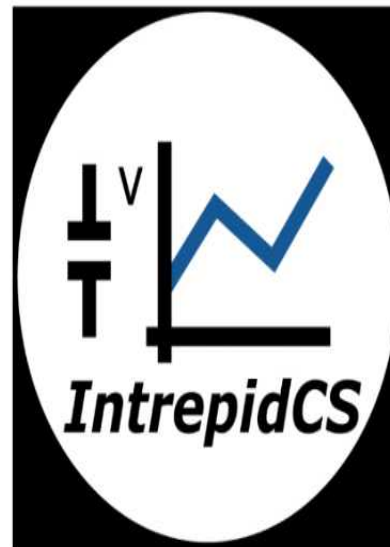


Autonomous Sensors

INTREPID CONTROL SYSTEMS



Vehicle Network Solutions

Dave Robins (Founder & CEO)

1

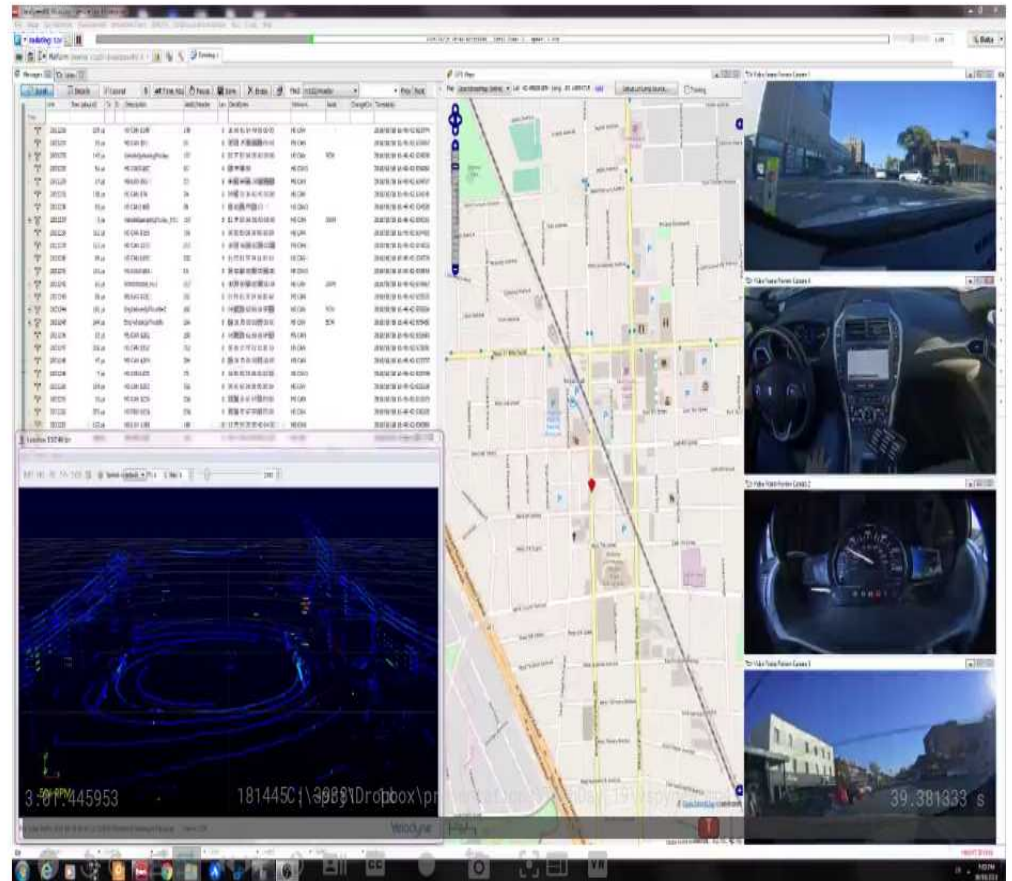


INTREPID CONTROL SYSTEMS



Data logging
and
visualization

autonomous**ONE**



RADAR

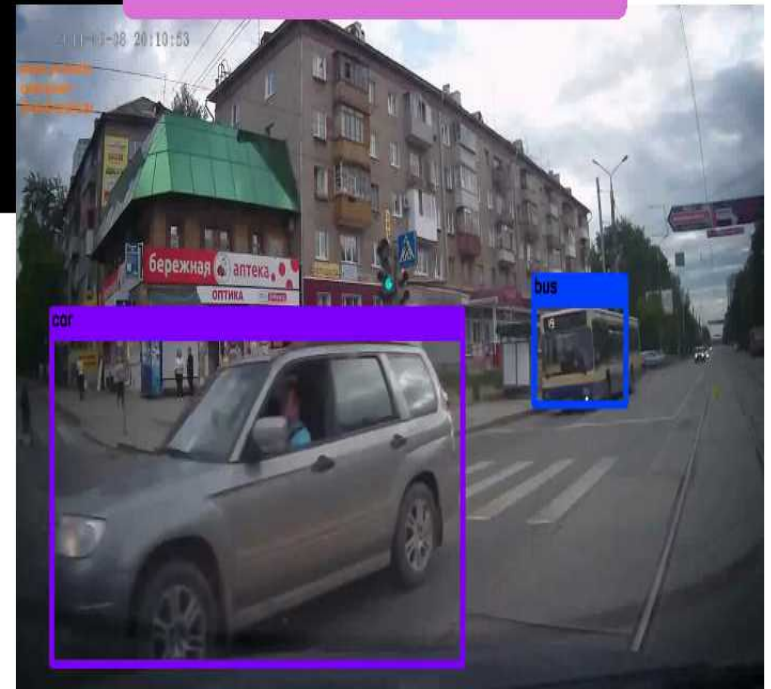


LIDAR

8to128



CAMERA



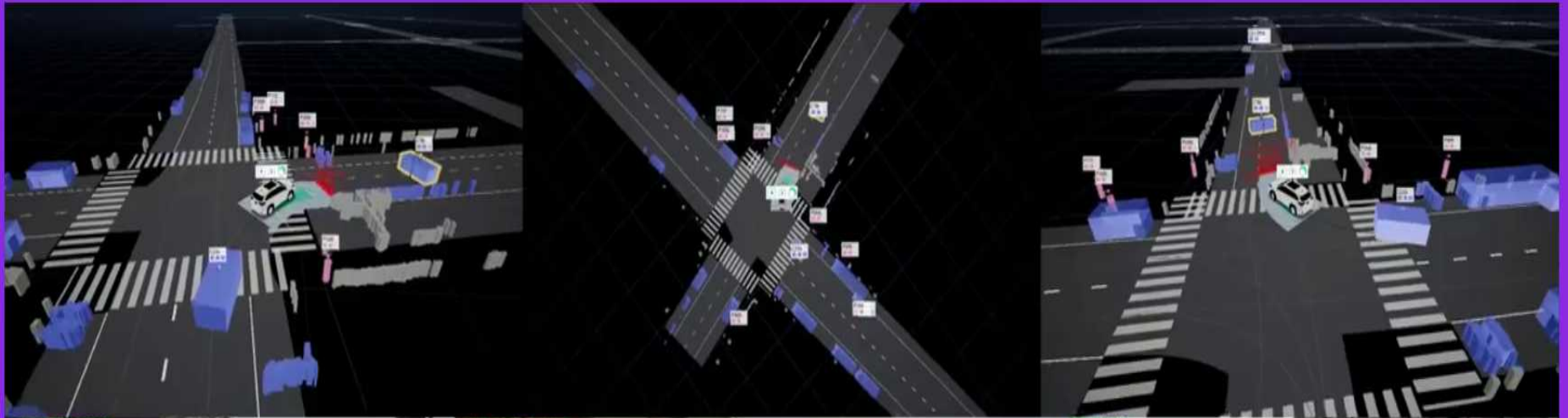


INTREPID
CONTROL SYSTEMS

SENSORS

ENDGAME

PERCEPTION SPACE



YIELDING TO U-TURNING CAR
GREEN ST

2:57.241714 177241 | 198809 1x

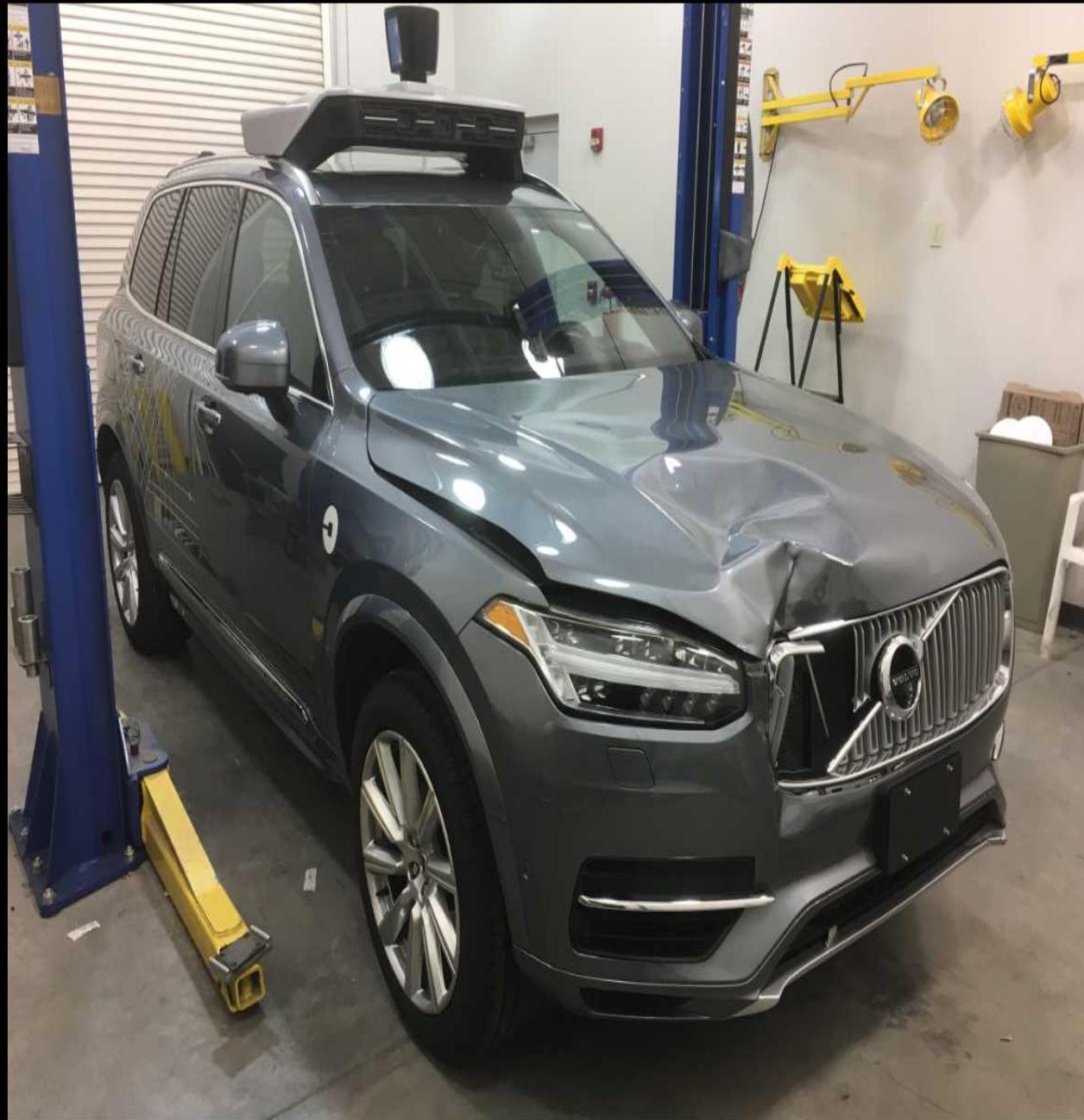
C:\~prj\Dropbox\presentations\TechDay_19\Zoox.mp4

ZO
OX

FULLY AUTONOMOUS (3X SPEED)



Failure



Perfect Sensor?



2:55.982824

175982 | 54016 1x

C:\~prj\Dropbox\presentations\TechDay 19\oustersmall.mp4

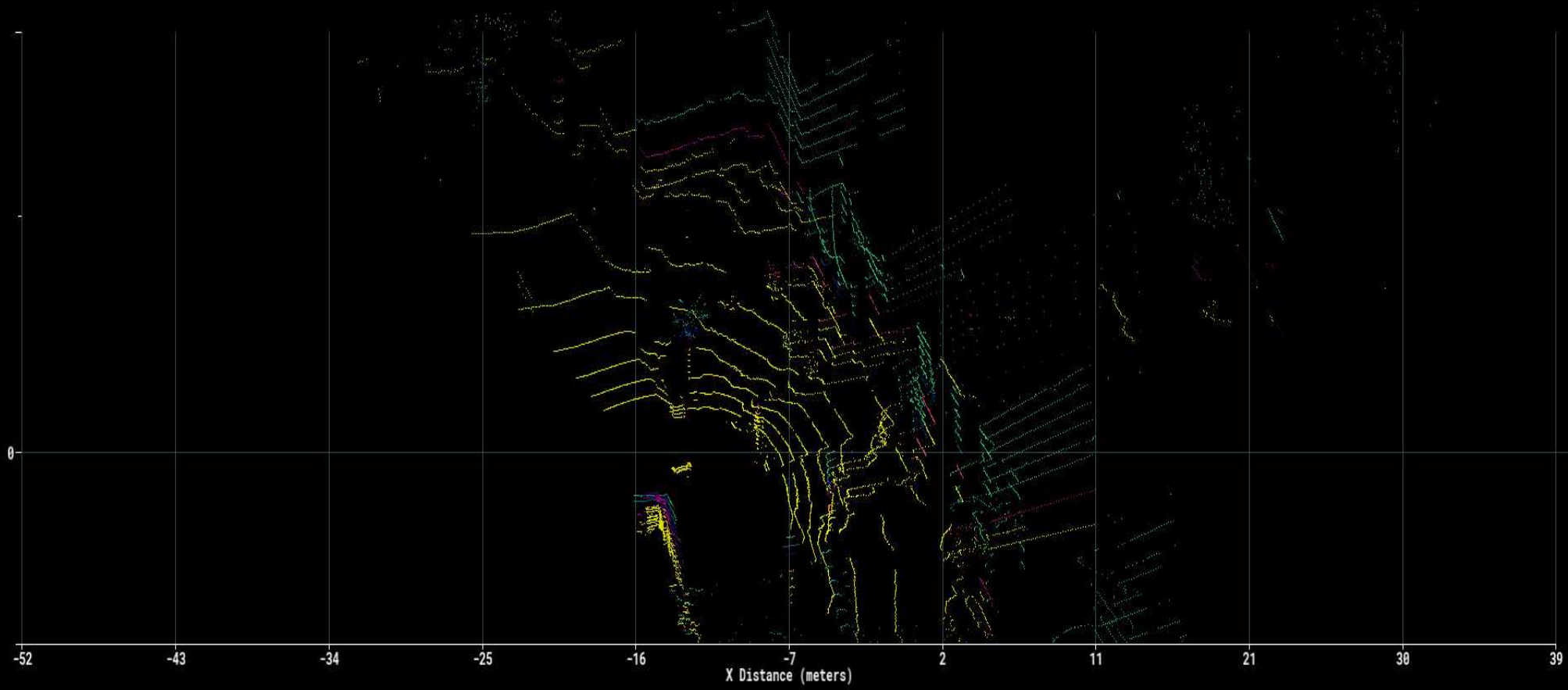
54.016000 s



Tradeoffs

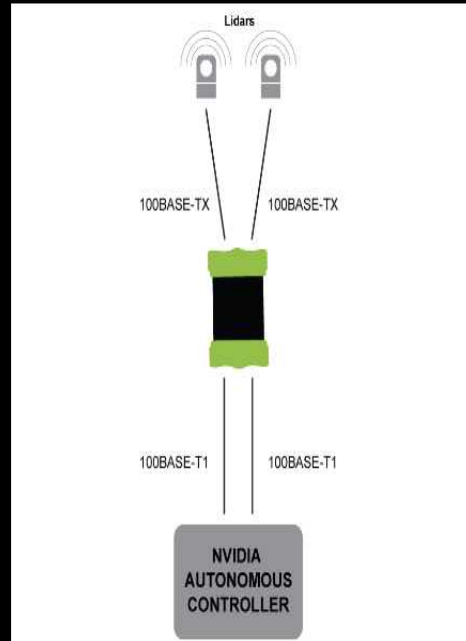
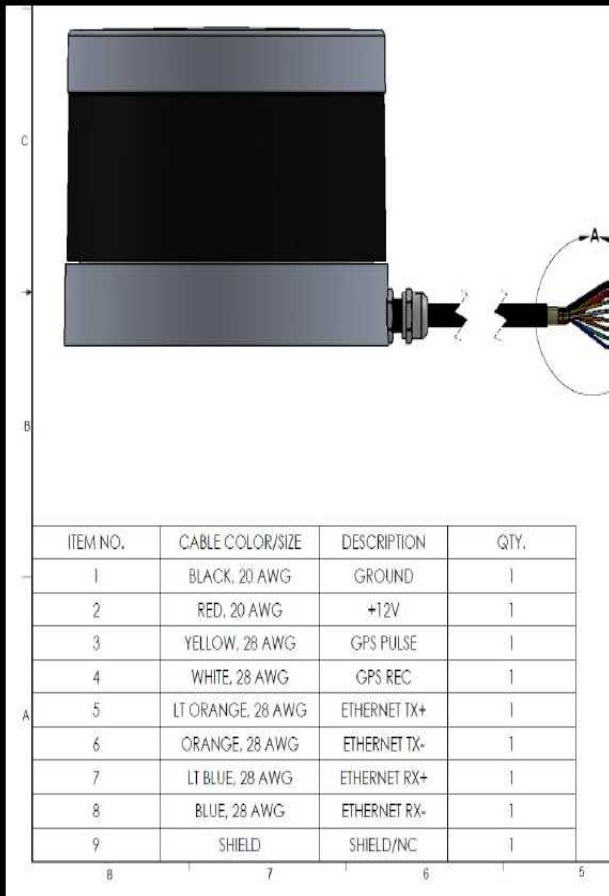
SENSOR		RADAR	LIDAR	VISION
Range		++	+	++
Angular Resolution			++	
Environment		++		
Poor Lighting		++	++	
High Brightness		++	+	+
Color Contrast				++
Velocity		++		

	Count	Time	Tx Er	Description	Len	Source	Src Po	Destination	Dst Po	EtherT	Protoc	Network
	73565	200.994		VD Point Data	1248	192.168.1.201	2368	255.255.255.255	2368	IPv4	UDP	
Azimuth 1				197.33								
	13336	200.994		VD GPS Data	554	192.168.1.201	8308	255.255.255.255	8308	IPv4	UDP	
	12	196.132		Packet 3	349	192.168.1.201	1900	239.255.255.250	1900	IPv4	UDP	
	8	196.132		Packet 4	216	169.254.162.220	51739	239.255.255.250	1900	IPv4	UDP	
	56	196.132		Packet 5	28		0		0	0xCAB1	1	
	56	196.132		Packet 6	28		0		0	0xCAB1	1	



VELODYNE LIDAR

RADMOON DUO CONVERT TO T1



DATA LOG



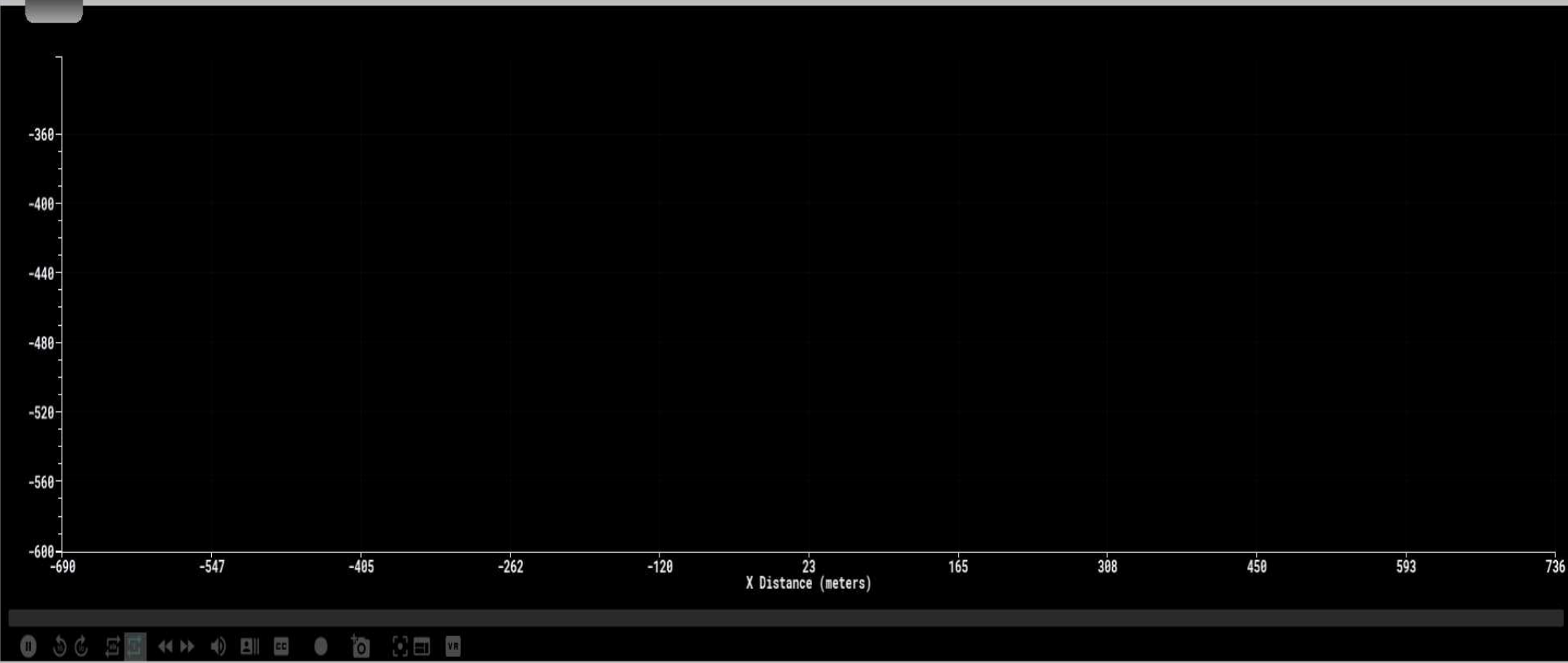
LOG TO VEHICLE SPY

Data Rates : 8 Mbps to 800 Mbps



||

Count	Time	Tx	Er	Description	Len	ArbID	DataBytes	Network

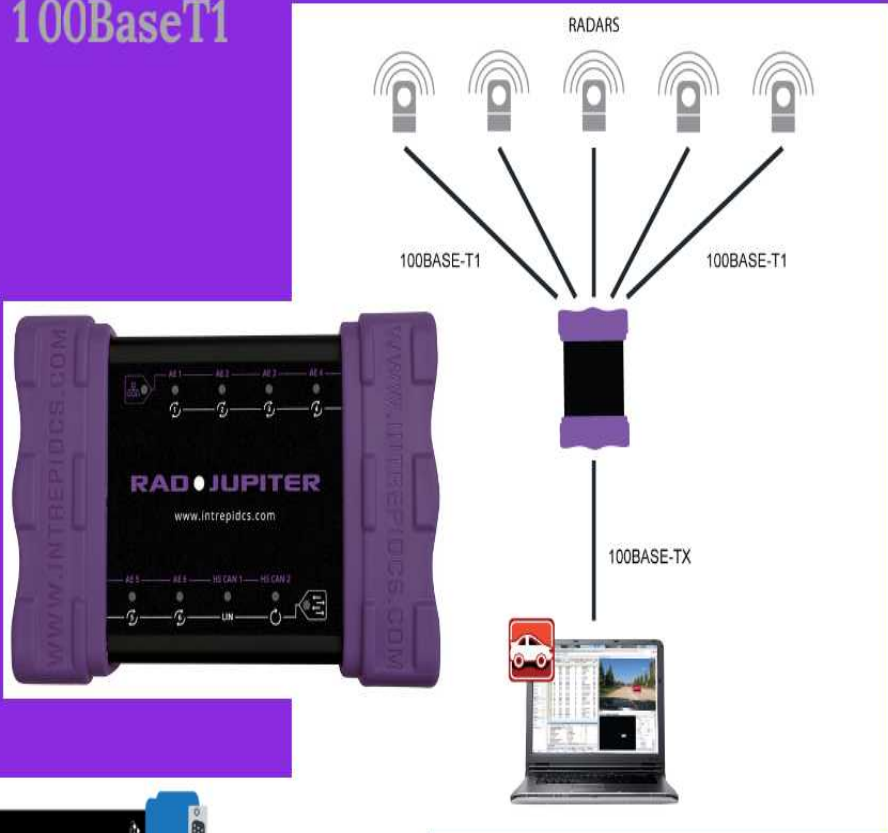


CONTINENTAL LIDAR

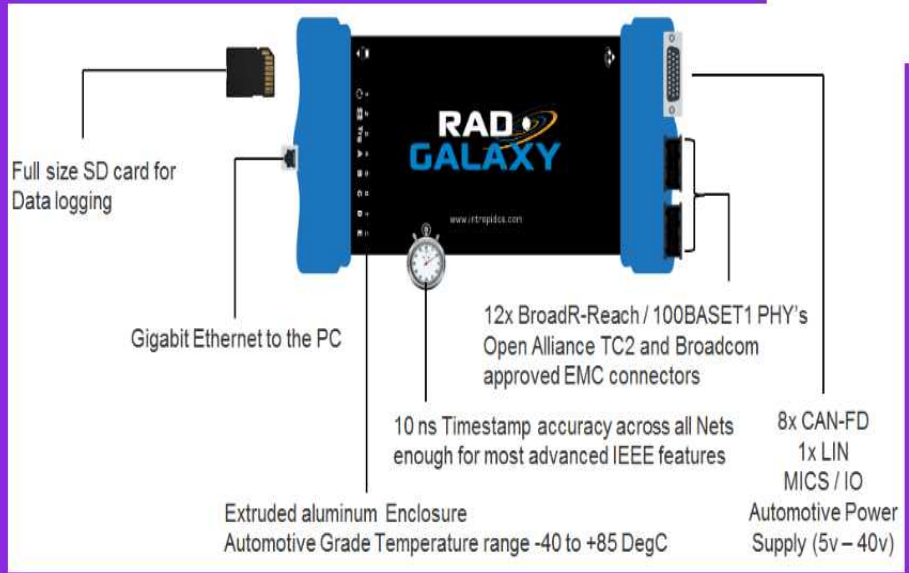


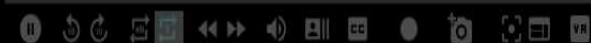
Data Rates : More than CAN

Interface CAN, CANFD, and
100BaseT1

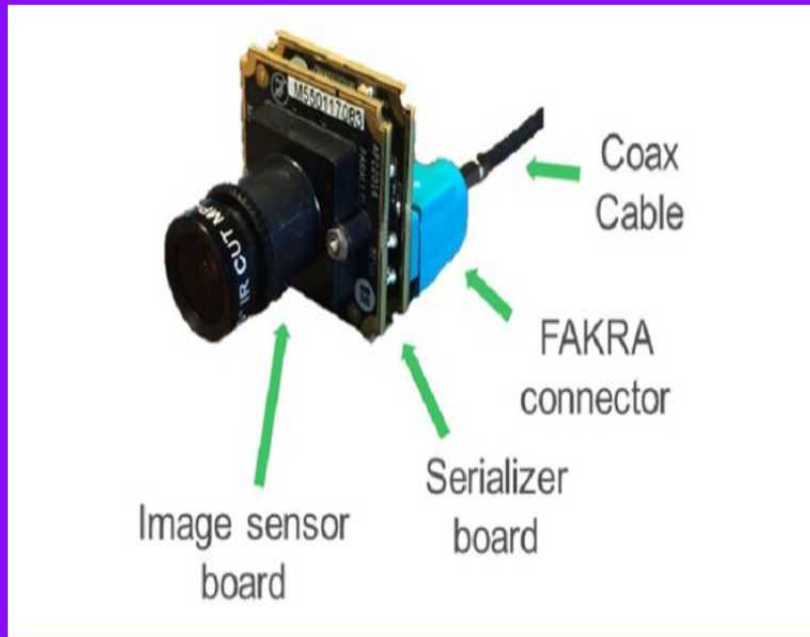


Data Log 100BaseT1,
CAN, and CANFD





ON SEMICONDUCTOR CAMERA



Interface Ethernet, SerDes, and
USB



USB CAMERA

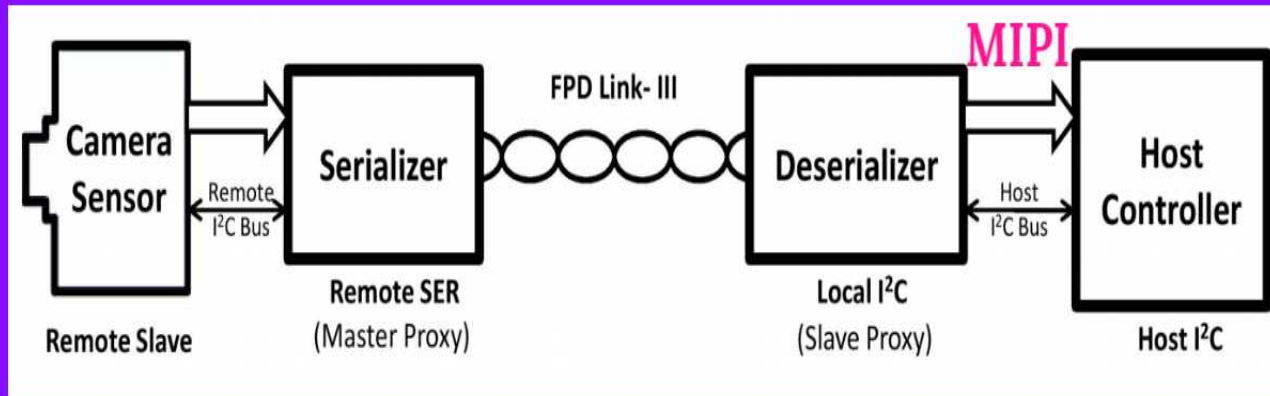


AXIS CAMERA

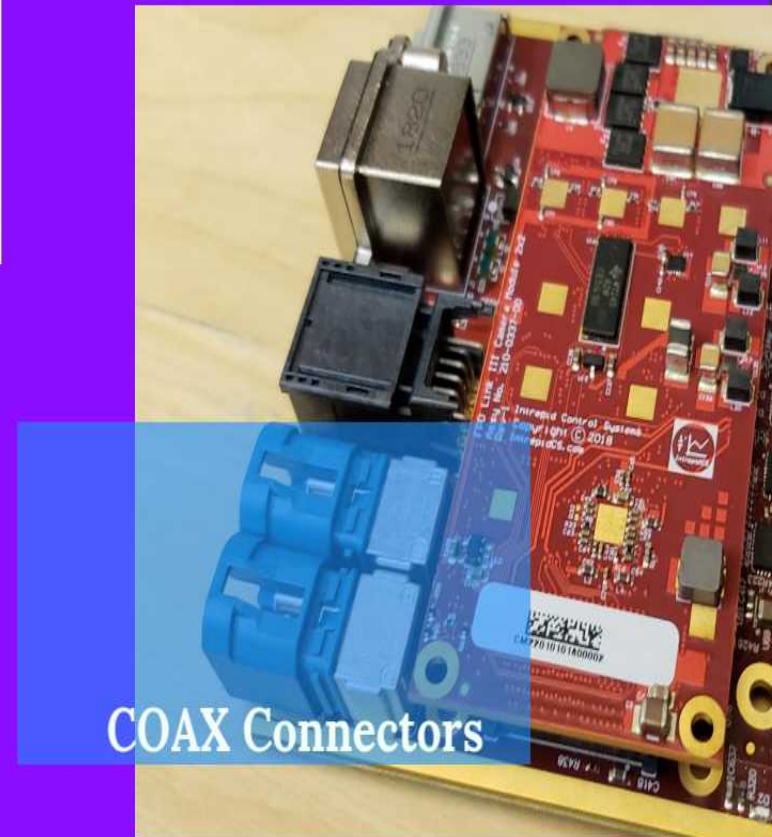


Something New: SerDes (serializer - deserializer)

TI FPD Link



ECON Systems GMSL Camera



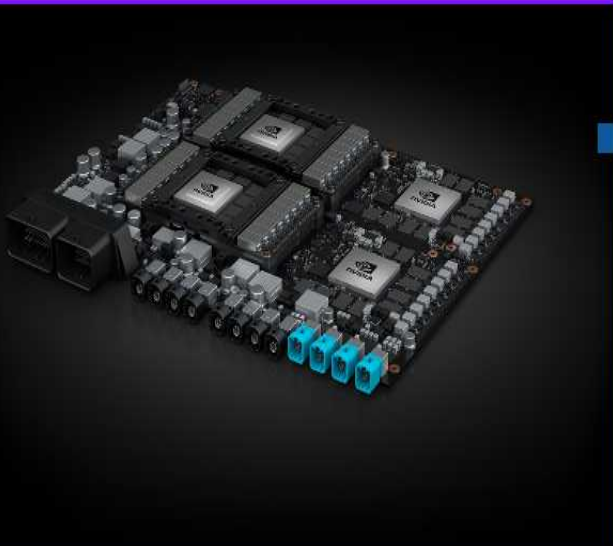
Capturing SerDes

Image Sensor



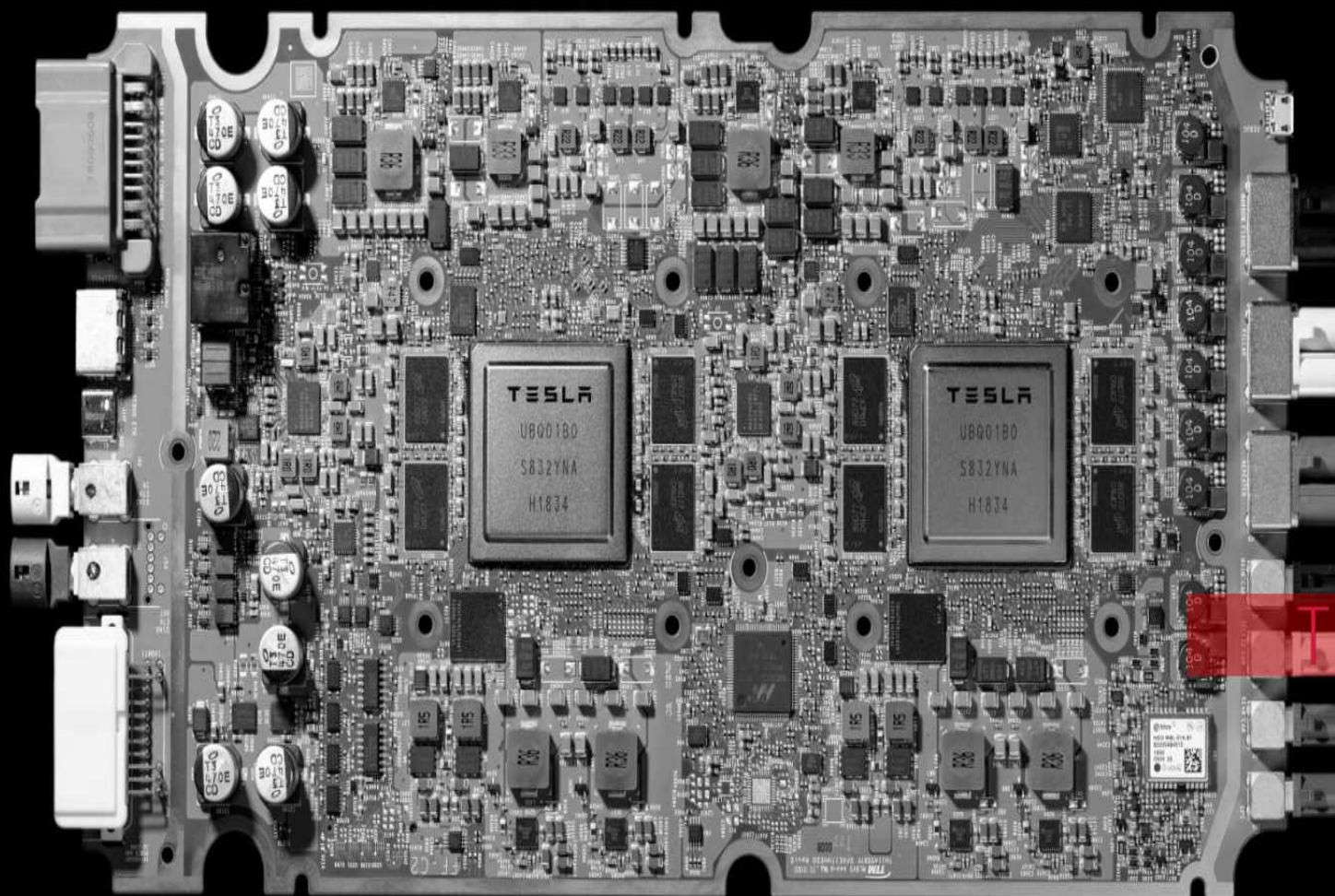
FPDLink/GMSL Coax
with Power

Image Sensor Processor



Intrepid SerDes Card

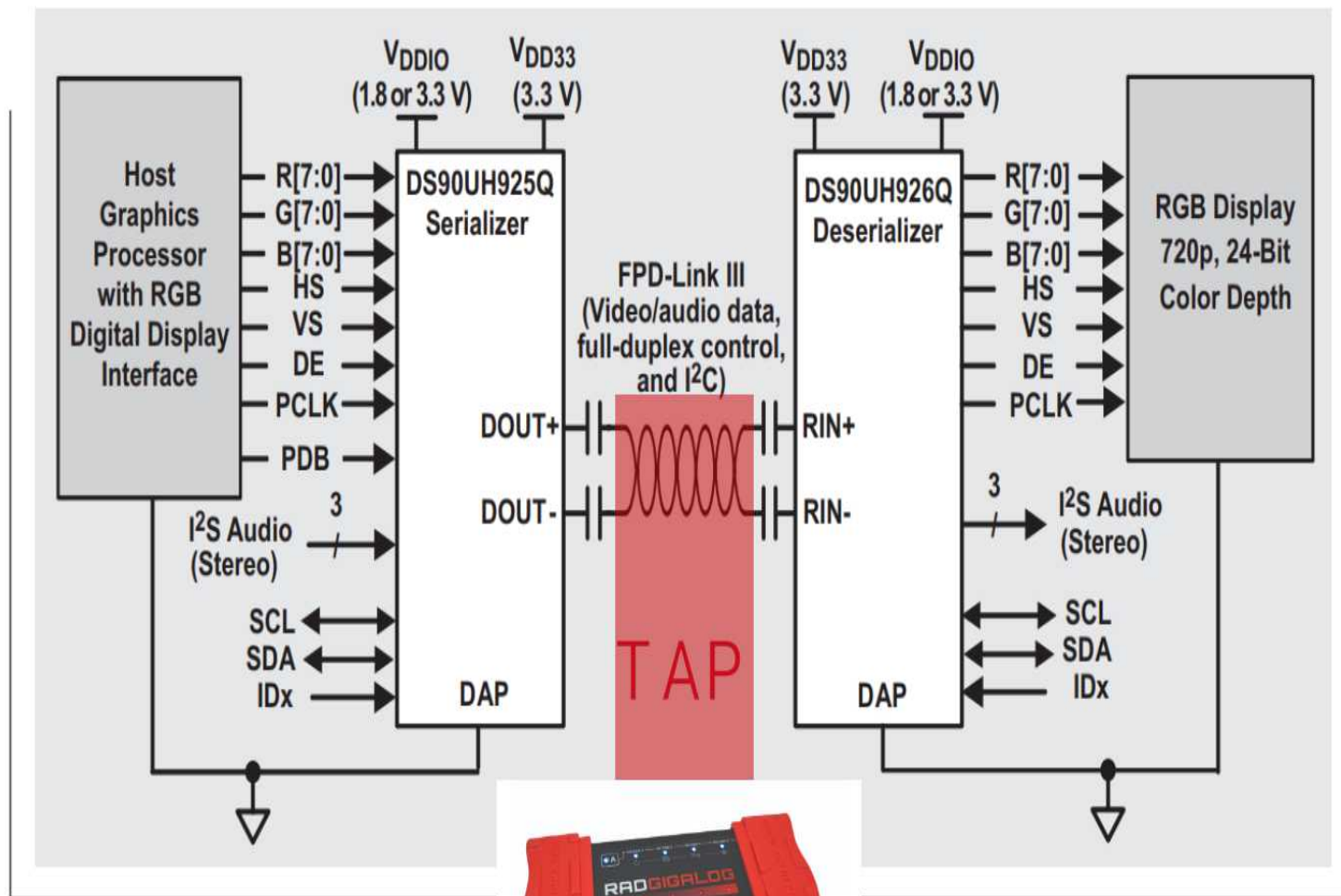


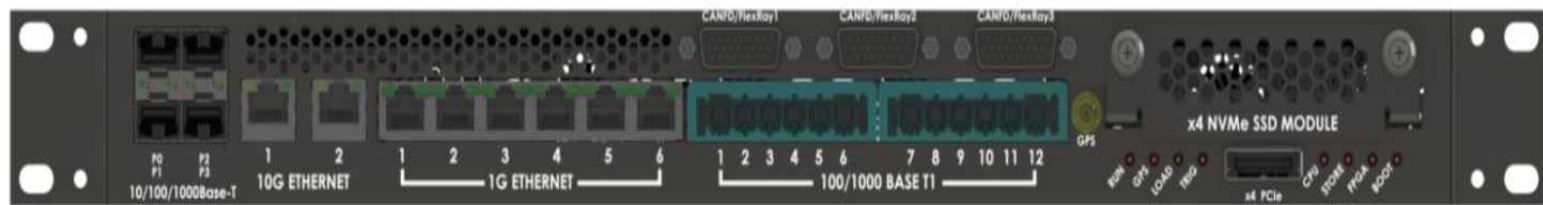


TAP

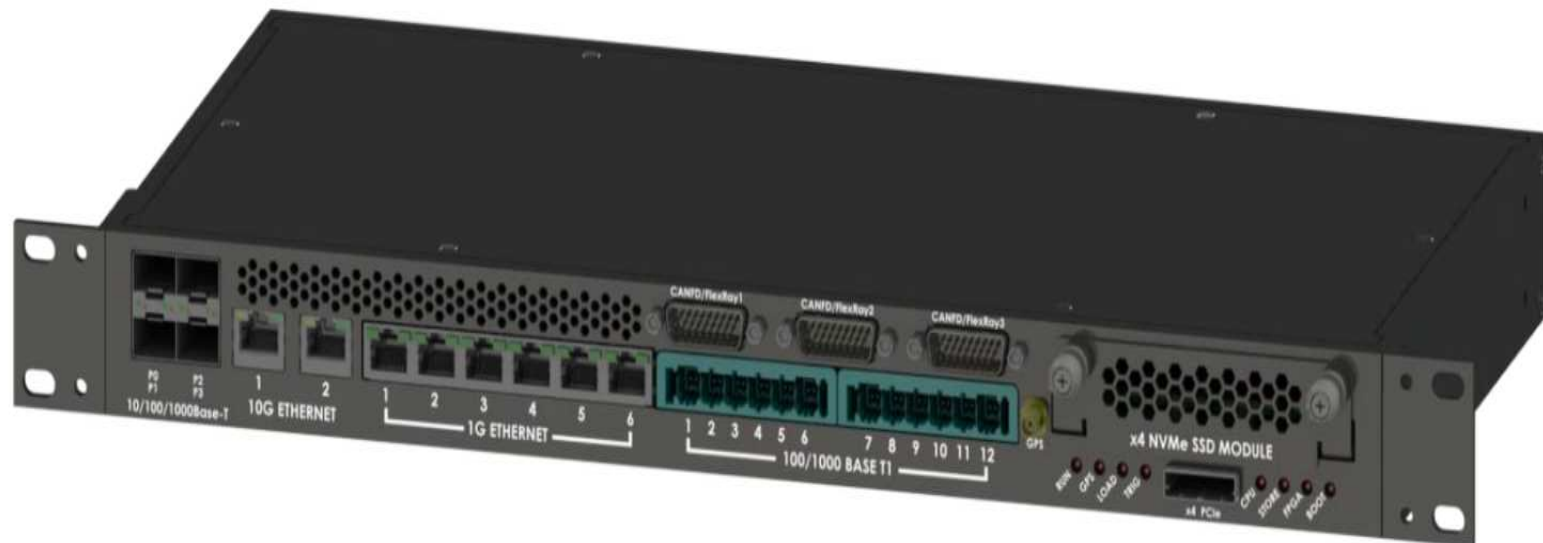
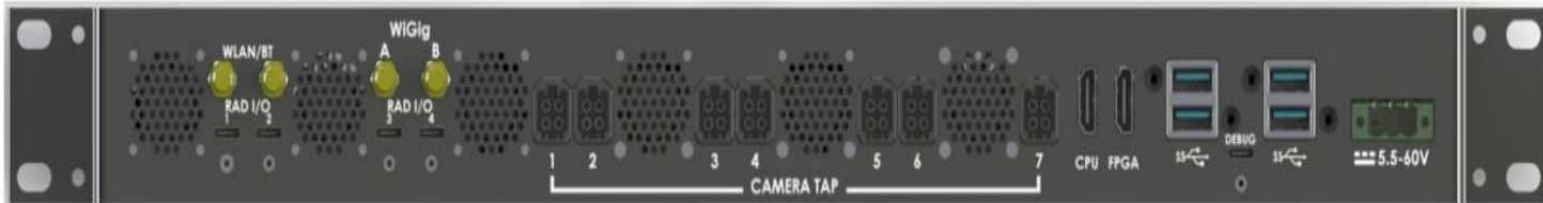
SerDes Tap : Record your soft display

Figure 1. Typical interface with FPD-Link III

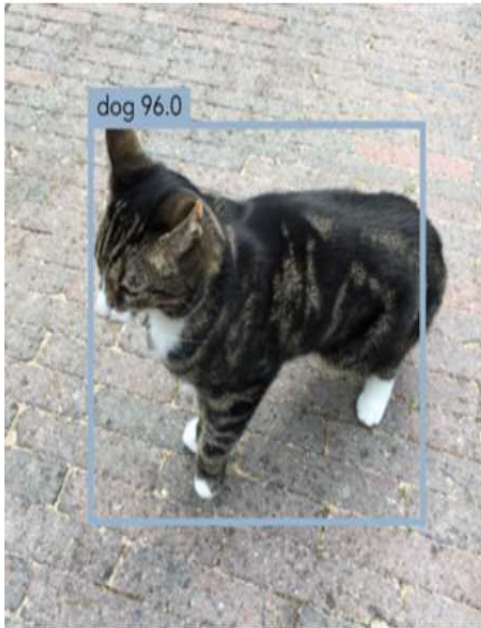




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Questions?



Sales:

icssales@intrepidcs.com
+1 (586) 731-7950 x 2

Technical Support:

icssupport@intrepidcs.com
www.intrepidcs.com/support
+1 (586) 731-7950 x 1

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April 30, 2019



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