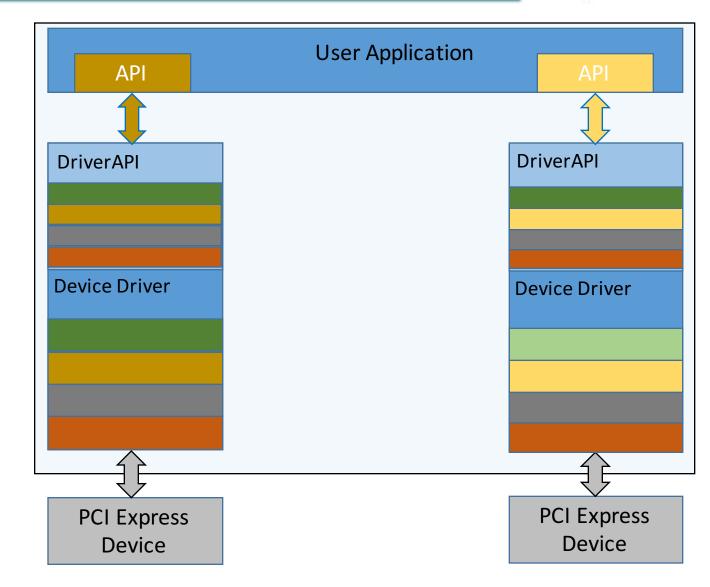
# The universal PCI Express Device Driver for MTCA.4

L.Petrosyan





- Basic PCI Express functionality
  - Mapping memories
  - Read, write and some common ioctl
  - Error handling
  - Hot Plug
- Standards or Guidlines functionalty
  - Standard Registers Set
  - SHAPI Registers Set (PICMG)
  - PICMG Standard Device Model
  - PCIe HotPlug functionality
- Device specific but has common API
  - DMA
- Device specific functionality

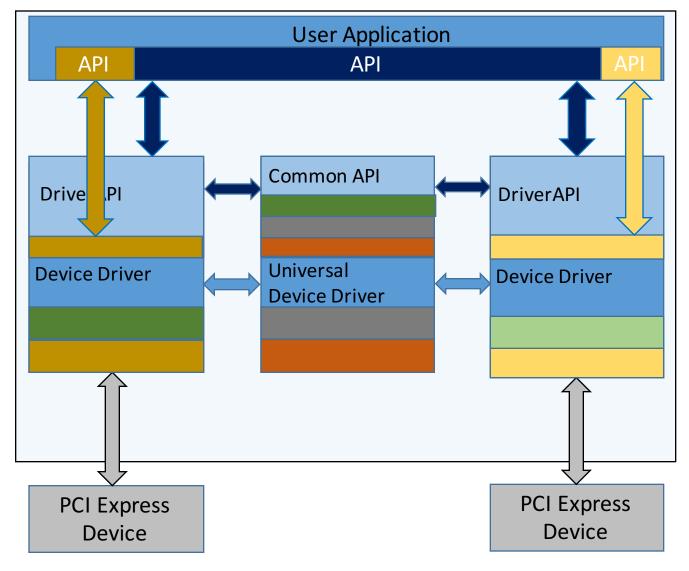








- Split Device Driver into two parts follow the Linux Device Driver stacking Model
- Add all common functionality and API into universal part
  - Basic PCI Express functionality
  - Standards or Guidlines functionalty
- Add Common API for Device specific functionality into universal part but keep functionality in Device Driver side
  - Device specific but has common API





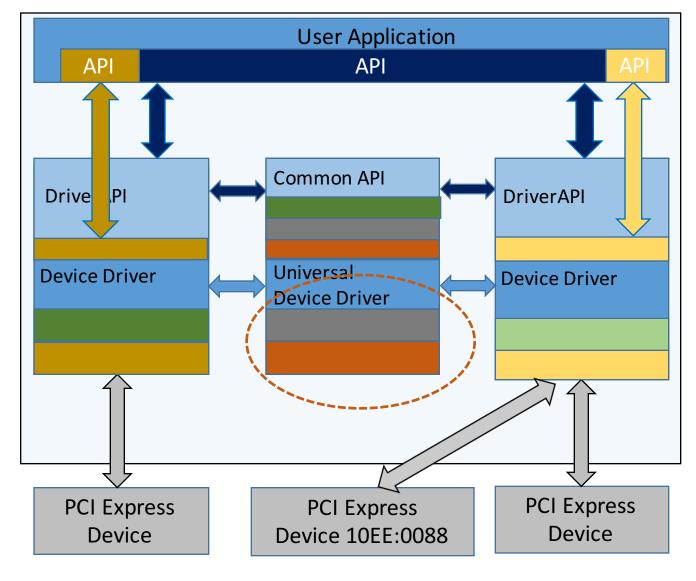




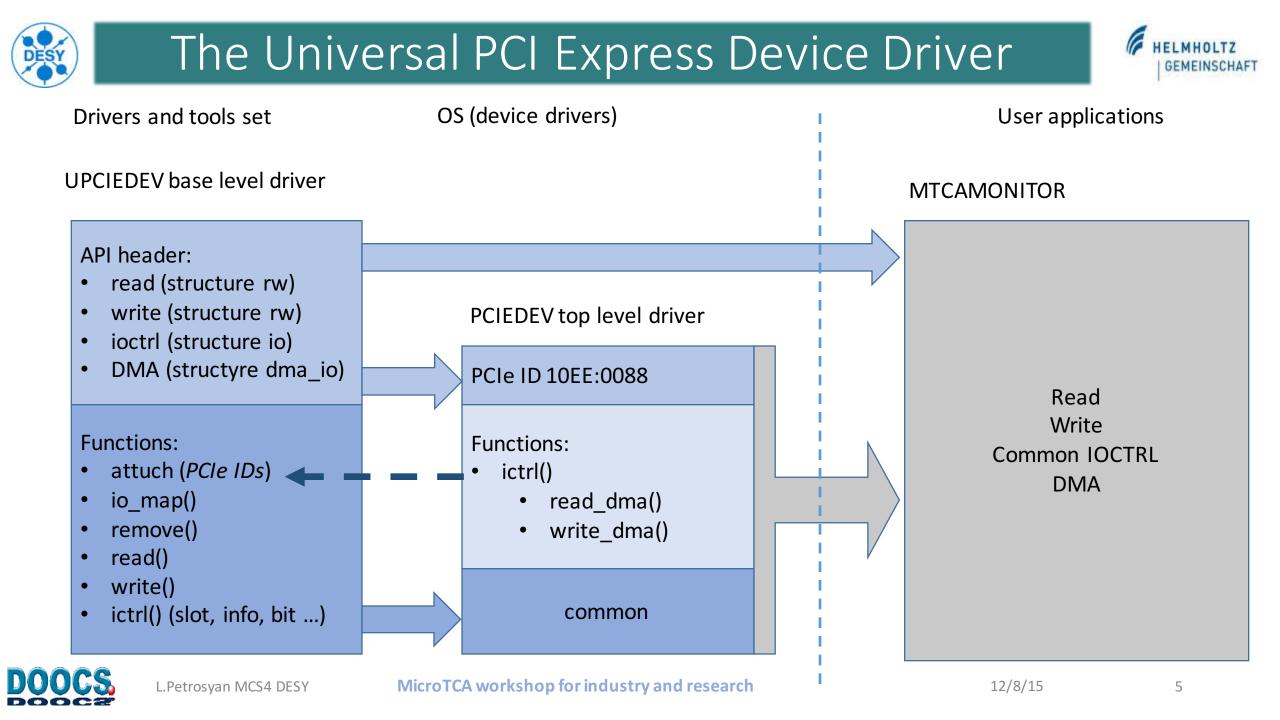
- this approach facilitates creation of new drivers and user applications
- The Device Driver created on the top of *universal* driver has all necessary PCI Express functionalty
- It could be binded to any PCI Express Device

#### echo "10EE:0088" > /sys/bus/devices/xxx/driver/new\_id

 facilitates integration of new devices into the existing software









**mTCA-MONITOR** 



#### MTCAMONITOR

MTCAMONITOR shows all Attached AMC(PCIe) boards And provides read/write access

× _ □ [					MICA-MO	NITOR					Attached	AIVIC(PCIe) bo	ards
	Scan PCIe Bus		R	Run PCIe-Monitor			Rescan Bus		Quit			des read/write	
10 Dev:	11 Dev:	12 Dev:	2 Dev:	3 Dev:	4 Dev:	5 Dev:	6 Dev:	7 Dev:	8 Dev:	9 Dev:			
0000:04:10.0	0000:04:0a.0	0000:04:0b.0		0000:04:01.0	0000:04:00.0	0000:04:08.0	0000:04:09.0	0000:04:13.0		0000:04:11.0			
10b5:8748		10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748		10b5:8748				
	10b5:8748					1		10b5:8748		10b5:8748			
SWITCH ON	SWITCH OFF	SWITCH OFF	SWITCH ON	SWITCH ON	SWITCH OFF	SWITCH OFF	SWITCH ON	SWITCH OFF	SWITCH ON	SWITCH ON			
DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	PCIe Monit	or v2.0		00
	0000:0a:00.0	0000:0c:04.0			0000:05:00.0	0000:08:00.0		0000:10:00.0					
IDs:	IDs:	IDs:	IDs:	IDs:	IDs:	IDs:	IDs:	IDs:	IDs:	Address map:			Browse
	10ee:0020	10b5:9056			1796:0018	10ee:0088		10ee:0088		Device:	/dev/damcbpms6		Browse
	3300:0020	12fe:0600			1796:0018	3300:0088		3300:0088			Bar:	0	
Driver:	Driver:	Driver:	Driver:	Driver:	Driver:	Driver:	Driver:	Driver:	Driver:		Data Mode	32	
	x1timer	NO DRIVER			sis8300	pciedev		pciedev			Offset:	0 Size:	4
	1.8.0				1.4.0	1.6.0		1.6.0			Mask:	0xFFFFFFFF Shift:	0
BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:		Address:		1
	16777215	511			16383	67108863		67108863			Data:	0×0	
	0	255			0	67108863		67108863			Radix:	🔶 Hex 💠 Dec 💠 Bin 💠 Ascii	
	0	65535			0	16777215		16777215			1/0:	Read Write Plot L	ist
	0	0			0	0		0					
	0	0			0	0		0			DMA:	Write Plot List Mb/s	
PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCle-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	P			
Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Status: OK			Quit
INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO				





**X2TIMER MODULE** 

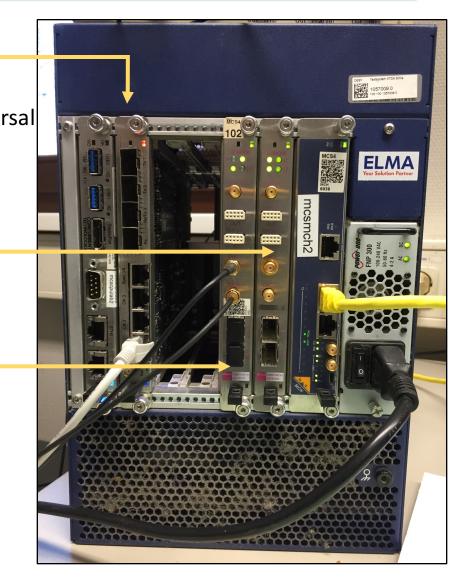
#### The Universal PCI Express Device Driver



FPGA FW based on DESY START\_UP PROJECT Has separate device driver, but based on the universal driver API PCIe ID 10EE:0020

SIS8300 BOARD LCBPM FPGA FW based on DESY START\_UP PROJECT PCIe ID 10EE:0088

SIS8300 DIGITIZER STRUCK FW with DMA R/W PCIe ID 1796:0018, 1796:0019









Switch ON the crate

SIS8300 board with the LCBPM project was binded to pciedev driver.

No drivers for X2TIMER and SIS8300 with the STRUCK FM boards

The "Bind pciedev" button activated for the boards which has no driver binded

We can bind pciedev driver to X2TIMER and SIS8300 boards

	• mTCA-M	ONITOR-pcieh	P										
		Scan PCIe B	us		Run PC	Cle-Monitor			Rescan Bus			Quit	
	1 Dev:	10 Dev:	11 Dev:	12 Dev:	2 Dev:	3 Dev:	4 Dev:	5 Dev:	6 Dev:	7 Dev:	8 Dev:	9 Dev:	9-1 Dev:
	0000:02:01.0	0000:04:10.0	0000:04:0a.0	0000:04:0b.0	0000:04:02.0	0000:04:01.0	0000:04:00.0	0000:04:08.0	0000:04:09.0	0000:04:13.0	0000:04:12.0	0000:02:09.0	0000:04:1
	10b5:8717	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8717	10b5:874
Μ	SWITCH ON	SWITCH ON	SWITCH ON	SWITCH ON	SWITCH OFF	SWITCH ON	SWITCH ON	SWITCH OFF	SWITCH OFF	SWITCH ON	SWITCH ON	SWITCH ON	WITCH ON
v	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI
•	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:
	0000:03:00.0 IDs:	IDs:	IDs:	IDs:	0000:07:00.0 IDs:	IDs:	IDs:	0000:08:00.0 IDs:	0000:09:00.0 IDs:	IDs:	IDs:	IDs:	IDs:
	00:00	iDs:	IDS:	IDS:	10ee:0020	iDs:	iDs:	1796:0018	10ee:0088	TDS:	IDS:	IDS:	IDS:
	00:00				3300:0020			1796:0018	3300:0088				
	Driver:	Driver:	Driver:	Driver:	Driver:	Driver:	Driver:	Driver:	Driver:	Driver:	Driver:	Driver:	Driver:
	NO DRIVER				NO DRIVER			NO DRIVER	pciedev				
									4.0.0				
	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:
									pciedevs6				
	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:
					1048575			16383 0	67108863 67108863				
					0			0	16777215				
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h	·				0		·	0	0				
					0			0	0				
	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W
	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	Cle-monito
C	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	ind pciede
	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO
	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI







Ma cap gat board	• mTCA-M	mTCA-MONITOR-pciehp											•••
We can get board		Scan PCIe B	us		Run P	Cle-Monitor			Rescan Bus			Quit	
information pushing "INFC	1	10	11	12	2	3	4	5	6	7	8	9	9-1
	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:
	0000:02:01.0	0000:04:10.0	0000:04:0a.0	0000:04:0b.0	0000:04:02.0	0000:04:01.0	0000:04:00.0	0000:04:08.0	0000:04:09.0	0000:04:13.0	0000:04:12.0	0000:02:09.0	0000:04:1
	10b5:8717	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8717	10b5:874
	SWITCH ON	SWITCH ON	SWITCH ON	SWITCH ON	SWITCH OFF	SWITCH ON	SWITCH ON	SWITCH OFF	SWITCH OFF	SWITCH ON	SWITCH ON	SWITCH ON	SWITCH ON
	I SPCI	L SPCI	I SPCI	I SPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI
• LSPCI							DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:
Command cat /proc/pciedevs6					Run it	Quit		0000:08:00.0	0000:09:00.0				
command cat/proc/peledevid					Nullic	Quit	IDs:	IDs:	IDs:	IDs:	IDs:	IDs:	IDs:
cat /proc/pciedevs6						A		1796:0018	10ee:0088				
UPCIEDEV Driver Version: 5.1								1796:0018	3300:0088				
Driver Version: 4.0							Driver:	Driver:	Driver:	Driver:	Driver:	Driver:	Driver:
Board NUM: 0						-		NO DRIVER	pciedev				
Slot NUM: 6							DevFile:	DevFile:	4.0.0 DevFile:	DevFile:	DevFile:	DevFile:	DevFile:
Board ID: 2							Devrile.	Devrile.	pciedevs6	Devrile.	Devrie.	Devrile.	Devrile.
Board Version; 1000000							BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:
Board Date: 20120224						-		16383	67108863				
Board HW Ver: 1 Board Next Prj: 0								0	67108863				
Board Reserved: 0								0	16777215				
Number of Proj: 1								0	0				
Project ID: 1								0	0				
Project ID: 1								0	0				
Project Version: 1000000							PCto-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCle-R/W
Project Date: 20120224							PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	Cle-monito
Project Reserver: O Project Next: O							Bind pciedev	Bind pciede	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	ind pciede
in oper nover o							INFO	INFO	INFO	INFO	INFO	INFO	INFO
						7	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI



9





can road fro	m and write	• mTCA-	MONITOR-pciel	hp										Θ
	II and write		Scan PCIe B	Bus		Run PCI	e-Monitor			Rescan Bus			Quit	
oard		1 Dev:	10 Dev:	11 Dev:	12 Dev:	2 Dev:	3 Dev:	4 Dev:	5 Dev:	6 Dev:	7 Dev:	8 Dev:	9 Dev:	
		0000:02:01.0			0000:04:0b.0		0000:04:01.0	0000:04:00.0		0000:04:09.0	0000:04:13.0	0000:04:12.0	0000:02:09.0	000
PCIe Monito	or v2.0					00(	5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8717	10
							ICH ON	SWITCH ON	SWITCH OFF	SWITCH OFF	SWITCH ON	SWITCH ON	SWITCH ON	SWI
Address map:						Browse	SPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	L
Device:	/dev/pciedevs6					Browse	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	
							Ds:	IDs:	0000:08:00.0 IDs:	0000:09:00.0 IDs:	IDs:	IDs:	IDs:	
	Ba	ir:		0	<i>k</i>				1796:0018	10ee:0088	103.	105.	105.	
	Da	ata Mode:		32	2	_	(   ·		1796:0018	3300:0088				
				4	-river:	Driver:	Driver:	Driver:	Driver:	Driver:	Driver:	C		
								NO DRIVER	pciedev				_	
	Ma	ask:	0xFFFFFFFF		Shift:	0	vFile:	DevFile:	DevFile:	4.0.0 DevFile:	DevFile:	DevFile:	DevFile:	De
	Ad	dress:	0x0				-	Devrae.	Devr ne.	pciedevs6	Devrie.	Devrine.	Devrie.	
	Da	ata:	0x626F726	4			ARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	E
	Ra	dix:	• Hex	Dec O Bir	Ascii				16383	67108863				
									0	67108863				
			Deed	14fuites	0				0	16777215 0				-
	1/0	):	Read	Write	Plot List				0	0				-
									0	0				
				[ [ .		-	e-R/W	PCIe-R/W	PCIe-R/W	Fcie-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PC
	DN	MA:	Write	Plot L	ist Mb/sec	: 0	monitor	PCie-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	Cle
	N.I.						pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	ind
							NFO	INFO	INFO	INFO	INFO	INFO	INFO	1
Status: READ F	Status: READ FROM /dev/pciedevs6				Quit	SPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	L	



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mTCA-MONITOR-prieho



#### pciedev driver attached to X2TIMER and SIS8300 boards

	Scan PCIe B	us		Run PC	Cle-Monitor			Rescan Bus			Quit	
1	10	11	12	2	3	4	5	6	7	8	9	9-1
Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:
0000:02:01.0	0000:04:10.0	0000:04:0a.0	0000:04:0b.0	0000:04:02.0	0000:04:01.0	0000:04:00.0	0000:04:08.0	0000:04:09.0	0000:04:13.0	0000:04:12.0	0000:02:09.0	0000:04:
10b5:8717	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8748	10b5:8717	10b5:874
SWITCH ON	SWITCH ON	SWITCH ON	SWITCH ON	SWITCH OFF	SWITCH ON	SWITCH ON	SWITCH OFF	SWITCH OFF	SWITCH ON	SWITCH ON	SWITCH ON	SWITCH O
LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI
DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:	DEV:
0000:03:00.0				0000:07:00.0			0000:08:00.0	0000:09:00.0				
IDs:	IDs:	IDs:	IDs:	IDs:	IDs:	IDs:	IDs:	IDs:	IDs:	IDs:	IDs:	IDs:
00:00				10ee:0020			1796:0018	10ee:0088				
00:00	Driver	Driver	Driver	3300:0020	Driver	D. i	1796:0018	3300:0088	Driver	Driver	Driver	Driver
Driver: NO DRIVER	Driver:	Driver:	Driver:	Driver: pciedev	Driver:	Driver:	Driver: pciedev	Driver: pciedev	Driver:	Driver:	Driver:	Driver:
NO DRIVER				4.0.0			4.0.0	4.0.0				
DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:	DevFile:
				pciedevs2			pciedevs5	pciedevs6				
BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:
				1048575			16383	67108863				
				0			0	67108863				
				0			0	16777215				
				0			0	0				
				0			0	0				
				0			0	0				
PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W
PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	Cle-monit
Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	ind pcied
INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO
LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI



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• PCIe Monitor	PCIe Monitor v2.0									PCIe Mo	nitor v2.0					
Address map:					Browse					Address map:					-	Browse
Device:	/dev/pciedevs2				Browse	Run P	Cle-Monitor			Device:	/dev/pd	ciedevs5				Browse
	Ba	r:		0		2	3	4	5			Bar:		0		
	Da	ta Mode:		32	_	Dev: 0000:04:02.0	Dev: 0000:04:01.0	Dev: 0000:04:00.0	Dev: 0000:04:08.0			Data Mod	e:	32	2	-
	Off	fset: 0		Size:	4	10b5:8748	10b5:8748	10b5:8748	10b5:8748			Offset:	0		Size:	4
	Ma	la de la companya de	FFFFFFF	Shift:	0	SWITCH OFF	SWITCH ON	SWITCH ON	SWITCH OFF			Mask:	0xFFFFFFF	F	Shift:	0
		dress: 0x0				LSPCI	LSPCI	LSPCI	LSPCI			Address:	0x0			
	Da	and the second se	424F5244	<b>D</b> I- C •"								Data:	0x830014			
	Ra	dix: •	Hex O Dec O	Bin C Ascii		DEV:	DEV:	DEV:	DEV:			Radix:	• Hex	Dec 🔿 Bir	Ascii	
	1/0		Read Write	Plot List	1	0000:07:00.0 IDs:	IDs:	IDs:	0000:08:00.0 IDs:			10	Band			1
	.,.	•	White			10ee:0020	103.	TDS.	1796:0018			I/O:	Read	Write	Plot List	
						3300:0020			1796:0018							
	DM	1A:	Write Plot	List Mb/sec	: 0	Driver:	Driver:	Driver:	Driver:			DMA:	Write	Plot L	ist Mb/sec:	0
		-				pciedev			pciedev							
					-	4.0.0	DevFile:	DevFile:	4.0.0 DevFile:			p.e.				
Status: READ FRO	OM /dev/pciedevs2				Quit	DevFile: pciedevs2	DevFile:	DevFile:	pciedevs5	Status: REA	D FROM /dev/pc	iedevs5				Quit
						BARs:	BARs:	BARs:	BARs:							
						1048575			16383	67108863						
						0			0	67108863						
						0			0	16777215						
						0		ļ	0	0		· · · · · · · · · · · · · · · · · · ·				
\						0			0	0						
We can re	ead	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIE-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W		
from and	write	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	Cle-monito		
to the boa	arda	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	ind pciede		
	arus	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO		
		LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI		







#### Custom drivers:

X1TIMER driver: Separate driver created does not use the upciedev functionality but based on the upciedev API.

SIS8300 driver: Based on the upciedev driver added only IOCTRL for DMA.

SIS8300 LCBPM project: pciedev driver.

Three different boards, three Drivers one user application.

	Scan PCIe B	IS		Run PC	Cle-Monitor			Rescan Bus			Quit	
		(					1					T
1	10	11	12	2	3	4	5	6	7	8	9	9-1
Dev:	Dev:											
0000:02:01.0	0000:04:10.0	0000:04:0a.0	0000:04:0b.0	0000:04:02.0	0000:04:01.0	0000:04:00.0	0000:04:08.0	0000:04:09.0	0000:04:13.0	0000:04:12.0	0000:02:09.0	0:0000
10b5:8717	10b5:8748	10b5:8717	10b5:8									
SWITCH ON	SWITCH ON	SWITCH ON	SWITCH ON	SWITCH OFF	SWITCH ON	SWITCH ON	SWITCH OFF	SWITCH OFF	SWITCH ON	SWITCH ON	SWITCH ON	SWITCH
LSPCI	LSPC											
DEV:	DEV											
0000:03:00.0				0000:07:00.0			0.00:08:00.0	0000:09:00.0				
IDs:	IDs:											
00:00				10ee:0020			1796:0018	10ee:0088				
00:00				3300:0020			1796:0018	3300:0088				
Driver:	Drive											
NO DRIVER				x1timer			sis8300	pciedev				
				3.5.0			4.0.0	4.0.0				
DevFile:	DevFi											
				x2timers2			sis8300s5	pciedevs6				
BARs:	BAR											
				1048575			16383	0				-
				0			0	0				
				0			0	0				
				0			0	0				-
				0			0	0				
PCIe-R/W	PCIe-R											
PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCle-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	Cle-mo
Bind pciedev	ind pci											
INFO	INFO											
LSPCI	LSPC											







PCIe Monitor	v2.0			008	• PCle	Monitor v2.0				008	• PCIe	Monitor v2.0				000
Address map:				Browse	Address ma	ap:				Browse	Address m	iap:				Browse
Device:	/dev/x2timers	2		Browse	Device:	/dev/si	s8300s5			Browse	Device:		pciedevs6			Browse
	E	Bar:	0	_	ION		Bar:		0	-			Bar:		0	
	0	Data Mode:	32	_			Data Mode:		32				Data Mode	:	32	_
	0	Offset:	0 Size:	4			Offset:	0	Size:	4			Offset:	0	Size:	4
	S	Mask:	And the second	0	Î 🗌		Mask:	0xFFFFFFFF	Shift:	0			Mask:	0xFFFFFFFF	Shift:	0
		Address:	0x0				Address:	0x0					Address:	0x0		
		Data: Radix:	0x424F5244		00		Data: Radix:	0x83001405	C Bin C Ascii		000		Data:	0x626F7264		
		duix.	Hex Dec Dill Asci		1		Naux.	inex in Dec	- Dill Asci		10		Radix:	• Hex 🔿 De	ec O Bin O Ascii	
	1,	/O:	Read Write Plot List		51		I/O:	Read W	rite Plot Lis	t	SW		I/O:	Read	Write Plot L	ist
		DMA:	Write Plot List Mb/sec	: 0			DMA:	Write Pl	ot List Mb/see	::   <b>0</b>	000		DMA:	Write	Plot List Mb/s	ec: 0
Status: READ ERO	OM /dev/x2timers2	,		Quit	Status:	READ FROM /dev/sis	58300s5			Quit	Chatura	READ FROM /dev/	sideuse			Quit
Status. news rite				Quit							17	READ FROM /dev/	pciedevso			Quit
							-				17					
				Driver:	Driver:	Driver:	Driver:	Driver:	Driver:	Drive:	Driver:	Driver:	Driver:	Driver:	Driver:	Driver:
				NO DRIVER				x1timer			sis8300	pciedev				
				DevFile:	DevFile:	DevFile:	DevFile:	3.5.0 DevFile:	DevFile:	DevFile:	4.0.0 DevFile:	4.0.0 DevFile:	DevFile:	DevFile:	DevFile:	DevFile:
W/o ha	vo roac	1/writ	te access	Devrile.	Devrile.	Devrine.	Devrine.	x2timers2	Devrine.	Devrile.	sis8300s5	pciedevs6	Devrine.	Devrile.	Devrile.	Devrile.
vvena	vereau	1/ VV I I	le alless	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs:	BARs.	BARs:	BARs:	BARs:
to the	boards							1048575			16383	0				
	bounds							0			0	0				
								0			0	0				
								0			0	0				
								0			0	0				
								0			0	0				
				PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCie-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W	PCIe-R/W
				PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	PCIe-monitor	Cle-monito
				Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	ind pciede
				INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO	INFO
				LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI	LSPCI







LSPCI Command cat /proc/sis8300s5		Run it Quit					LSP Comman	cat /proc/pciede	2V56				Run it Quit
cat /proc/sis8300s5 UPCIEDEV Driver Version: 5.1 Driver Version: 4.0 Board NUM: 0 Slot NUM: 5			1p us		Run P	Cle-Monitor	cat /proc UPCIEDEV Driver Ve Board NUM	c/pciedevs6 Driver Version: ersion: 4.0					
Board ID: 83001405 Board Version; 0 Board Date: 0 Board HW Ver: 66 Board Next Prj: 0 Board Reserved: 0 Number of Proj: 0			11 Dev: 0000:04:0a.0 10b5:8748 SWITCH ON	12 Dev: 0000:04:0b.0 10b5:8748 SWITCH ON	2 Dev: 0000:04:02.0 10b5:8748 SWITCH OFF	3 Dev: 0000:04:01.0 10b5:8748 SWITCH ON	Board ID: Board Ver Board Dat Board HW 0000 Board Nei 10b Board Res	: 0 rsion; 0 te: 0 Ver: 0 xt Pri: 0					
			LSPCI DEV:	LSPCI DEV: IDs:	LSPCI DEV: 0000:07:00.0 IDs:	LSPCI DEV: IDs:							
We could get all information	00:00 00:00 Driver: NO DRIVER	Driver:	Driver	Driver:	10ee:0020 3300:0020 Driver: x1timer	Driver:	Driver:	1796:0018 1796:0018 Driver: sis8300	10ee:0088 3300:0088 Driver: pciedev	Driver:	Driver:	Driver:	Driver:
-	DevFile: BARs:	DevFile:	DevFile:	Devi ile: BARs:	3.5.0 DevFile: x2timers2 BARs:	DevFile: BARs:	DevFile: BARs:	4.0.0 DevFile: sis8300s5 BARs:	4.0.0 DevFile: pciedevs6 BARs:	Devrile:	DevFile: BARs:	DevFile: BARs:	DevFile: BARs:
					1048575 0 0 0			16383 0 0 0	0 0 0 0				
	PCIe-R/W PCIe-monitor	PCIe-R/W PCIe-monitor	PCIe-R/W PCIe-monitor	PCIe-R/W PCIe-monitor	0 0 PCIe-R/W PCIe-monitor	PCIe-R/W PCIe-monitor	PCIe-R/W PCIe-monitor	0 0 PCIe-R/W PCIe-monitor	0 0 PCIe-R/W PCIe-monitor	PCIe-R/W PCIe-monitor	PCIe-R/W PCIe-monitor	PCIe-R/W PCIe-monitor	PCIe-R/W
	Bind pciedev	Bind pciedev	-	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind pciedev	Bind priedev	Bind pciedev	Bind pciedev	Bind pciedev	ind pciede
	INFO LSPCI	INFO LSPCI	INFO LSPCI	INFO LSPCI	INFO LSPCI	INFO LSPCI	INFO LSPCI	INFO LSPCI	INFO LSPCI	INFO LSPCI	INFO LSPCI	INFO LSPCI	INFO LSPCI







#### Fast access to lspci for current mTCA-MONITOR-pciehp board Scan PCIe Bus **Run PCIe-Monitor Rescan Bus** Quit 10 11 12 2 3 9-1 4 5 6 7 8 9 LSPCI 000 Dev: 00:04:0b.0 0000:04:02.0 0000:04:01.0 0000:04:00.0 0000:04:08.0 0000:04:09.0 0000:04:13.0 0000:04:12.0 0000:02:09.0 0000:04:1 Command Ispci -vvvv -s 0000:08:00 Quit Run it 0b5:8748 10b5:8748 10b5:8748 10b5:8748 10b5:8748 10b5:8748 10b5:8748 10b5:8748 10b5:8717 10b5:874 lspci -vvvv -s 0000:08:00 WITCH ON SWITCH OFF SWITCH ON SWITCH OFF SWITCH OFF SWITCH ON SWITCH ON SWITCH ON WITCH ON SWITCH ON 08:00.0 Communication controller: Research Centre Juelich Device 0018 Subsystem: Research Centre Juelich Device 0018 LSPCI Physical Slot: 5 Control: I/O+ Mem+ BusMaster+ SpecCycle- MemWINV- VGASnoop- ParErr- Stepping- SERR- FastB2B- DisINTx+ Status: Cap+ 66MHz- UDF- FastB2B- ParErr- DEVSEL=fast >TAbort- <TAbort- <MAbort- >SERR- <PERR- INTx-DEV: DEV: DEV: DEV: DEV: DEV: DEV: DEV: DEV: DEV: Latency: 0, Cache Line Size: 64 bytes 0000:07:00.0 0.00:08:00.0 0.00:09:00.0 Interrupt: pin A routed to IRO 89 Region 0: Memory at b9000000 (32-bit, non-prefetchable) [size=16K] IDs: Expansion ROM at b9e00000 [disabled] [size=1M] 10ee:0020 1796:0018 10ee:0088 Capabilities: [40] Power Management version 3 3300:0020 1796:0018 3300:0088 Flags: PMEClk- DSI- D1- D2- AuxCurrent=OmA PME(D0-, D1-, D2-, D3hot-, D3cold-) Status: DO NoSoftRst- PME-Enable- DSel=O DScale=O PME-Driver: Driver: Driver: Driver: Driver: Driver: Driver: Driver: Driver: Driver: Capabilities: [48] MSI: Enable+ Count=1/1 Maskable- 64bit+ x1timer sis8300 pciedev Address: 00000000fee00758 Data: 0000 3.5.0 4.0.0 4.0.0 Capabilities: [60] Express (v1) Endpoint, MSI 00 DevCap: MaxPayload 512 bytes, PhantFunc 1, Latency LOs unlimited, L1 unlimited DevFile: ExtTag+ AttnBtn- AttnInd- PwrInd- RBE+ FLResetx2timers2 sis8300s5 pciedevs6 DevCtl: Report errors: Correctable- Non-Fatal- Fatal- Unsupported-RlxdOrd+ ExtTag- PhantFunc- AuxPwr- NoSnoop+ BANS: BARs: BARs: BARs: BARs: BARs: BARs: BARs: BARs: BARs: MaxPayload 256 bytes, MaxReadReq 512 bytes 1048575 16383 0 DevSta: CorrErr- UncorrErr- FatalErr- UnsuppReg- AuxPwr- TransPend-LnkCap: Port #0, Speed 2.5GT/s, Width x4, ASPM LOs, Latency L0 unlimited, L1 unlimited 0 0 0 ClockPM- Surprise- LLActRep- BwNot-0 0 LnkCtl: ASPM Disabled; RCB 64 bytes Disabled- Retrain- CommClk-0 0 0 ExtSynch- ClockPM- AutWidDis- BWInt- AutBWInt-LnkSta: Speed 2.5GT/s, Width x4, TrErr- Train- SlotClk+ DLActive- BWMgmt- ABWMgmt-0 0 0 Capabilities: [100 vl] Device Serial Number 00-00-00-00-00-00-00-00 0 0 0 Kernel driver in use: sis8300 Kernel modules: sis8300 PCIe-R/W PCIe-R/W PCIe-R/W PCIe-monitor PCIe-monitor PCIe-monitor INFO INFO INFO

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LSPCI





Fast access to Ispci for curre	nt • mtca-m	IONITOR-pcieł	ιp										<b>98</b>
MCH PCIe Switch port		Scan PCIe B			Run P	Cle-Monitor			Rescan Bus			Quit	
	1	10	11	12	2	3	4	5	6	7	8	9	9-1
	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:	Dev:
• LSPCI	00000000000	00000410.0		0b.0	0000:04:02.0	0000:04:01.0	0000:04:00.0	0000:04:08.0	0000:04:09.0	0000:04:13.0	0000:04:12.0	0000:02:09.0	0000:04:1
Command Ispci -vvvv -s 0000:04:08.0			Rur	n it Quit 48	10b5:8748	10b5:8717	10b5:874						
lspci -vvvv -s 0000:04:08.0				ON	SWITCH OFF	SWITCH ON	SWITCH ON	SWITCH OFF	SWITCH OFF	SWITCH ON	SWITCH ON	SWITCH ON	WITCH ON
04:08.0 PCI bridge: PLX Technology, Inc. Device 8748 (rev ba) (prog-if 00 [Normal de Control: I/O+ Mem+ BusMaster+ SpecCycle - MemMINV- VGASnoop- ParErr- Stepping Status: Cap+ 66MHz- UDF- FastB2B- ParErr- DEVSEL=fast >TAbort- <tabort- <tabort-="" <tabort-<tabort-<tabort-<taboft="">Tabort- <tabort-<tabort-<tabort-<tabort-<tabort-<taboft>Tabort- <tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabott-<tabort-<tabott-<tabott-<tabort-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<t< td=""><td><ul> <li>SERR- FastB2B- DisI</li> </ul></td><td>NTx+ Tx-</td><td></td><td></td><td>LSPCI</td><td>LSPCI</td><td>LSPCI</td><td>LSPCI</td><td>LSPCI</td><td>LSPCI</td><td>LSPCI</td><td>LSPCI</td><td>LSPCI</td></tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabort-<tabott-<tabort-<tabott-<tabott-<tabort-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<tabott-<t<></tabort-<tabort-<tabort-<tabort-<tabort-<taboft></tabort->	<ul> <li>SERR- FastB2B- DisI</li> </ul>	NTx+ Tx-			LSPCI	LSPCI							
Bus: primary=04, secondary=08, subordinate=08, sec-latency=0 I/O behind bridge: 0000f000-00000fff					DEV:	DEV:							
Memory behind bridge: b9000000-b90fffff Prefetchable memory behind bridge: 0000000b9e00000-0000000ba0fffff					0000:07:00.0	DEV.	ULV.	0000:08:00.0	0000:09:00.0	DEV.	DEV.	DEV.	DEV.
Secondary status: 66MHz- FastB2B- ParErr- DEVSEL=fast >TAbort- <tabort- <mab<br="">BridgeCtl: Parity- SERR- NoISA- VGA- MAbort- &gt;Reset- FastB2B-</tabort->	ort- <serr- <perr-<="" td=""><td></td><td></td><td></td><td>IDs:</td><td>IDs:</td><td>IDs:</td><td>IDs:</td><td>IDs:</td><td>IDs:</td><td>IDs:</td><td>IDs:</td><td>IDs:</td></serr->				IDs:	IDs:							
PriDiscTmr- SecDiscTmr- DiscTmrStat- DiscTmrSERREn- Capabilities: [40] Power Management version 3					10ee:0020			1796:0018	10ee:0088				
Status: D0 NoSoftRst+ PME-Enable- DSel=0 DScale=0 PME-	Flags: PMEClk- DSI- Dİ- D2- AuxCurrent=0mA PME(D0+,D1-,D2-,D3hot+,D3cold+) Status: DO NoSoftRst+ PME-Enable- DSel=O DScale=O PME-								3300:0088				
Capabilities: [48] MSI: Enable+ Count=1/8 Maskable+ 64bit+ Address: 00000000fee00518 Data: 0000 Masking: 000000fe Pending: 00000000				:	Driver:	Driver:							
Capabilities: [68] Express (v2) Downstream Port (Slot+), MSI 00 DevCap: MaxPayload 512 bytes, PhantFunc 0, Latency LOs <64ns, L1 <1u:					xitimer			sis8300	pciedev				
ExtTag. RBE+ FLReset- DevCtl: Report errors: Correctable- Non-Fatal- Fatal- Unsupported-	5				3.5.0			4.0.0	4.0.0				
RlxdOrd+ ExTag- PhantFunc- AuxPwr- NoSnoop+ MaxPayload 256 bytes, MaxReadReq 128 bytes				e:	DevFile:	DevFile:							
DevSta: CorrErr+ UncorrErr- FatalErr- UnsupPReq+ AuxPwr- TransPend- LnkCap: Port #8, Speed unknown, Width x4, ASPM LOs L1, Latency L0 <4	us. Ll <4us				x2timers2			sis8300s5	pciedevs6				
ClockPM- Surprise+ LLActRep+ BwNot+ LnkCtl: ASPM Disabled; Disabled- Retrain- CommClk-				:	BARs:	BARs:							
ExtSynch- ClockPM- AutWidDis- BWInt- AutBWInt- LnkSta: Speed 2.5GT/s, Width x4, TrErr- Train- SlotClk- DLActive+ BW	Mgmt+ ABWMgmt-				1048575			16383	0				
SltCap: AttnBtn+ PwrCtrl+ MRL+ AttnInd- PwrInd- HotPlug+ Surprise- Slot #5, PowerLimit 25.000W; Interlock- NoCompl-					0			0	0				
SltCtl: Enable: AttnBtn+ PwrFlt- MRL+ PresDet+ CmdCplt+ HPIrq+ LinkCl Control: AttnInd Unknown, PwrInd Unknown, Power- Interlock-	hg-				0			0	0				
SltSta: Status: AttnBtn- PowerFlt- MRL- CmdCplt- PresDet+ Interlock- Changed: MRL- PresDet- LinkState-					0			0	0				
DevCap2: Completion Timeout: Not Supported, TimeoutDis- ARIFwd+ DevCtl2: Completion Timeout: 50us to 50ms, TimeoutDis- ARIFwd-					0			0	0				
LnkCtl2: Target Link Speed: Unknown, EnterCompliance- SpeedDis-, Sel Transmit Margin: Normal Operating Range, EnterModifiedCompl:		- 6dB			0			0	0				
Compliance De-emphasis: -6dB LnkSta2: Current De-emphasis Level: -3.5dB Capabilities: [a4] Subsystem: PLX Technology, Inc. Device 8748				VV	PCIe-R/W	PCIe-R/W							
Capabilities: [100 v1] Device Serial Number ba-87-00-10-b5-df-0e-00 Capabilities: [fb4 v1] Advanced Error Reporting UESta: DLP- SDES-TLP- FOP- CmpltT0- CmpltAbrt- UnxCmplt- RxOF- Mal	fTLP- ECRC- UnsupReq-	ACSViol-		itor	PCIe-monitor	Cle-monito							
UEMek: DLP- SDES-TLP-FCP-CmpltTO-CmpltAbrt-UnxCmplt-RoOF-Mal UESvrt: DLP+SDES+TLP-FCP+CmpltTO-CmpltAbrt-UnxCmplt-RoOF+Mal CESta: RxErr-BadTLP-BadDLLP-Rollover-Timeout-NonFatalErr+	fTLP- ECRC- UnsupReq- fTLP+ ECRC- UnsupReq-	ACSViol- ACSViol-		dev	Bind pciedev	ind pciede							
CEMsk: RxErr- BadTLP- BadDLLP- Rollover- Timeout- NonFatalErr+ AERCap: First Error Pointer: 1f, GenCap+ CGenEn- ChkCap+ ChkEn- Capabilities: [138 v]] Power Budgeting					INFO	INFO							
Capabilities: [lOc v1] #19					LSPCI	LSPCI							

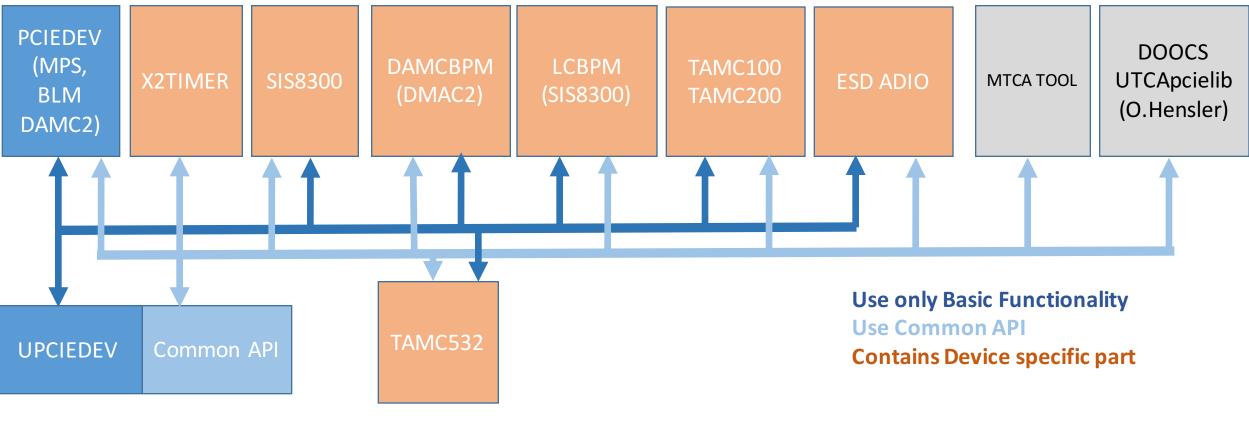






#### Status

- this architecture was developed in DESY group MCS4 and till today with success is used
- the following drivers, tools and libraries are developed used







#### THANK YOU

