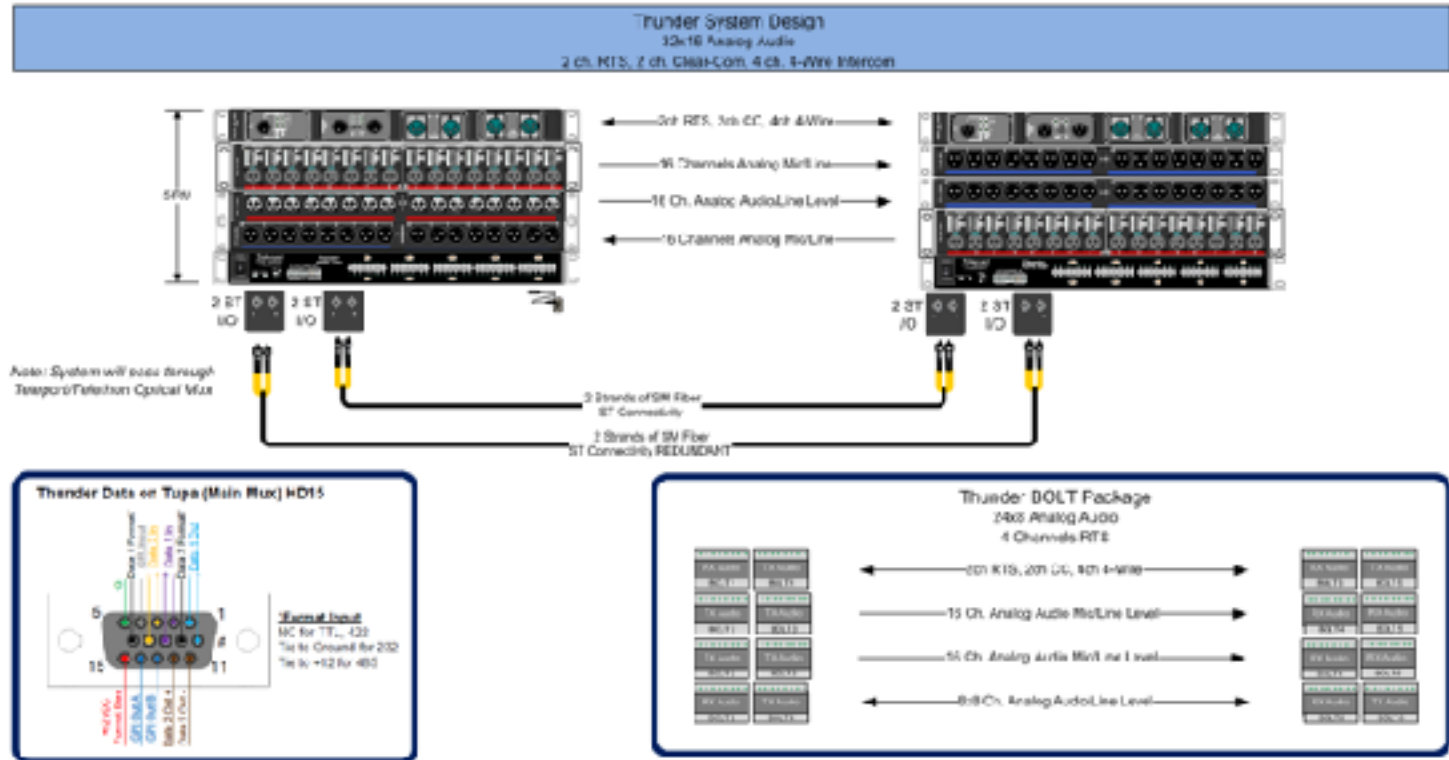


OpticalCON Duo



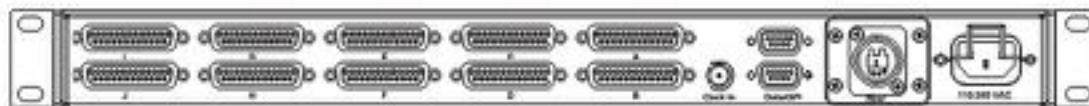
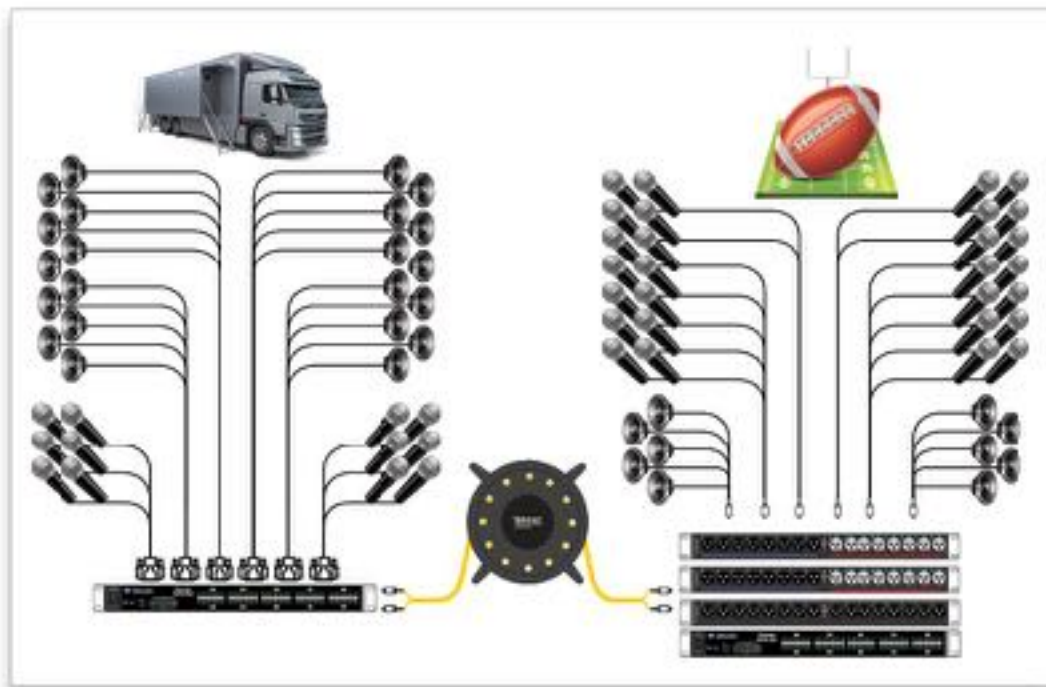
OpticalCON Quad

# Thunder Configuration- Passive/Active Panels





# Thunder



Thunder ear view

# Commlink 642i Intercom

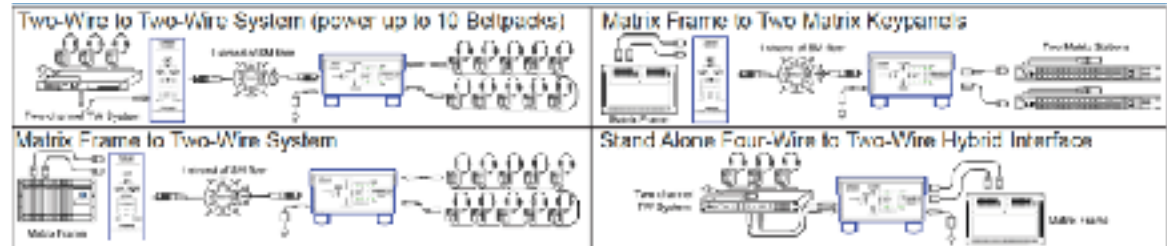
Extend two channels of Party-line or Digital Matrix intercom over a single strand of fiber

Transports two intercom channels via one strand of single mode fiber up to 30 KM

- Infrastructure Fiber
- Tactical Fiber cable
- Compatible with most Partyline and Digital

## Matrix intercom systems

- Two-Wire Partyline:
- Clear-Com®
- RTS® TW
- Matrix:
- Clear-Com® MatrixPlus/Eclipse
- RTS® Adam/Cronus/Zeus
- Advanced Automatic Digital Nulling



# Commlink 6442i Intercom

# Applications

- Remote Outside Broadcasting (sports and entertainment)
- Electronic News Gathering (E.N.G.)
- Satellite News Gathering (S.N.G.)
- Theme Parks and Theatres
- Corporate Video Production
- Industrial Testing Environments





# Commlink 6442i Intercom

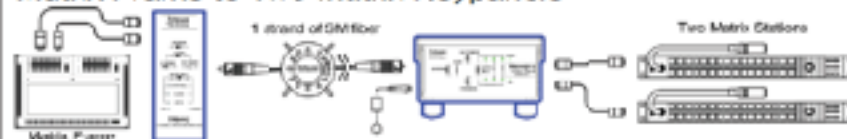
Extend two channels of Party-line or Digital Matrix intercom over a single strand of fiber



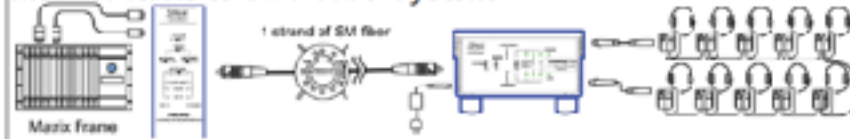
Two-Wire to Two-Wire System (power up to 10 Beltpacks)



Matrix Frame to Two Matrix Keypanels



Matrix Frame to Two-Wire System



Stand Alone Four-Wire to Two-Wire Hybrid Interface



# This is not a Tough Decision...



*99% Weight Savings*

# THANKS FOR YOUR TIME

## QUESTIONS

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August 2017

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