



Akademia ProAV²

USB typu C, 3.0, 4.0 – rozwój standardu USB + sygnał USB – jak przedłużyć?

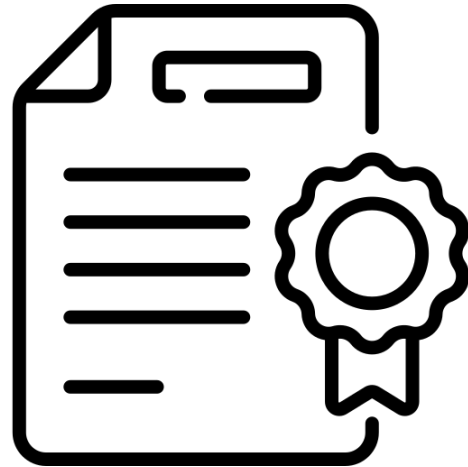
| Kamil Węglarz

| Maciej Rychta

| Adam Kaczmarek

Akademia Pro AV [┌] [┐]
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Akademia Pro AV ² to:





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ATEN
Akademia Pro AV 2

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USB typu C, 3.0, 4.0 – rozwój
standardu USB + Sygnał USB – jak
przedłużyć?



Pamiętaj, aby potwierdzić
swoją obecność!

informacje

exclusive-networks.com/pl/akademia-proav/

akademiaproav@exclusive-networks.pl

Partner
technologiczny



Kurs Signal Management

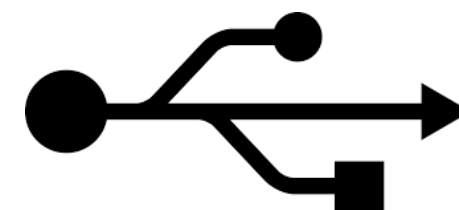
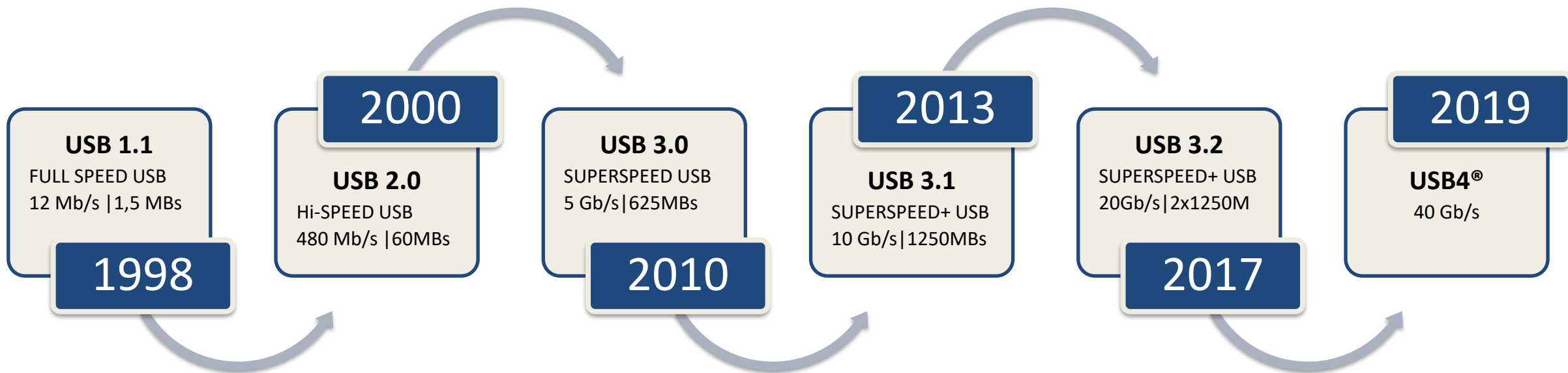
USB typu C, 3.0, 4.0
– rozwój standardu USB
+ sygnał USB – jak przedłużyć?

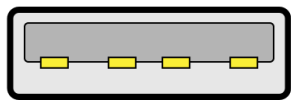


Miesiąc	Temat	data
Luty	Wprowadzenie do dystrybucji sygnału – Podstawowe terminy i technologie	23.02
Marzec	HDCP, EDID, CEC i inne ciężkie terminy, które warto znać	23.03
Kwiecień	Sygnał AV – jak przedłużyć i na co zwrócić uwagę?	20.04
Maj	Zarządzanie sygnałem AV – matryce, splittery, switchery	18.05
Czerwiec	USB typu C, 3.0, 4.0 – rozwój standardu USB + Sygnał USB – jak przedłużyć?	15.06
Lipiec	Wolne 🌴🌞	
Sierpień	Bezprzewodowość w sali konferencyjnej – omówienie różnych ścieżek	TBA
Wrzesień	KVM – warty uwagi kawałek rynku	TBA
Październik	Pamiętajmy o audio w sali konferencyjnej	TBA
Listopad	Jeden by wszystkimi rządzić – czyli sterowanie urządzeniami w sali konferencyjnej	TBA
Grudzień	Streaming treści –wprowadzenie i technologie	TBA

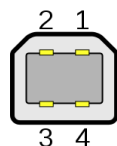
Universal Serial Bus



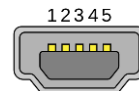
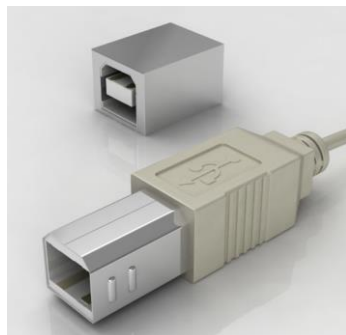




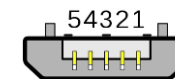
1 2 3 4
Typ-A



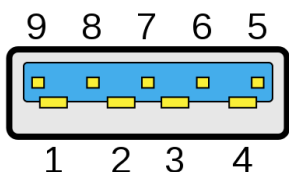
2 1
3 4
Typ-B



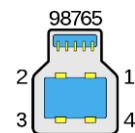
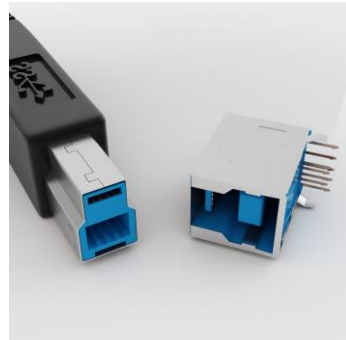
12345
Mini-A



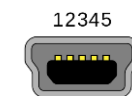
54321
Micro-B



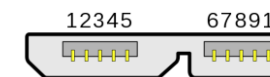
9 8 7 6 5
1 2 3 4
Typ-A Super Speed



98765
2 1
3 4
Typ-B Super Speed



12345
Mini-B



12345 678910
Micro-B Super Speed



USB 2.0



USB 3.2



USB4[®]



USB 2.0

USB 3.2

USB4[®]

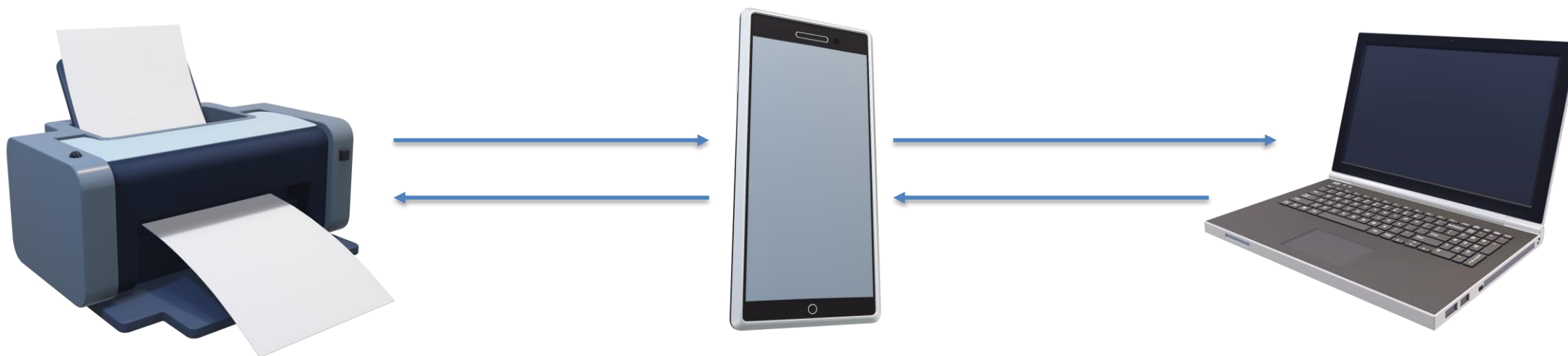
USB Performance-only Packaging Logos and Cable and Port Logos



USB Device Power Port Logos



- ✓ USB OTG – On the GO – urządzenie mobilne jako host
- ✓ Attach Detection Protocol (ADP)
- ✓ Session Request Protocol (SRP)
- ✓ Host Negotiation Protocol (HNP)
- ✓ Role Swap Protocol (RSP) – USB 3.x

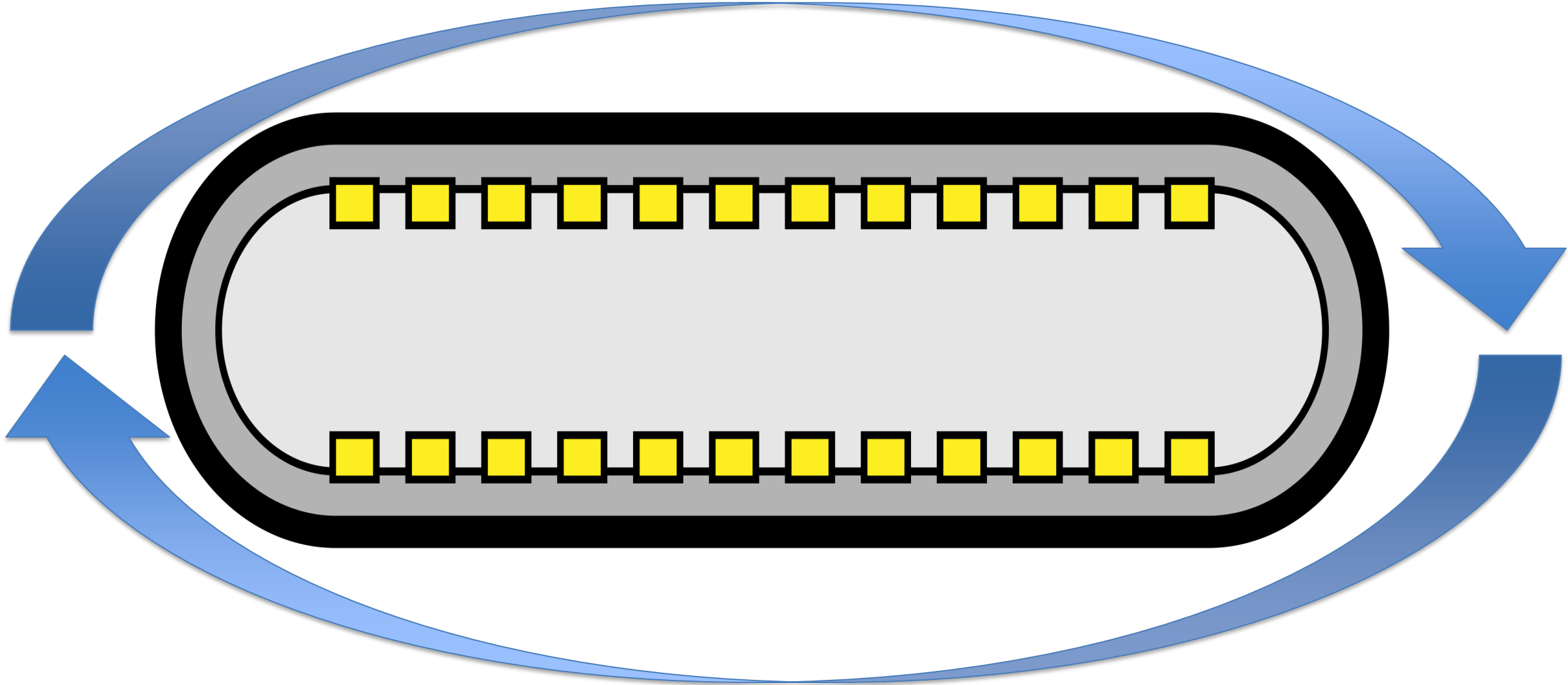


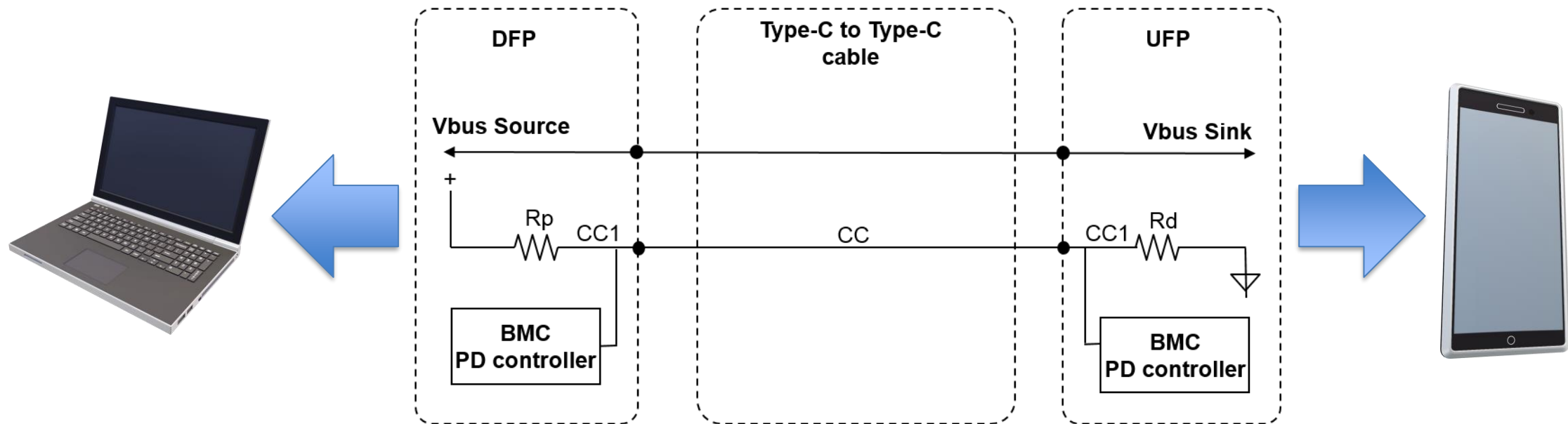
OTG Device

- ✓ USB Dual Role – czyli OTG dla USB-C
- ✓ DFP – downstream-facing port
- ✓ UFP – upstream facing port



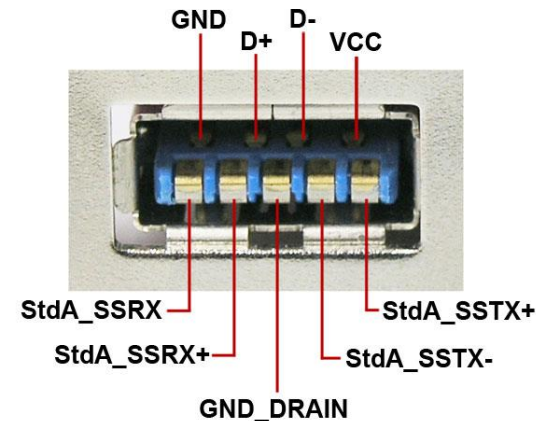
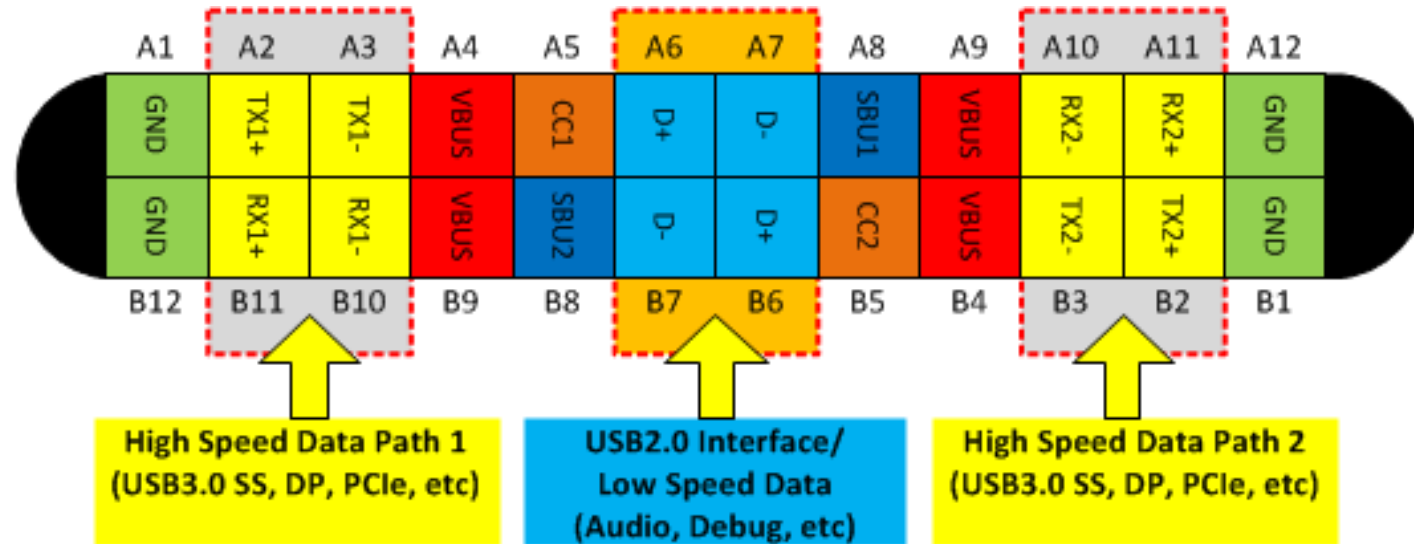
Urządzenie DRD
(Dual Role Device)



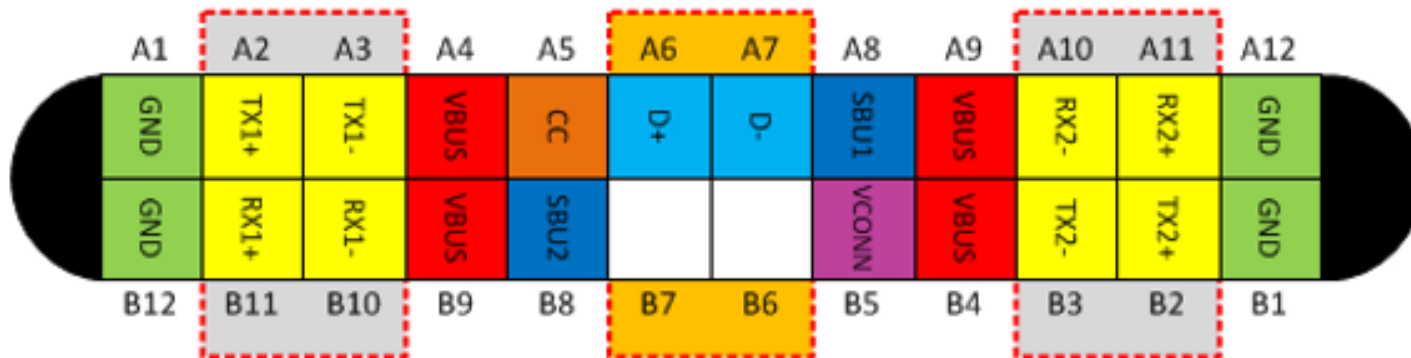


USB Type-C - pinout

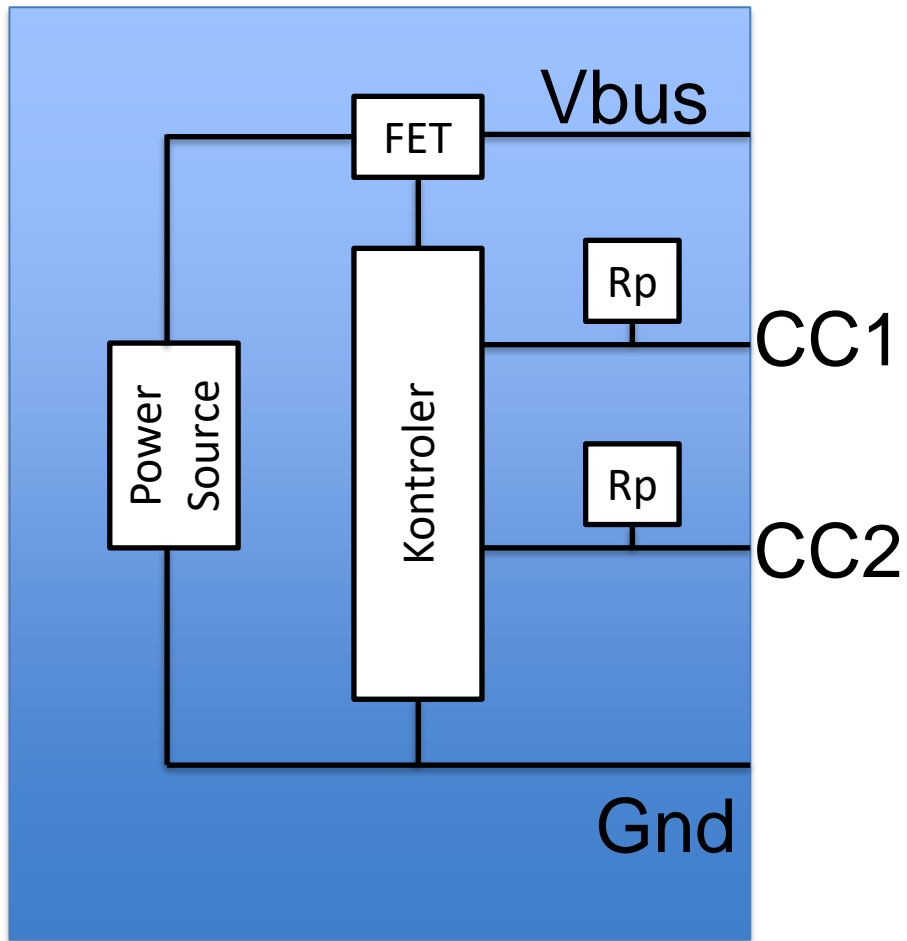
Gniazdo



Wtyczka

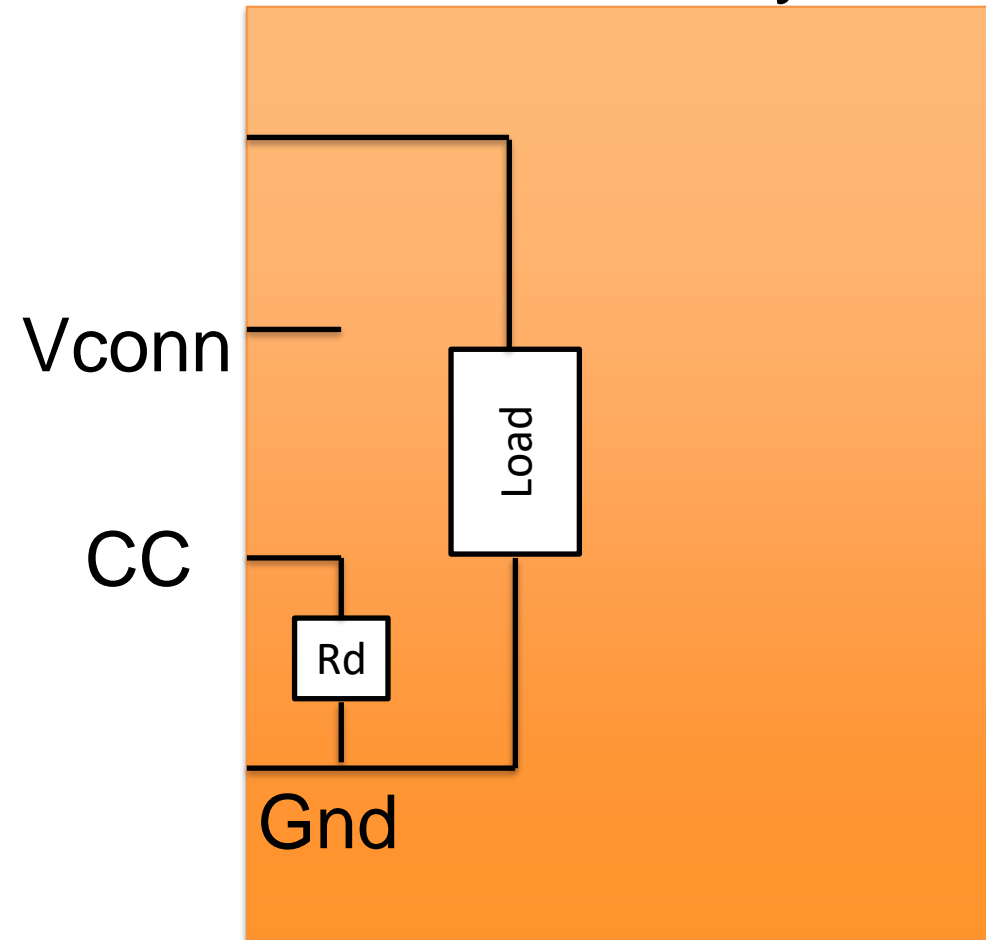


DFP Gniazdo

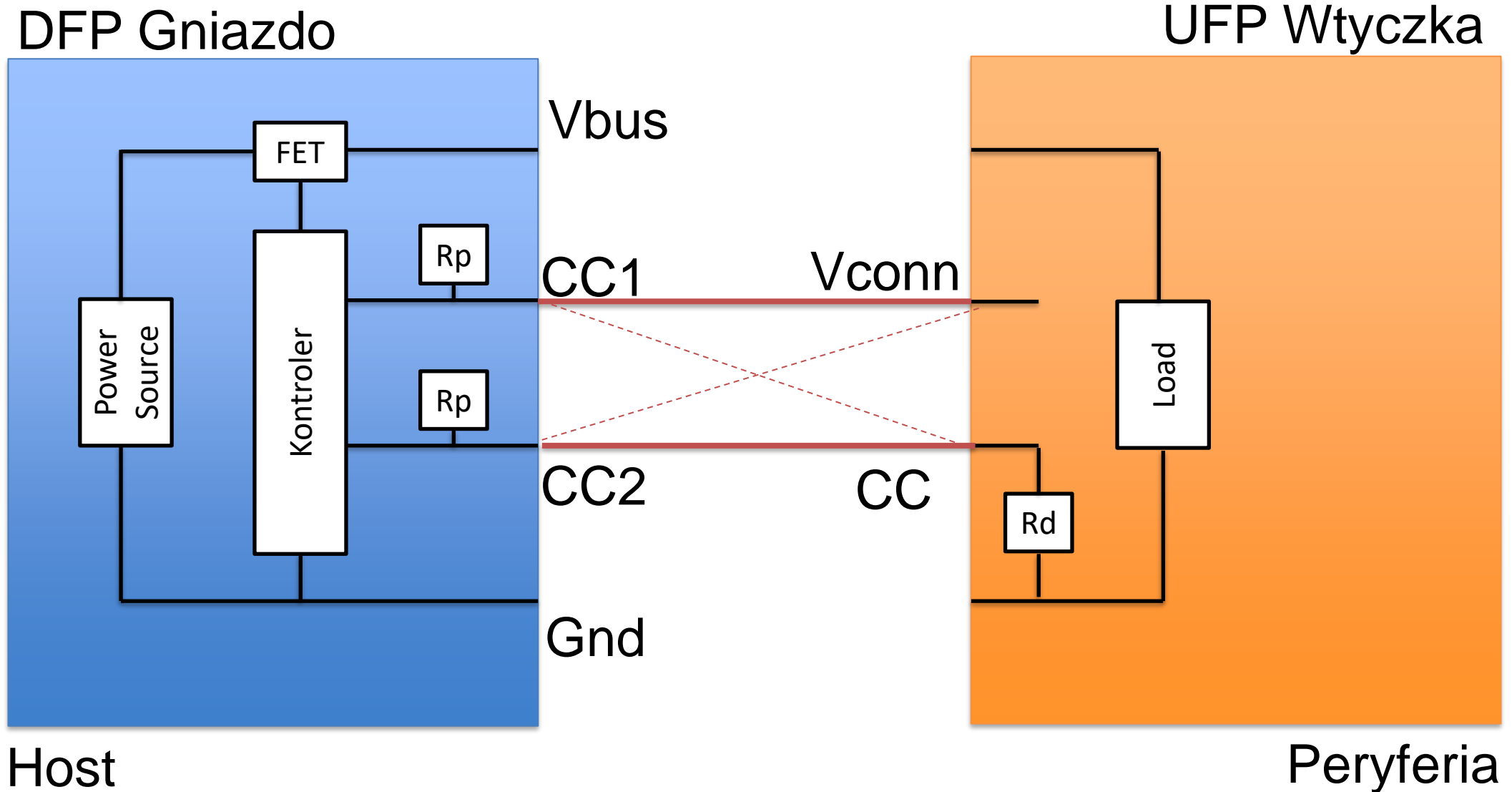


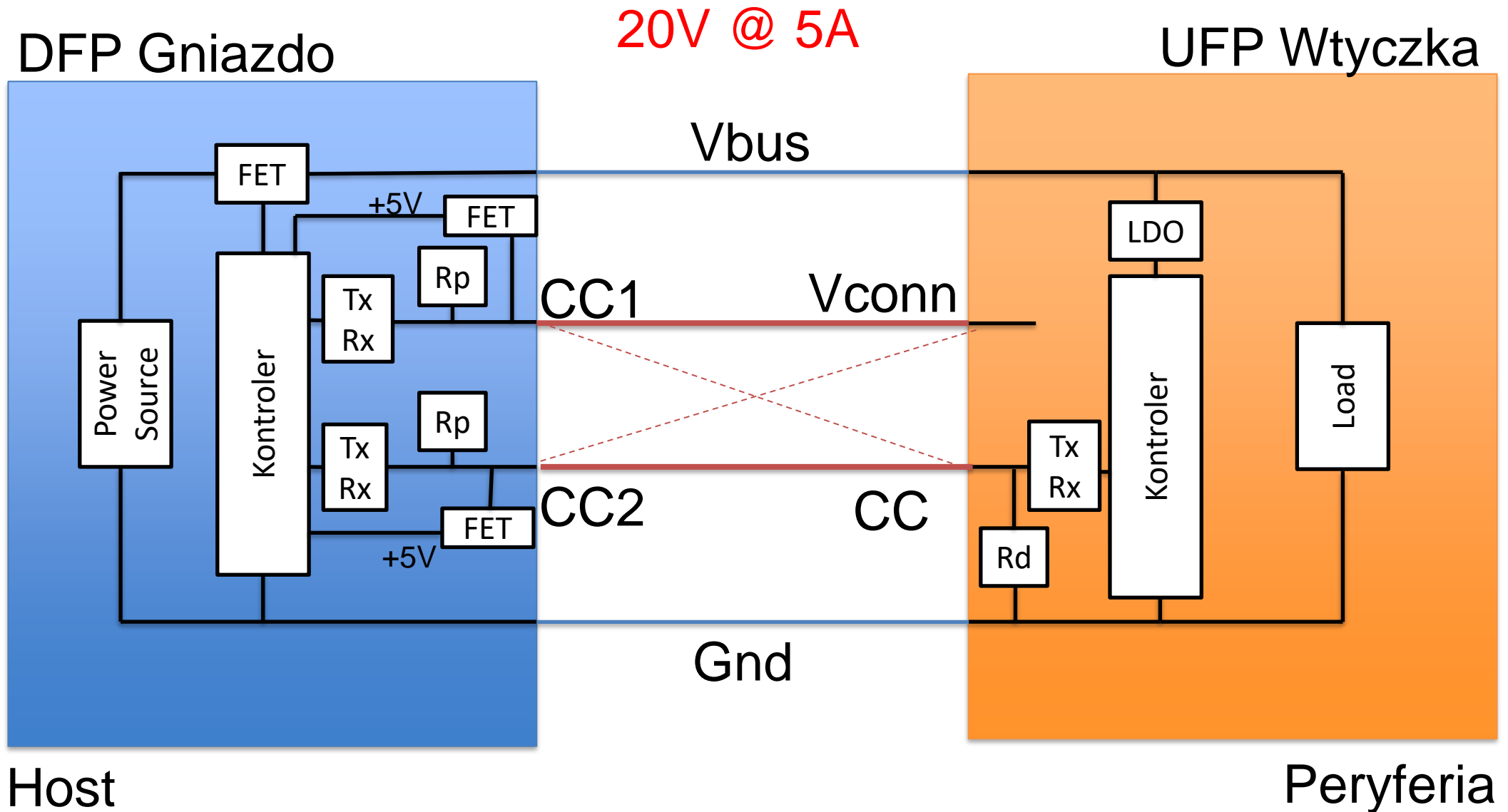
Host

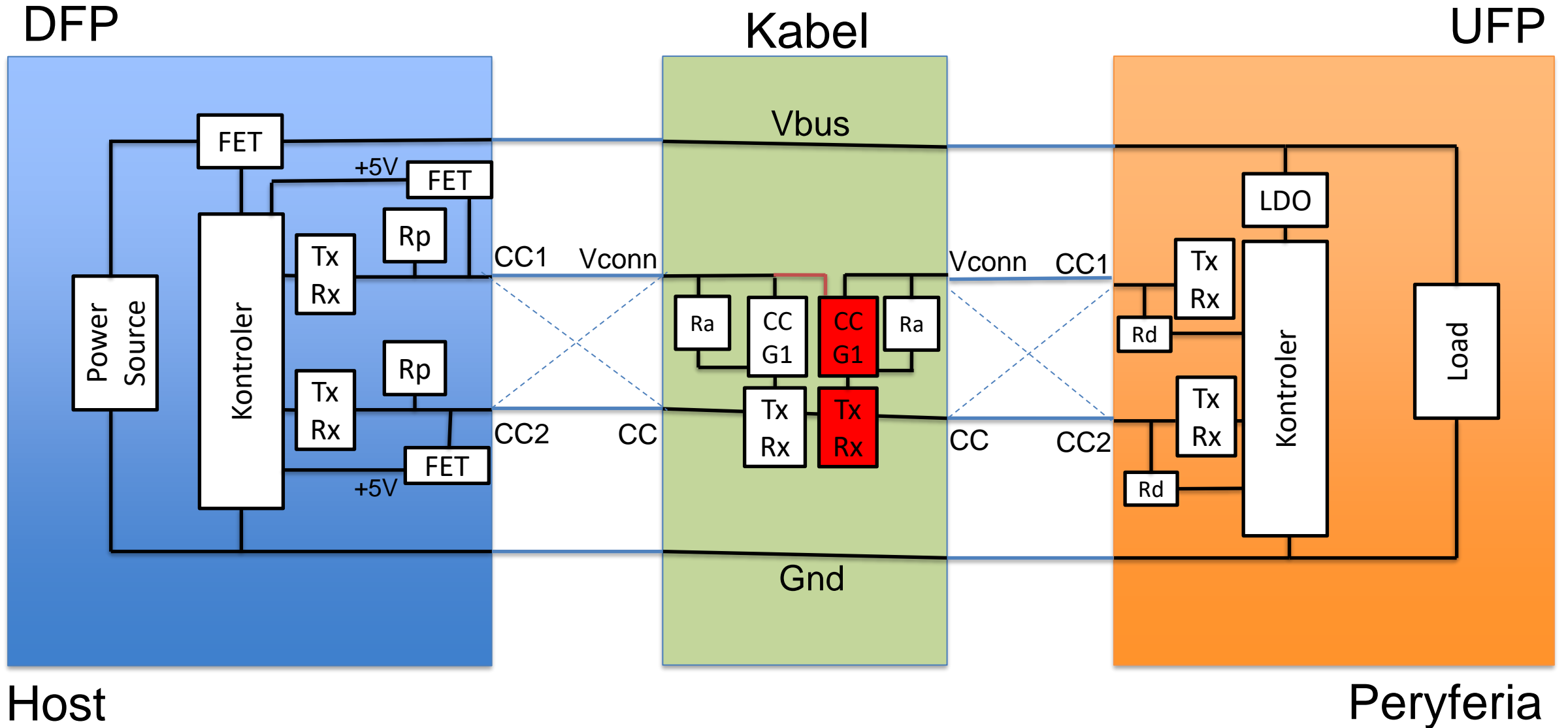
UFP Wtyczka



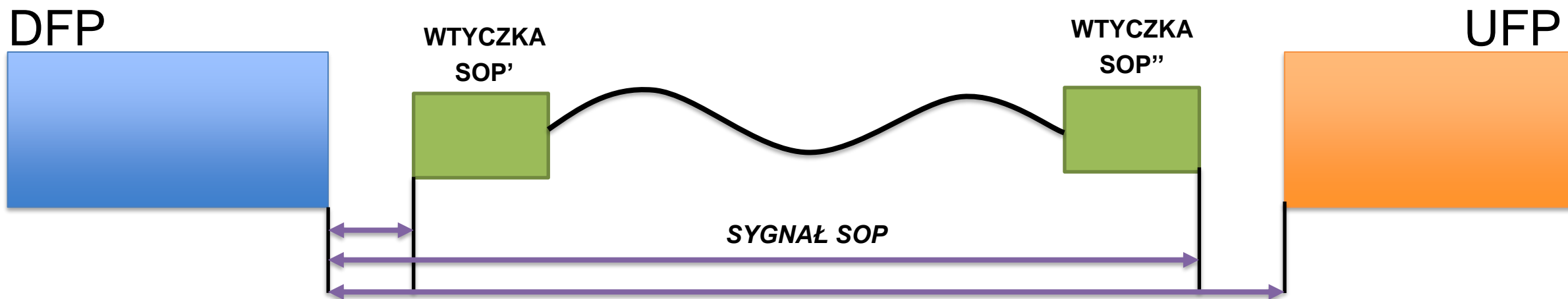
Peryferia







- ✔ Wiadomości:
- ✔ Dla Power Delivery:
 - ✔ 13 wiadomości kontrolnych
 - ✔ 5 wiadomości data
- ✔ W zależności od typu wiadomości mogą być:
 - ✔ Wysłane przez źródło
 - ✔ Wysłane przez urządzenie
 - ✔ Wysłane przez kabel





USB-Type C / USB PD

Teledyne LeCroy USB Protocol Suite - USB 3.1, 2.0, and SSIC - [F:\Dropbox\Dropbox\USB-C Easy Bake Oven\easy0bake-oven.usb]

File Setup Record Generate Report Search View Window Help

Status:n/a Record

PKT ITR XFR PTP SCS

Run once USB 3.1/PD Exerciser

Trace View

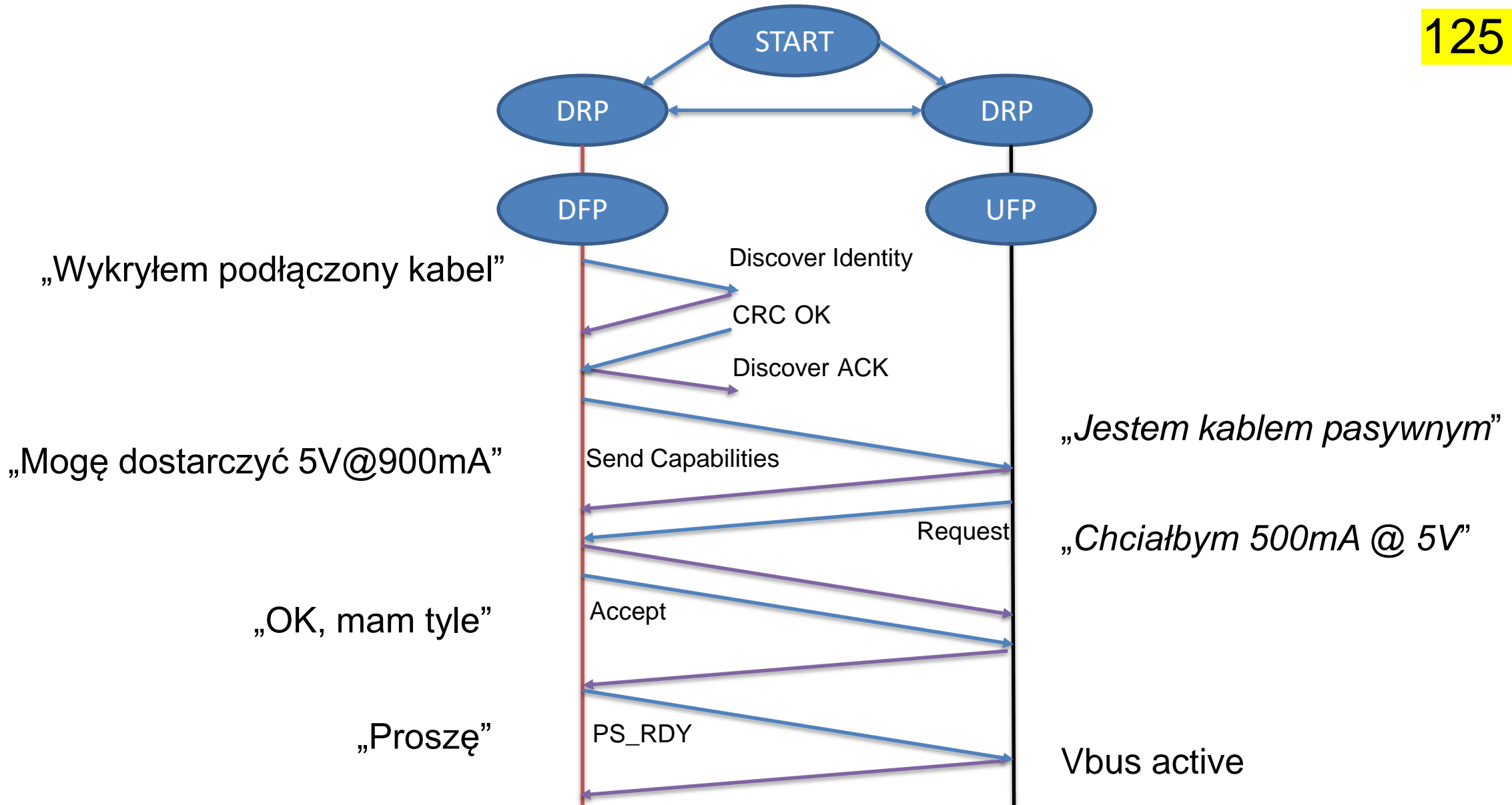
CC Left) AttachWait.SRC ==> Attached.SRC @ 07.377 719 000 CC Right) AttachWait.SNK ==> Attached.SNK @ 07.377 719 000

Packet	CC Event	CC1 Pins	Ad Curr	Left	CC1	CC2	Right	CC1	CC2	Time	Time Stamp						
9	Connected	1.5 A	"Left"	Rp	Ra	"Right"	Rd	Open		152.940 ms	7.377 719 000						
76 Packets	Left	SRC	PD Msg	Msg Type	DR	PR	Msg ID	Obj Cnt	Fixed	Max Cur	Voltage	Dual Role	Source Cap	Duration	Time	Time Stamp	
10-85	"Left"	SOP	Source Cap	DFP	SRC	0	1			2.40 A	5.00 V	0		627.480 us	2.136 sec	7.530 659 272	
86	Right	SNK	PD Msg	Msg Type	DR	PR	Msg ID	Obj Cnt		Duration	Idle	Time Stamp					
"Right"	SOP	Get SRC Cap	UFP	SNK	0	0				496.617 us	120.935 us	9.666 645 720					
87	Left	SRC	PD Msg	Msg Type	DR	PR	Msg ID	Obj Cnt		Duration	Idle	Time Stamp					
"Left"	SOP	GoodCRC	DFP	SRC	0	0				494.382 us	225.754 us	9.667 263 272					
88	Left	SRC	PD Msg	Msg Type	DR	PR	Msg ID	Obj Cnt	Fixed	Max Cur	Voltage	Dual Role	Duration	Idle	Time Stamp		
"Left"	SOP	Source Cap	DFP	SRC	3	1				2.40 A	5.00 V	0	627.102 us	88.938 us	9.667 983 408		
89	Right	SNK	PD Msg	Msg Type	DR	PR	Msg ID	Obj Cnt		Duration	Idle	Time Stamp					
"Right"	SOP	GoodCRC	UFP	SNK	3	0				496.617 us	5.254 ms	9.668 699 448					
90	Right	SNK	PD Msg	Msg Type	DR	PR	Msg ID	Obj Cnt	Request	Max Opr Cur/Pow	Opr Cur/Pow	Cap Mismatch	Obj Pos	Duration	Idle	Time Stamp	
"Right"	SOP	Request	UFP	SNK	1	1				2.40A / 60.00W	2.40A / 60.00W	0	1	630.315 us	120.917 us	9.674 450 360	
91	Left	SRC	PD Msg	Msg Type	DR	PR	Msg ID	Obj Cnt		Duration	Idle	Time Stamp					
"Left"	SOP	GoodCRC	DFP	SRC	1	0				494.382 us	425.026 us	9.675 201 592					
92	Left	SRC	PD Msg	Msg Type	DR	PR	Msg ID	Obj Cnt		Duration	Idle	Time Stamp					
"Left"	SOP	Accept	DFP	SRC	4	0				494.382 us	88.978 us	9.676 121 000					
93	Right	SNK	PD Msg	Msg Type	DR	PR	Msg ID	Obj Cnt		Duration	Idle	Time Stamp					
"Right"	SOP	GoodCRC	UFP	SNK	4	0				496.915 us	27.696 ms	9.676 704 360					
94	Left	SRC	PD Msg	Msg Type	DR	PR	Msg ID	Obj Cnt		Duration	Idle	Time Stamp					
"Left"	SOP	PS Ready	DFP	SRC	5	0				494.382 us	88.794 us	9.704 897 184					
95	Right	SNK	PD Msg	Msg Type	DR	PR	Msg ID	Obj Cnt		Duration	Idle	Time Stamp					
"Right"	SOP	GoodCRC	UFP	SNK	5	0				496.617 us	8.518 ms	9.705 480 360					
5 Packets	Port	CBL	PD Msg	Msg Type	Cable Plug	Msg ID	Obj Cnt	VDM Header	Cmd	Cmd Type	Obj Pos	Vendor ID	Vendor Defined	Duration	Time	Time Stamp	
96-100	"???"	SOP	Vendor Defined	DFP or UFP	0	1			Discover Identity	Initiator	0	PD SID		627.102 us	9.977 ms	9.705 480 360	
101	Port	CBL	PD Msg	Msg Type	Cable Plug	Msg ID	Obj Cnt		Duration	Idle	Time Stamp						
"???"	SOP	GoodCRC	Cable	1	0					499.001 us	1.686 ms	9.724 472 136					
102	Port	CBL	PD Msg	Msg Type	Cable Plug	Msg ID	Obj Cnt	VDM Header	Cmd	Cmd Type	Obj Pos	Vendor ID	ID Header	Vendor ID	Rsvd	Modal Opr	Pr
"???"	SOP	Vendor Defined	Cable	0	5				Discover Identity	Resp ACK	0	PD SID	Magic Control Technology Corp.	0x000	Supported	Pass	
103	Port	CBL	PD Msg	Msg Type	Cable Plug	Msg ID	Obj Cnt		Duration	Idle	Time Stamp						
"???"	SOP	GoodCRC	DFP or UFP	0	0					494.382 us	19.620 ms	9.727 947 720					
104	Left	SRC	PD Msg	Msg Type	DR	PR	Msg ID	Obj Cnt	Fixed	Max Cur	Voltage	Dual Role	Fixed	Max Cur	Voltage	Dual Role	Duration
"Left"	SOP	Source Cap	DFP	SRC	6	3				2.40 A	5.00 V	0		3.00 A	9.00 V	0	892.542 us
105	Right	SNK	PD Msg	Msg Type	DR	PR	Msg ID	Obj Cnt		Duration	Idle	Time Stamp					
"Right"	SOP	GoodCRC	UFP	SNK	6	0				496.766 us	4.282 ms	9.749 043 360					
106	Right	SNK	PD Msg	Msg Type	DR	PR	Msg ID	Obj Cnt	Request	Max Opr Cur/Pow	Opr Cur/Pow	Cap Mismatch	Obj Pos	Duration	Idle	Time Stamp	
"Right"	SOP	Request	UFP	SNK	2	1				4.30A / 107.50W	4.30A / 107.50W	0	3	629.937 us	120.335 us	9.753 822 496	

QuickTiming markers not set

Ready Search: Fwd

125 msek



Quick charge vs. Power Delivery

STD	Napięcie	Prąd	Moc
USB 2.0 (A lub B)	5V	0,5A	2,5W
USB 3.0 (A lub B)	5V	0,9A	4,5W
USB Battery Charging 1.2	5V	5A (1,5A dla smartfonów)	25W (5,5W dla smartfonów)
USB type C	5V	1,5A lub 3A	7,5W lub 15W
USB type C + Power Delivery	Do 20V	Do 5A	Do 100W
Quick Charge 1.0	5V	2A	10W
Quick Charge 2.0	5V, 9V, 12V	Do 2A	18W
Quick Charge 3.0	Od 3,6V do 20V w 200mV krokach	Do 3A	18+W
Quick Charge 4	3,6V do 20V w 20mV krokach	2,6A lub 4,6A	100W
Quick Charge 4+	3V do 21V w 20mV krokach	3A (PD) 2,6A lub 4,6A (QC)	100W (QC) lub 27W (PD)

✔ Tryby alternatywne (Alternate modes)

- ✔ Thunderbolt Alternate Mode
- ✔ MHL – Mobile High Definition Link Alternate Mode
- ✔ HDMI Alternate Mode
- ✔ DisplayPort Alternate Mode
- ✔ VirtualLink Alternate Mode*

- ✔ Audio Adapter Accessory Mode
- ✔ Debug Accessory Mode



UC3002A Konwerter USB-C - VGA



UC3238 Konwerter USB-C - HDMI 4K

- ✓ Kable
- ✓ Nieoznaczone elektronicznie (Un-Marked) – 3A@20V
- ✓ Oznaczone elektronicznie (E-Marked) – 5A@20V
- ✓ Oznaczenia:

- ✓ USB typu C – charging



- ✓ USB typu C – SS charging



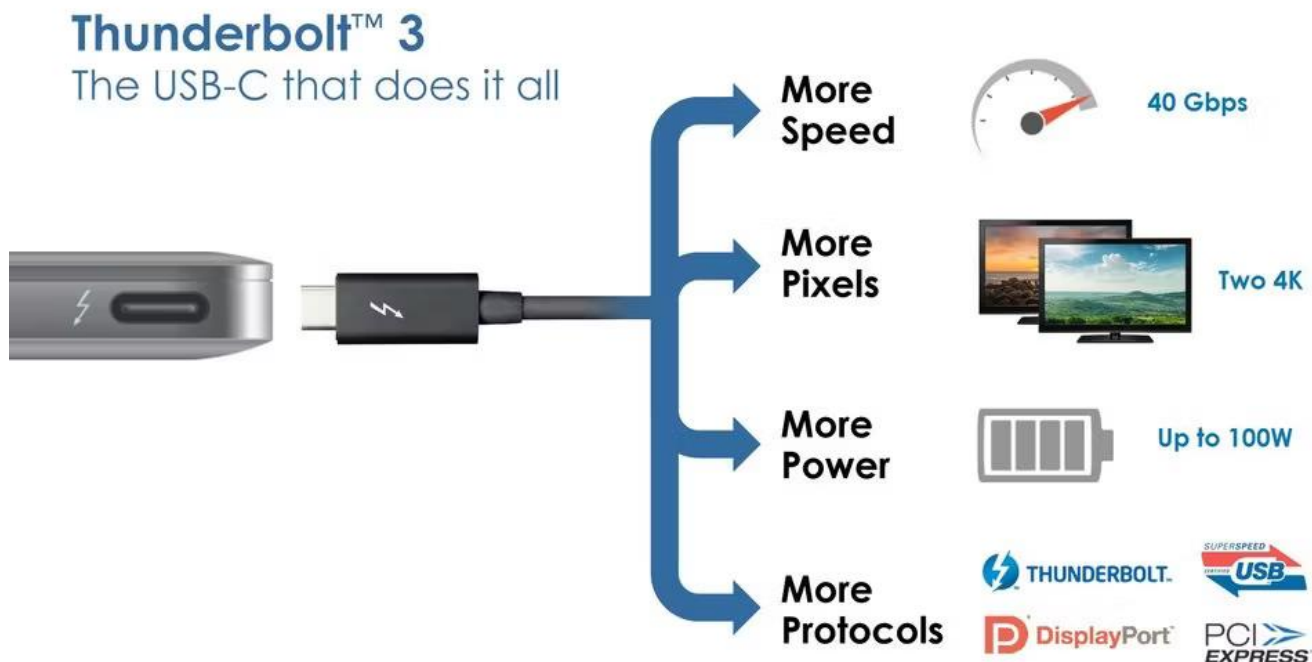
- ✓ USB typu C – SS 10Gbps charging



UH3239 – mini dock z PowerDelivery

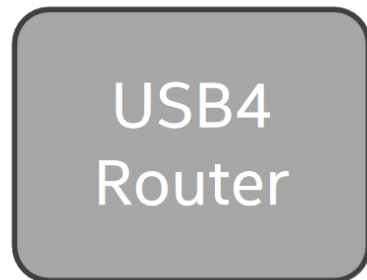
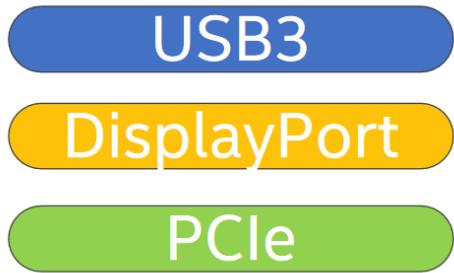
Cable Ref	Plug 1	Plug 2	USB Version	Cable Length	Current Rating	USB Power Delivery	USB Type-C Electronically Marked
CC2-3	C	C	USB 2.0	≤ 4 m	3 A	Supported	Optional
CC2-5					5 A		Required
CC3G1-3	C	C	USB 3.2 Gen1 and USB4 Gen2	≤ 2 m	3 A	Supported	Required
CC3G1-5					5 A		
CC3G2-3	C	C	USB 3.2 Gen2 and USB4 Gen2	≤ 1 m	3 A	Supported	Required
CC3G2-5					5 A		
CC4G3-3	C	C	USB4 Gen3	≤ 0.8 m	3 A	Supported	Required
CC4G3-5					5 A		

- ✔ Thunderbolt 3 / 4:
- ✔ 40 Gbps Data Rate
- ✔ Ładowanie do 100W
- ✔ USB 3.1 10 Gbps
- ✔ 2x 4K 60Hz Display Port / do 16K dla TB4
- ✔ Jeden kabel – do 6 urządzeń w kaskadzie
- ✔ Zew. grafika na linii PCI-Express
- ✔ Sieć: nawet 10GbE

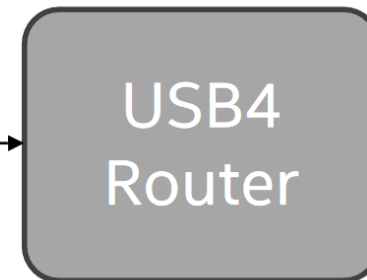
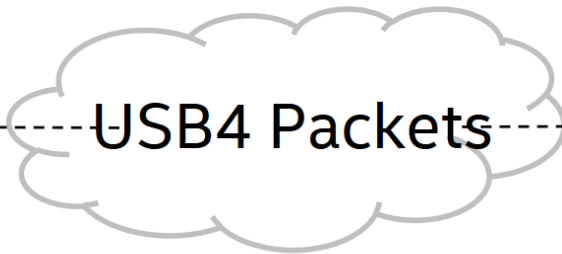


- ✓ USB4, Thunderbolt 5
- ✓ Zgodność ze złączem USB Type-C
- ✓ Tunelowanie USB 3, 2x wzrost wydajności PCIe oraz DP 2.1
- ✓ Prędkości na poziomie do **80Gbps**, **pasmo do 120Gbps (dual 8K@60Hz)**
- ✓ Zwiększona długość kabli pasywnych
- ✓ Topologia nawet do 6 routerów
- ✓ PowerDelivery w trybie Extended power range nawet do **240W** (5A@48V)

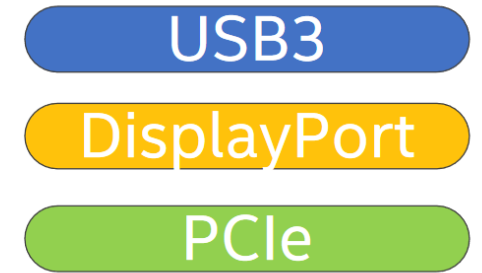
Tunneled Protocols



USB4 Fabric



Tunneled Protocols



- ✔ USB Typ-C to definicja **portu** a nie standardu
- ✔ Najważniejsza wartość dla portu USB-C dotyczy
- ✔ Zasilania – Power Delivery do 100W (20V @ 5A)
- ✔ Trybów Alternatywnych
- ✔ Najlepszą iteracją portu USB-C jest Thunderbolt
- ✔ Każdy porty typu-C wymaga kontrolera CC
- ✔ **Kabel ma znaczenie**



UE331C/UE332C – przedłużacz USB-C

Simply Better Connections

Maciej Rychta
Technical Supervisor, ATEN Poland
maciej.rychta@pl.aten.com



sesja
Q&A

Akademia ProAV²

Dziękujemy!