General Purpose MIPI Interface

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For what it was designed

10 Gbps Camera Serial Interface

10 Gbps Display Serial Interface
What we want

SoC

10 Gbps Link

Low Cost FPGA

10 Gbps Link

General Data

mobile industry processor interface
Problem

Transmission

Access

Processing
35 YEARS OF MICROPROCESSOR TREND DATA

- Transistors (thousands)
- Single-thread Performance (SpecINT)
- Frequency (MHz)
- Typical Power (Watts)
- Number of Cores


Logarithmic scale on the y-axis.
35 YEARS OF MICROPROCESSOR TREND DATA

Access

Transmission

35 YEARS OF MICROPROCESSOR TREND DATA

Gigabit Streams

Peripheral
Transmission

High Speed Links = High Speed Tasks

Bottleneck
Common High Speed Links

Gen2
- x1 4 Gbps
- x4 16 Gbps

Gen3
- x1 8 Gbps
- x4 32 Gbps

- 3.0 5 Gbps
- 3.1 10 Gbps

1 Gbps
How much do you have?

Extend with

PCI Express

SUPERSPEED USB

Gigabit Ethernet

mipi mobile industry processor interface
MIPI

Simple
Synchronous
“Unidirectional”

IN HARDWARE
4 x 2.5 Gbps

Cost effective

290 members

Why not MIPI – Video Protocol

CSI
Camera Serial interface

DSI
Display Serial interface

YES?
Protocol

Line / Frame based

DATA:

Short Packet  Long Packet  Long Packet  Short Packet

KEY:
LPS – Low Power State
ET – End of Transmission
ST – Start of Transmission

# Frame sizes

![Frame sizes diagram](image)

<table>
<thead>
<tr>
<th>Lane length</th>
<th>Frame height</th>
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<tr>
<td>SP</td>
<td>Ip</td>
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**Short Package**
- low power
- Data byte

**Access at Frame End**
Frame sizes

Lane length

Frame height

SP  Short Package
lp  low power
D   Data byte
Data rate – Latency Simulation

Data rate & Latency

- **Data rate [Gbps]**
- **Latency [ms]**

![Graph showing data rate and latency as a function of line length in bytes.](image-url)
Mobile devices are small
Thanks Autonomous driving
FPD Link III / GMSL
Concentrate

SoC

CSI 3 Gbps

Low cost FPGA

DSI 3 Gbps

In Stream 0

In Stream 1

In Stream 2

Out Stream 0

Out Stream 1

Out Stream 2
Share processing

SoC

CSI 8 Gbps → DSI 8 Gbps → CSI 8 Gbps

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SoC

CSI 8 Gbps → DSI 8 Gbps → CSI 8 Gbps

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SoC

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Recap

One High Speed Task

Consumer electronics or not present

Communication User interface

SoC

Camera Serial Interface

Display Serial Interface

Often unused

Usable 8 Gbps / Port

Unused Processor Cores