



JIIA

Japan Industrial Imaging Association

CoaXPress標準化に向けて

2009年12月3日

一般社団法人

日本インダストリアルイメージング協会

次世代IF分科会CoaXPressTFリーダ

海野 創

CoaXPressTFメンバー

渡邊 雅仁

CoaXPressとは

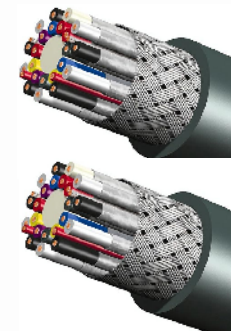
CoaXPress is a revolutionary new digital interface technology -

- Single coax cable
- High speed
- Long length
- Power and Control

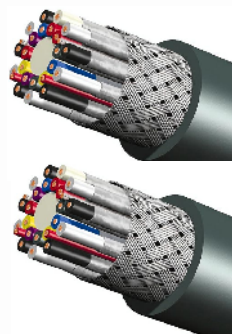
From Analog Coax (1950)



Digital Camera Link (2000)



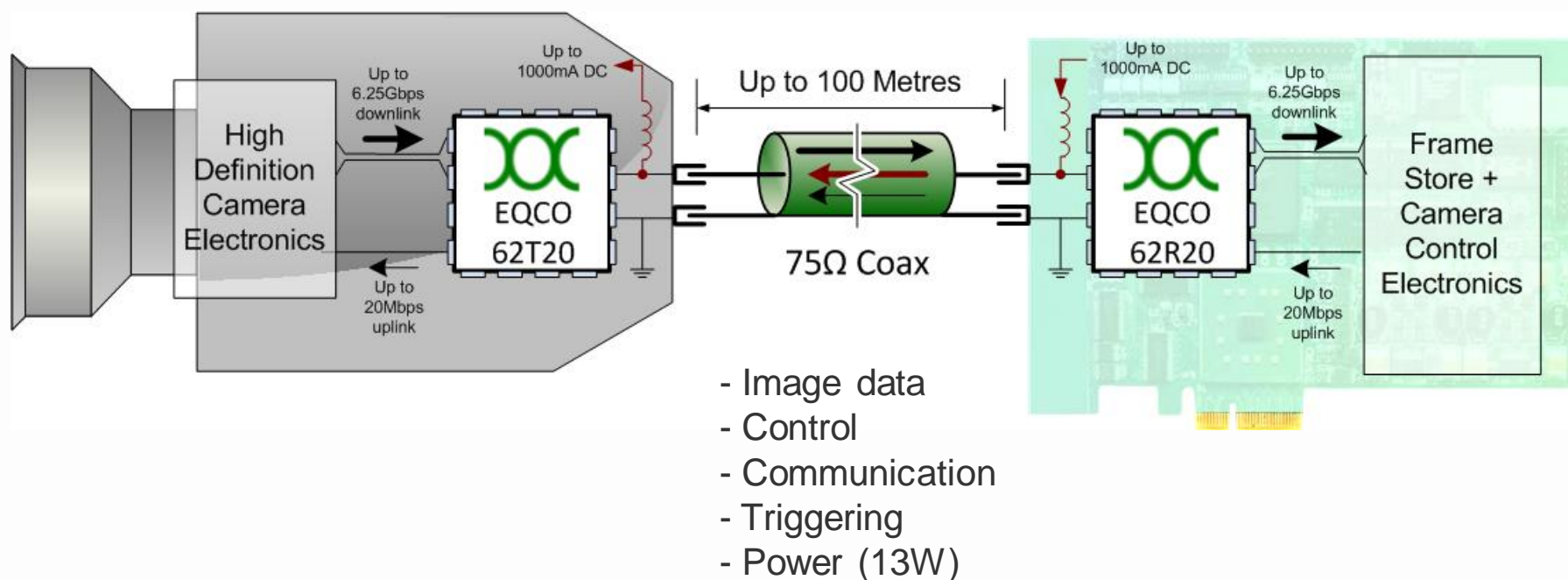
From Camera Link (2000) to ...



Coax again! (2009)



CoaXPressの接続



All on **one** coaxial cable!

CoaXPressのバージョン

CoaXPress version	Camera Link equivalent	Capability
Base	Base	3.125 Gbps 100 meters
Full	Base, Medium, Full	6.25 Gbps 40 meters
Dual Full (2 cables)		12.5 Gbps 40 meters
Quad Full (4 cables)		25 Gbps 40 meters
N cables		$N * 6.25$ Gbps 40 meters

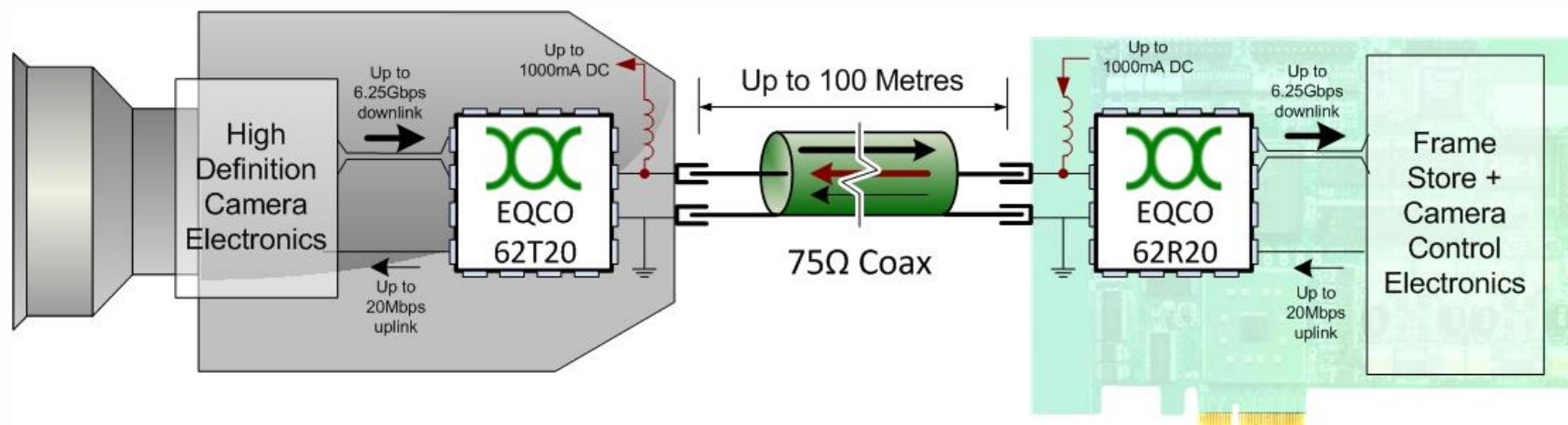
CoaXPressの特長

- Digital video, control, communication, triggering and power over **one** cable
- Coax ease of use, flexibility and reliability
- Camera Link timing accuracy
- Camera Link speed and higher
- GigE cable length
- Support of legacy coax cables (analog systems)
- Plug and Play

CoaXPressの標準化に向けて

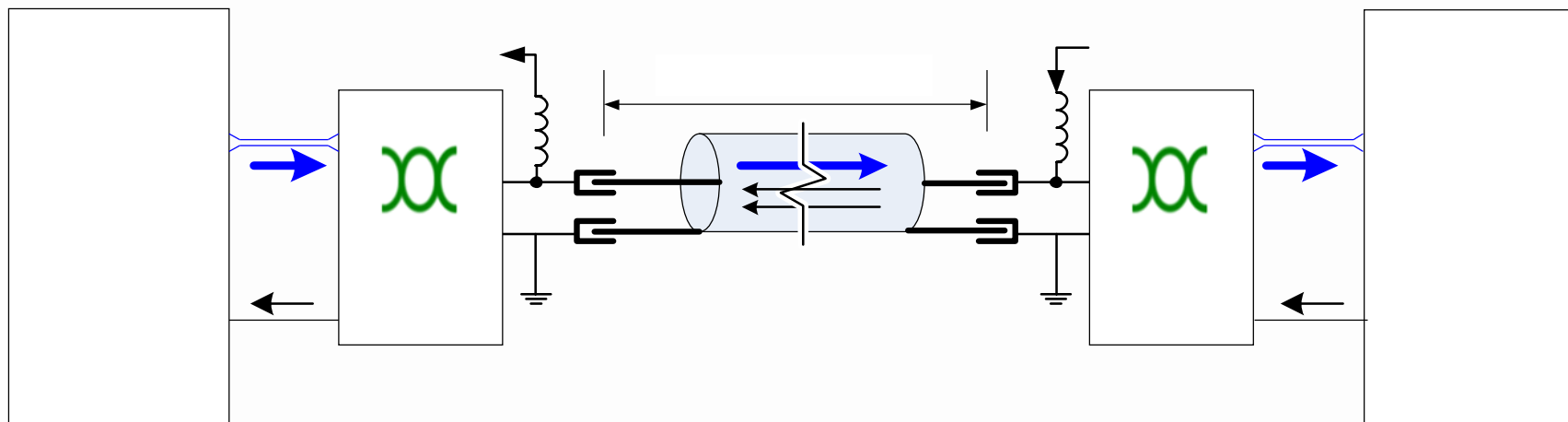
- Goal of Consortium was to make first version of the specification and then transfer for standardization
 - In order to be successful CoaXPress needs to be a World Wide standard!
- Japan Industrial Imaging Association (JIIA) will host CoaXPress standardization
 - AIA and EMVA are invited to adopt through G3 agreement
- Formal transfer to JIIA during ITE show in Yokohama (Early December 2009)

CoaXPressの詳細



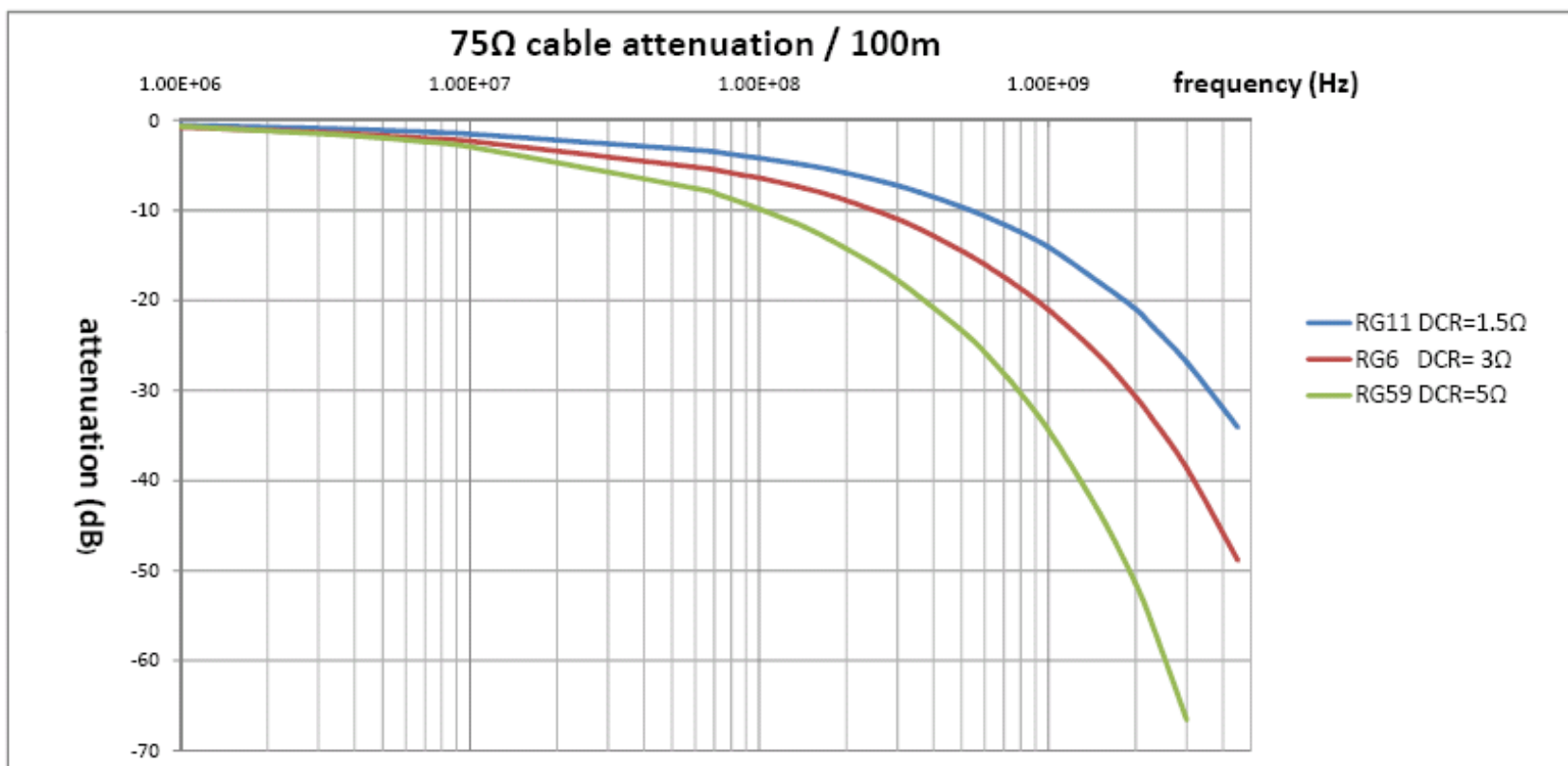
- EqcoLogic EQCO62X20 chipset in standard CMOS
- EQCO62T20 = High speed cable driver with integrated low speed receiver
- EQCO62R20 = High speed receiver with integrated low speed driver
- Video data, camera control and power over single coaxial cable
- Low voltage (1.2V), low power (<70 mW) operation

High Speed channel

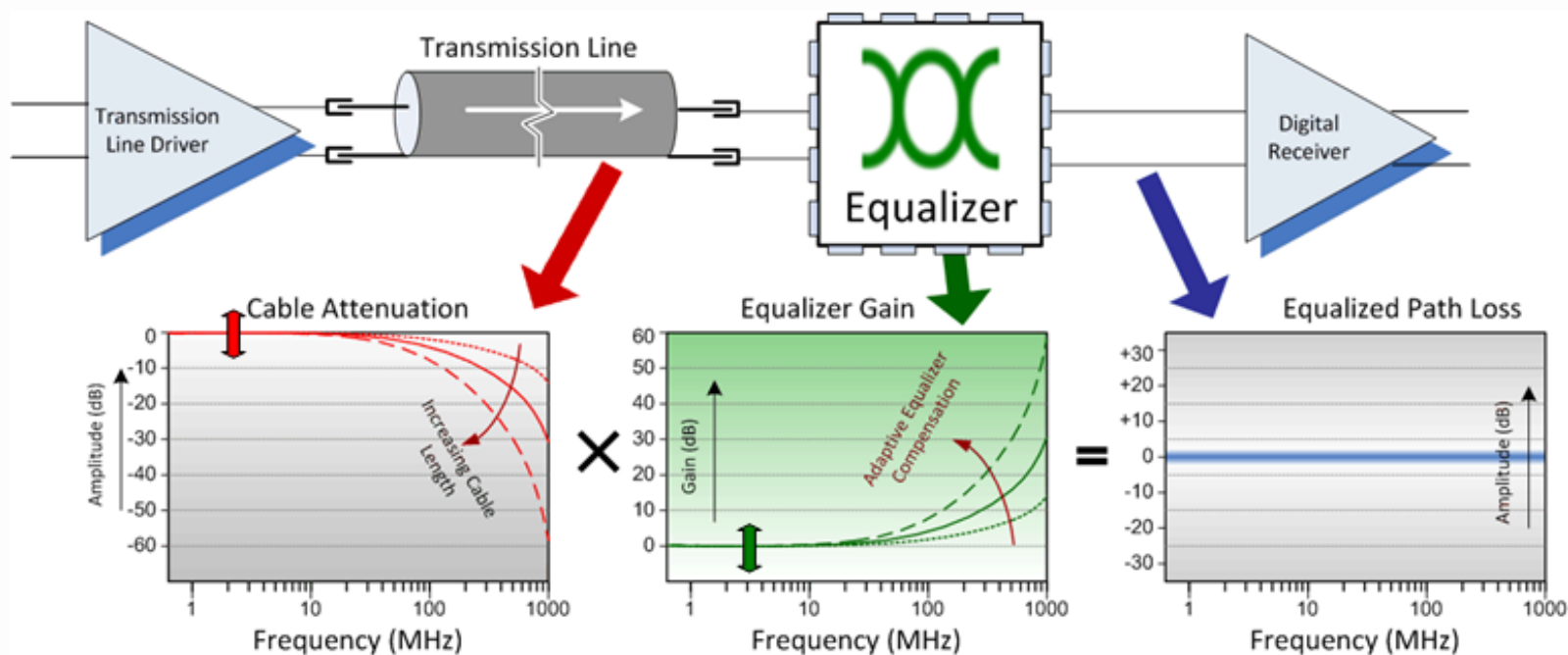


- 1.25Gb/s up to 6.25Gb/s from camera to frame grabber
- Differential input/output to FPGA in camera/frame grabber
- 8B/10B coded data
- EQCO62T20 = Coax line driver
- EQCO62R20 = Receiver with integrated auto-adaptive equalizer

ケーブル特性への対応

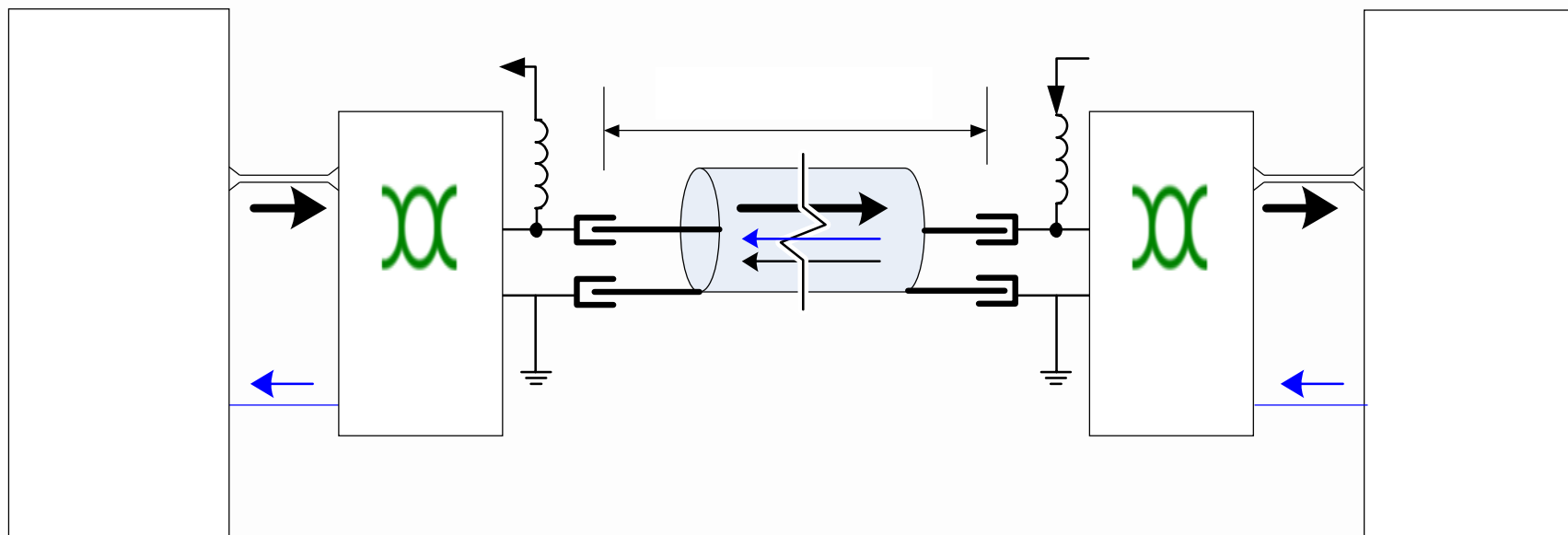


イコライザの動作



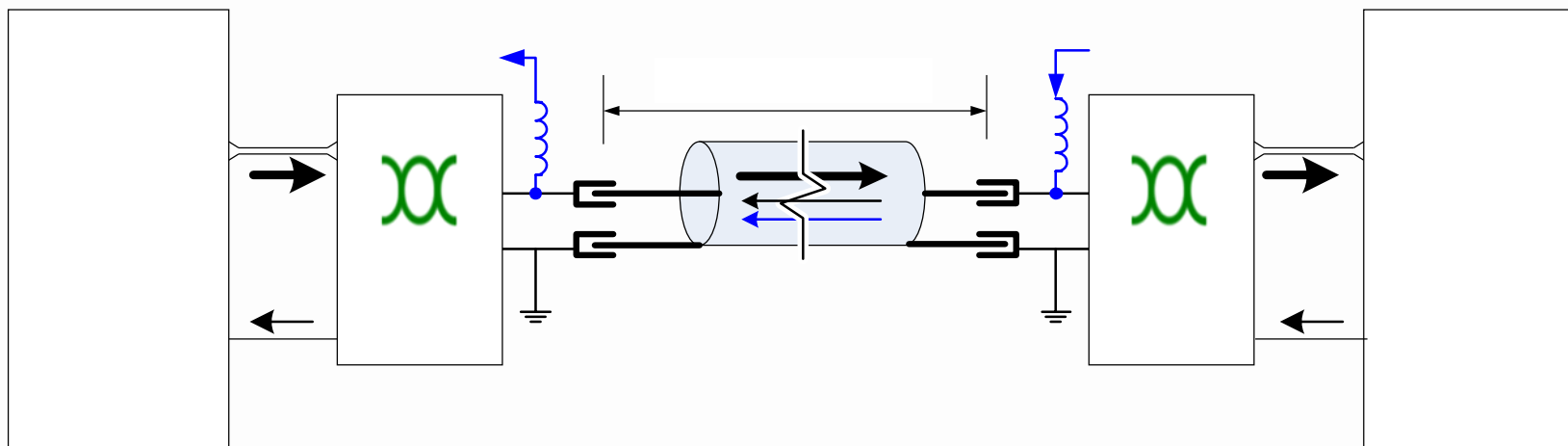
- Fully auto-adaptive operation for all types of 75Ω coax cables (RG6, RG11, RG59, ...)
- Optimal compensation for both high and low frequency attenuation
- Very robust operation (temperature, transmit amplitude,...) compared to competitors

Low speed uplink



- 0-20Mbps uplink channel from frame grabber to camera
- Single ended interface to FPGA in camera/frame grabber
- High resolution trigger with accuracy up to 4ns

電源供給



- Power supply over coax cable from frame grabber to camera
- 24V, 13 Watts per cable
- Automatic detection of CoaXPress cameras
- Short circuit protection
- No need for power brick for camera

CoaXPress Protocol Highlights

- Bitrate
 - Base: 1.25 – 3.125 Gbps
 - Full: 1.25 – 6.25 Gbps
 - Through link aggregation: N x 6.25 Gbps

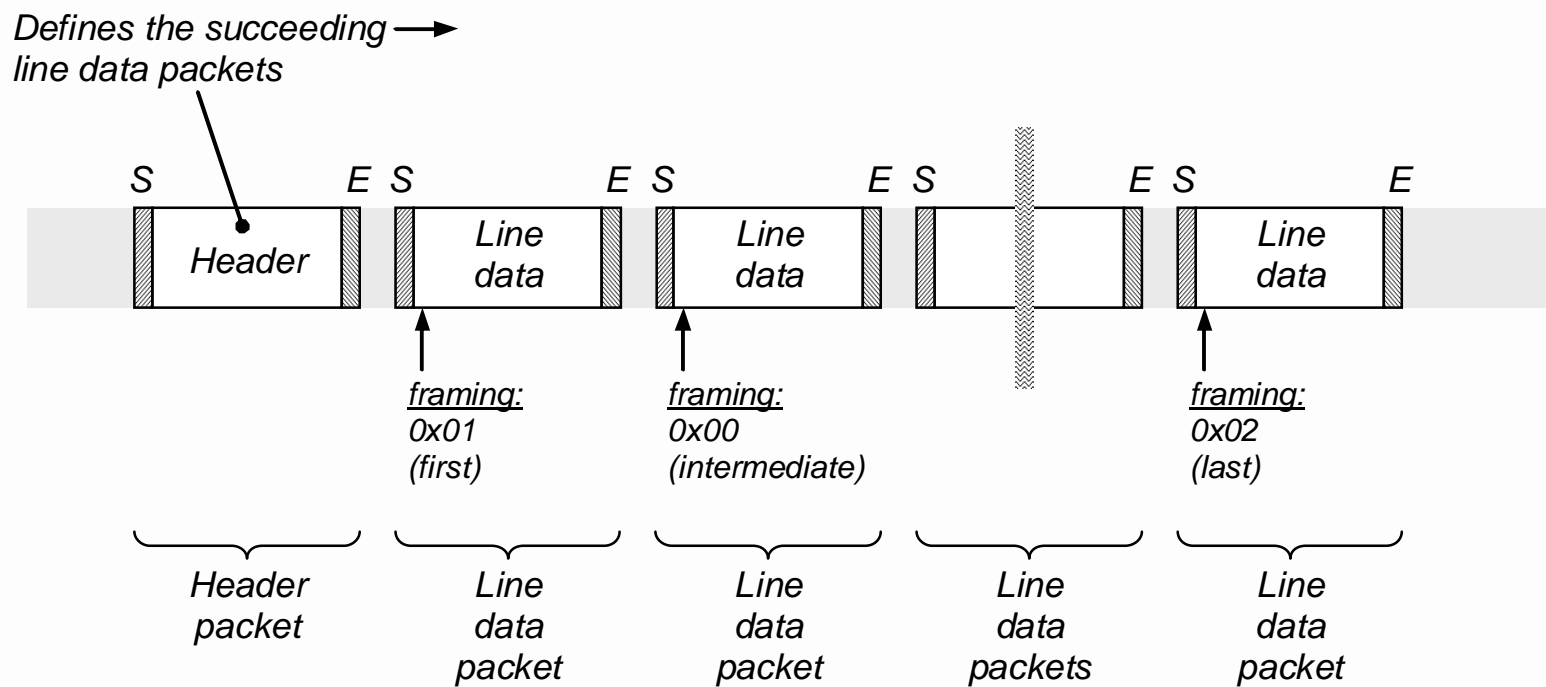
- Data integrity
 - Redundant coding
 - CRC32
 - Link test

- Trigger
 - Fixed latency of 3.4 μ s, +/- 4 ns accuracy

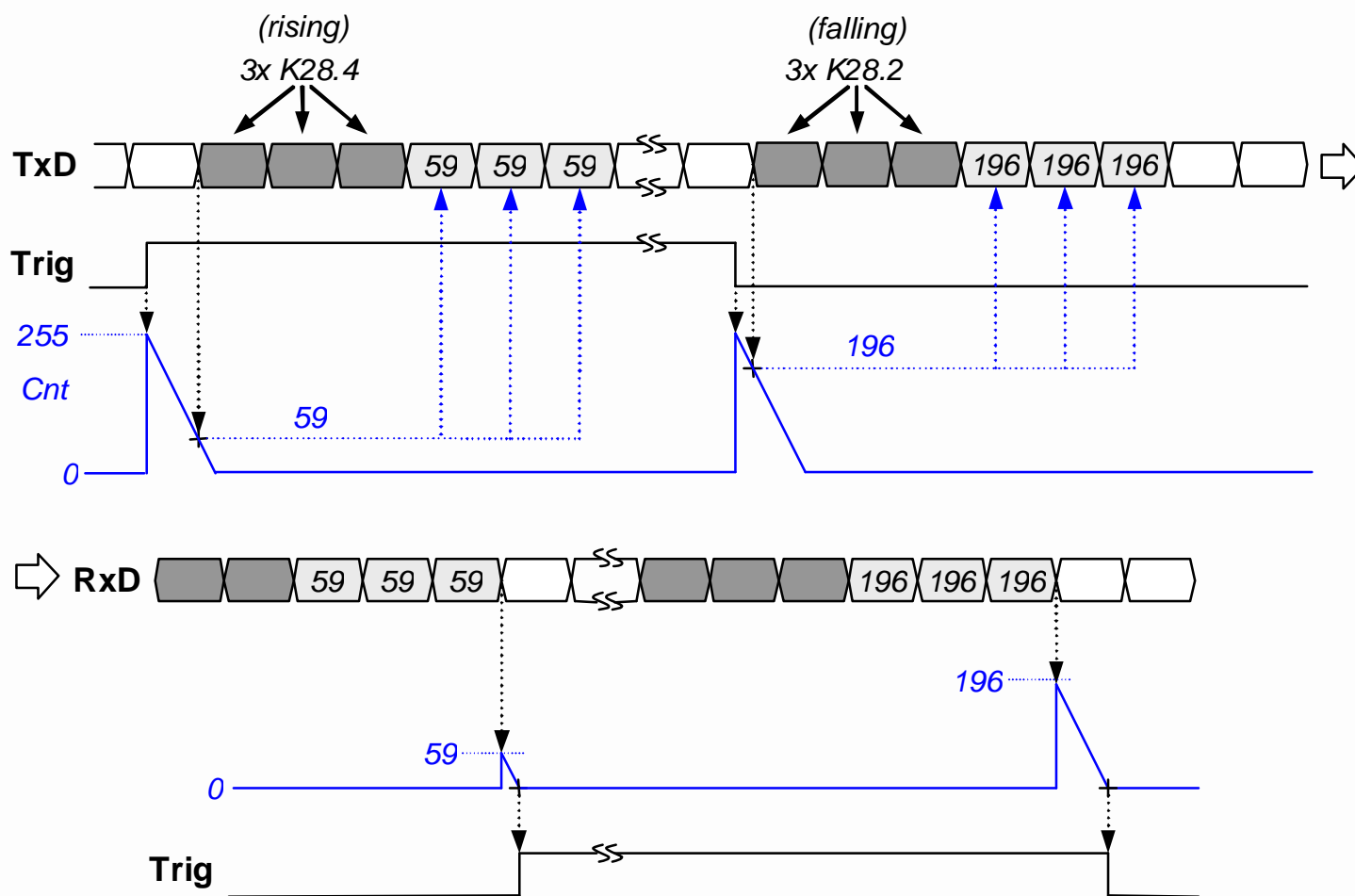
- Communication
 - Down: 20 Mbps typical (at 5% of bandwidth at 3.125 Gbps)
 - Up: Maximum 20 Mbps (shared with trigger)

- Plug & Play
 - Auto bitrate, link setup, device detection, data packing format, bit depth, etc

Downlink Protocol



Uplink protocol



Comparison with Other Standards

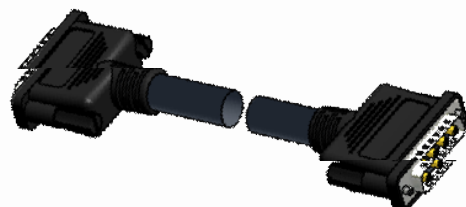
	CoaXPress	Camera Link	GigE Vision	USB-3
Single Speed	3.125 Gbps 6.25 Gbps	2 Gbps (Base, 1 cable)	1 Gbps	5 Gbps
Max Speed	N x 6.25 Gbps (N cables)	6 Gbps (Full, 2 cables)	1 Gbps	5 Gbps
Cost	Low	Medium	Medium	Low
Complexity	Low	Low	High	Medium
Cabling	Coax	Custom multi-core	Cat-6	Complex, mass produced
Max Length	100m / 50m	10m / 7m	100m	3m
Data Integrity	CRC	None	CRC / Resend	CRC
Real Time Trigger	Yes, +/- 4 ns	Yes	No	No

Cable solutions(1)

- A wide selection of Coaxial cables can be used, depending on requirements
 - Focus on long distance
 - Focus on flexibility
 - Focus on cable diameter
- Currently 2 cable vendors have been selected, Belden and Gepco
 - We will test using their cables (length, EMC/EMI etc)
 - Many other cable vendors will be added
- Consortium is also looking at multi-cable assemblies

Cable solutions(2)

Type	Diameter	Use	CoaXPress Max length at 3.125 Gbps	CoaXPress Max length at 6.25 Gbps
Gepco VHD1100	10 mm	Long distance	155 m	60 m
Gepco VSD2001	7 mm	General (long)	110 m	40 m
Gepco VPM2000	6 mm	General	80 m	30 m
Gepco VHD2000M	6 mm	Flexible	55 m	20 m
Gepco VDM230	4 mm	Thin	50 m	20 m



Example of 5 cable solution
(CXP quad + extra trigger)

CoaXPress Products on the market

- First products on the Vision Show now
 - Cameras
 - CoaXPress to Camera Link converters
 - Frame Grabbers
 - Cable solutions
- Q1 first production shipments
- Later in 2010 products of many companies expected

- During ITE in Yokohama (December), Japanese partners will show first products

おわりに

ご静聴ありがとうございました。

ご質問をお受けいたします。

CoaXPress標準化に向けて