



**First National Conference of The College Music
Society/ATMI
Vancouver, British Columbia,
October 11–13, 2018.**



**Cables, Connectors, Jacks and Plugs:
Everything you think you know about these items but
really don't!!**

Presenter

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Presentation Webpage:

**[http://fredkersten.com/VancouverCables18/VancouverCables.
html](http://fredkersten.com/VancouverCables18/VancouverCables.html)**

Abstract

A hands-on examination of connectors to provide valuable information on how to enable your computers, projectors, and systems quickly and effectively. New connectors such as USB-C, discontinued connectors, interconnectivity problems, and possibilities will be addressed. Several plugs and connector hardware templates will be provided with the plugs affixed providing a real-time physical examination of the items discussed.

Presentation Outline

Thanks to Selection Committee for their Tolerance!

*I wanted to show something mechanical **besides musical**. Get into new connectors and also examine protocols that are very important regarding speed that is necessary for gaming. As we have preconference sessions on video and gaming this information is highly related.

*Computer looks like wired Octopus.

*New Directions for standardization of connectivity.

*Will attempt to show new "future."

USB-C--CABLE OF FUTURE-NOW? --SORTA!!

*Fully Reversible.

*Backwards Compatible.

*2020 Implementation Date.

*Data-10 Gbps! Power - 100 WATTS! Video 4K!

*Current Problem -All types of adapters needed!!

*Major problem-continuous new formats!

*It's a new all-in-one solution for power, video, and data delivery using a single cable.

*Can Carry Thunderbolt (Apple-Intel).

*Can Carry PCI Express.

*Can Carry DisplayPort.

VGA (VIDEO GRAPHICS ARRAY)

*Will be phased out in approximately 3 years.

*Have to go from Analog to Digital and back-slows down process.

*Each step introduces a small bit of error-distortion.

*Can be used for HD video resolution of 1080p.

VGA, HDMI, USB-C Comparisons

*VGA "Supposedly "Not Hot Pluggable vs HDMI --quickly plug in. No external audio plugs.

*HDMI carries both audio and video.

*HDMI cable costs more as has double feed for AV.

*HDMI used by PC Gamers-faster screen updates and shifts. Difference between HDMI 1.4 limited to 30FPS and HDMI2.0 up to 60FPS.

*VGA cables are subject to crosstalk (signal interference from other cables) and length issues; for beyond about 4 feet, the analog video signal tends to break down. HDMI

cables are less sensitive to crosstalk, but can suffer interference from electromagnetic fields.

*HDMI cables can be influenced by magnetic fields of other cables hence the thick shielding on them.

VGA Resolutions

*VGA Video Graphics Array 640x480.

*SVGA Super Video Graphics Array 800x600.

*XGA Extended Graphics Array 1024x768.

*SXGA Super Extended Graphics Array 1280x1024.

DVI (Digital Video Interface) COMPARISON AND DEFINITION

VGA (VIDEO GRAPHICS ARRAY DEFINITION)

*Cable Length 15 + feet -resolution to 1920x1200. 49 feet from 1280x1024.

*Transmit Digital and Analog Video.

*Developed industry standard for transfer of Uncompressed Digital Video content.

*DVI picture quality is better than working with VGA. Does not carry audio.

*Superseded--VGA connector.

*Hot pluggable--Yes.

*Pins: 29.

*HDMI and DVI are, for all intents and purposes, the same thing. The only difference of any note is HDMI does audio.

*VGA cables are more susceptible to electrical disturbances and noise compared to DVI.

*Various Pin Layouts.

*Some DVI solutions can carry sound when signal is converted to HDMI.

*Video signals transmitted over DVI need no conversion because they are digital-only.

*Consequently, picture quality is better.

*For greater distances, the use of a DVI booster—a signal repeater which may use an external power supply—is recommended to help mitigate signal degradation.

*DVI offers a higher quality signal compared to VGA.

*Video signals transmitted over DVI need no such conversion because they are digital-only. Consequently, picture quality is better. The difference may not be noticeable for text or even SD (standard definition) video but can be seen for HD videos and hi-resolution images or on hi-res displays.

Thunderbolt Now 3??

*What is it??? Thunderbolt is the brand name of a hardware interface standard (protocol) developed by Intel/Apple.

“Thunderbolt™ technology is a revolutionary I/O technology that supports high-resolution displays and high-performance data devices through a single, compact port.”

*Two duplex lanes, each 10 Gbit/s comprising one lane of input and one lane of output.

*However not all USB Type-C ports and wires support Thunderbolt 3.

*Thunderbolt 3 ports can also be Type-C 3.1.

*Four lanes of output data at no more than 5.4 Gbit/s per Thunderbolt lane.

Mini's and Micros?!?

- *Size of connection-main difference. Both ports use same software protocol.
- *Micro USB is slightly smaller in thickness than mini.
- *Micro designed more durable for use with devices that require frequent charging such as phones.
- *Mini USB-smaller used by phones/cameras.
- *Standard USB-four pins. Mini USB-five pins.
- *Mini USB abandonment—(1000 insertions) Micro-10,000 insertions.
- * Micro-USB connectors allow manufacturers to push the limits of thinner and lighter mobile devices with sleeker designs and greater portability.
- *Once a new standard is widely adopted and attains “critical mass” the economics of scale tend to drive the market very rapidly to the new standard. It becomes increasingly less cost effective to manufacture and stock and handle parts which have a diminishing market share and which are incompatible with new facilities.
- *Older mobile devices use the Mini Type-B connector, while most new devices use the Micro Type-B connector.

Do I need these??

- *Gender changer-A gender changer or "gender-bender", is a hardware device placed between two cable connectors of the same type and gender. An example is a cable connector shell with either two female, or two male connectors on it (male-to-male or female-to-female), used to correct the mismatches that result when interconnecting two devices or cables with the same gender of connector.
- *Power Cords-Usually Male.
- *Ports on a computer usually female.
- *Gender Adapter (changer, converter). Usually not needed. However, for extended chord lengths can be employed.
- * USB female is the standard “host” connector type. This is found on computers, hubs, or any device intended to have peripherals plugged into it.
- *Extension Cable, male on one end and female on other.

DisplayPort

- *The most advanced A/V display connection technology now uses the most versatile connector.
- *DisplayPort™ can deliver digital content at resolutions above Ultra HD, the highest available from a single A/V connector. This makes it ready for future applications, including VR and 8K HDR displays.
- *Full DisplayPort audio/video (A/V) performance (up to 8k at 60Hz).
- *SuperSpeed USB (USB 3.1) data.
- *Up to 100 watts of power over a single cable.
- *Reversible plug orientation and cable direction.
- *Backward compatibility to VGA, DVI, and HDMI with plug adapters or adapter cables.
- *Adapters supports HDMI 2.0a and full 4K UHD resolution.

Online Resources

*Good article on Thunderbolt 3 from Laptop magazine.

<https://www.laptopmag.com/articles/thunderbolt-3-guide>

https://www.monoprice.com/pages/usb_31_type_c?msclkid=76019f48d9521592d336c409b3b223ba&utm_source=bing&utm_medium=cpc&utm_campaign=OD%20-%20NB%20-%20Exact%20-%20Returning&utm_term=usb-c&utm_content=USB%20C%20-%20Exact%20-%20Returning

*Great information on specifics of USB-C.

https://simple.wikipedia.org/wiki/Digital_Visual_Interface Information on DVI and HDMI specifications.

*USB-C iPhone change over.

<https://www.forbes.com/sites/gordonkelly/2018/06/12/apple-iphone-new-iphone-x-plus-x2-specs-charging-usb-c-lightning-upgrade-price-release-date/#4f2b8e485edf>

*The Male and Female of It!

https://www.reddit.com/r/Monitors/comments/2t5n0w/both_male_and_female_vga_ports_on_my_computer/

*What is the difference between male and female connectors on a computer --hdmi

<https://www.techwalla.com/articles/what-is-the-difference-between-male-and-female-hdmi-connectors>

*Male and Female differences on computer plugs.

<https://www.techwalla.com/articles/what-is-the-difference-between-male-and-female-hdmi-connectors>

*Male and Female VGA ports.

<https://www.bing.com/search?q=male+and+female+vga+ports&qs=AS&pq=male+and+female+vga&sc=8-19&cvid=79e0c99244424045ae0267342d16017a&q=male+and+female+vga+ports&form=PRUSEN&mkt=en-us&httpsmsn=1&refig=79e0c99244424045ae0267342d16017a&sp=1&qs=AS&pq=male+and+female+vga&sc=8-19&cvid=79e0c99244424045ae0267342d16017a> VGA

*USB-C Port Availability.

<http://www.bootcamp.com/report.jsp?reportId=5164> Kingston Technology's versatile Nucleum USB C hub arriving.

*What Really is 4K

4K resolution, also called 4K, refers to a horizontal screen display resolution in the order of 4,000 pixels.^[1] There are several different 4K resolutions in the fields of digital television and digital cinematography. In television and consumer media, 4K UHD or

UHD-1 is the dominant 4K standard. In the movie projection industry, Digital Cinema Initiatives (DCI 4K) is the dominant 4K standard. (Wikipedia source for information on 4K https://en.wikipedia.org/wiki/4K_resolution)

*4K displays (4096 x 2160 30bpp @ 60 Hz) There are three main 4K resolution standards:

- https://en.wikipedia.org/wiki/4K_resolution
- UHD-1, or ultra-high-definition television (UHDTV), is the 4K standard for television and computer monitors. UHD-1 is also called 2160p^{[5][6]} as it has a resolution of 3840 × 2160 (16:9, or approximately a 1.78:1 aspect ratio), which is twice the horizontal and twice the vertical resolution of 1080p, or three times the horizontal and vertical resolution of 720p.^[5] UHD-1 is used in consumer television and other media, e.g. video games.
- UW4K is the ultra-wide 4K standard, with a resolution of 3840 × 1600, and an aspect ratio of 12:5 (2.4:1, or 21.6:9) This resolution is most commonly used on Ultra HD Blu-ray discs, and PC gaming monitors.
- DCI 4K ("4K envelope") which has a resolution of 4096 × 2160 pixels (256:135, approximately a 1.9:1 aspect ratio). This standard is only used in the film and video production industry.^[7] The DCI 4K standard has twice the horizontal and twice the vertical resolution of DCI 2K.

*Thunderbolt Specs:

<https://www.intel.com/content/www/us/en/io/thunderbolt/thunderbolt-technology-developer.html> through intel.

*Thunderbolt technology <https://thunderbolttechnology.net/products> “Thunderbolt™ technology is a revolutionary I/O technology that supports high-resolution displays and high-performance data devices through a single, compact port.”

*Why Apples new thunderbolt port is awesome <https://www.makeuseof.com/tag/apples-thunderbolt-port-awesome-technology-explained/>

*WHAT IS THUNDERBOLT? <https://www.makeuseof.com/tag/thunderbolt-3-device-cable-can-everything/>

*Thunderbolt 3 Explained <https://www.laptopmag.com/articles/thunderbolt-3-guide>
Good Article for PICTURES!!!! HALF WAY THROUGH THE ARTICLE. SPEED PICTURES.

*USB Type-C Accessories and Cables. <https://www.laptopmag.com/articles/best-usb-type-c-accessories-cables> Laptop Magazine.

*Good source (saved) defining difference between Thunderbold3 and USB-C.
<https://thunderbolttechnology.net/blog/difference-between-usb-c-and-thunderbolt-3>.

<https://www.quora.com/What-is-the-difference-between-a-USB-charging-cable-and-a-data-cable>

*What are the different characteristics of a USB-C port?

<https://www.bing.com/search?q=usb+connector+differences&form=PRUSEN&mkt=en-us&httpsmsn=1&refig=8cf765503564408bbfef5c1916d323f3&sp=1&q=N&pq=how+is+a+usb-c+connector+different&sc=1-34&cvid=8cf765503564408bbfef5c1916d323f3>

*Good Video on USB 3. <https://www.youtube.com/watch?v=WDJWjqyjcwM>

*USB ADAPTER. https://www.amazon.com/Adapter-Boscheng-Thunderbolt-Compatible-Chromebook/dp/B074MYD9PT/ref=pd_cart_vw_2_1?encoding=UTF8&pd_rd_i=B074MYD9PT&pd_rd_r=8dbfe5f3-4e61-469b-8c2c-bba6eb715e5e&pd_rd_w=uCMGp&pd_rd_wg=ir7OA&psc=1&refRID=VTJH5GYZGD7SYCMEH3XT Multiple inputs including HDMI, VGA, USB-3 USB-C

https://www.amazon.com/Adapter-Boscheng-Thunderbolt-Compatible-Chromebook/dp/B074MYD9PT/ref=pd_cart_vw_2_1?encoding=UTF8&pd_rd_i=B074MYD9PT&pd_rd_r=8dbfe5f3-4e61-469b-8c2c-bba6eb715e5e&pd_rd_w=uCMGp&pd_rd_wg=ir7OA&psc=1&refRID=VTJH5GYZGD7SYCMEH3XT Multiple inputs including HDMI, VGA, USB-3 USB-C

*VGA Splitter cable...

https://www.bing.com/images/search?view=detailV2&ccid=LXqL5t2d&id=3C12AF25D7502F65978F2756240D1A5E9DFEDCD2&thid=OIP.LXqL5t2dVc6B2SMevxNBKgHaFT&mediaurl=https%3A%2F%2Fwebobjects2.cdw.com%2Fis%2Fimage%2FCDW%2F465207%3F%24product-main%24&exph=430&expw=600&q=thin+laptop+dvi&simid=608054688377473567&q_pvt=thin+laptop+dvi&ajaxhist=0&pivotparams=insightsToken%3Dccid_xC9lvFBt*mid_E5481886645ED5FFD84443968D4EAA85FAE0B35C*simid_608051888092808911*thid_OIP.xC9lvFBtRPfoO3zJbPYyAHaHa&iss=VSP

*VGA Splitter cable-tech specific.

<https://www.cdw.com/shop/products/c2g-ultima-svga-hd15m-to-dual-hd15f-monitor-y-cable/465207.aspx>

Picture Sources of connectors

<https://www.bing.com/images/search?view=detailV2&ccid=nkOvJPlo&id=B9FB3912FA9AC99FC41204FB4E0C62157AA53BB5&thid=OIP.nkOvJPlokojecgGJZ3nrwHaFR&mediaurl=https%3A%2F%2Fs-media-cache-ak0.pinimg.com%2Foriginals%2F9e%2F43%2Faf%2F9e43af24f96891ca2379c806259de7af.png&exph=798&expw=1120&q=Identify+Computer+Cable+Connectors&simid=608008856765992180&selectedindex=44&ajaxhist=0>

*Great Pictures of Connectors. <https://www.ramelectronics.net/connecters.aspx>

*Great Connector article. <https://www.laptopmag.com/articles/port-and-adapter-guide> A Guide to Computer Ports and Adapters

By Avram Piltch, LAPTOP Online Editorial Director | March 15, 2017 07:50 pm

*Good Adapter page-- https://www.amazon.com/s/ref=nb_sb_noss_2?tag=laptop-magazine-20&url=search-alias%3Daps&field-keywords=HDMI+to+dvi&rh=i%3Aaps%2ck%3AHDMI+to+dvi downloaded already

*GOOD Page on Ports...at <https://www.laptopmag.com/articles/port-and-adapter-guide>.

*Computer plug sales but has at top some good info on new plugs.
<http://www.computerplug.com>

*Computer port speeds explained.
USB speeds between 2 & 3
<https://www.laptopmag.com/articles/port-and-adapter-guide>

*USB c advantages.
<https://www.laptopmag.com/articles/port-and-adapter-guide>

*PixelFlash No-Bend Pins USB 3 CF Card Reader 1" Cabled Tactical SuperSpeed Compact Flash Adapter: Computers & Accessories.

Can use for storage on pad.
https://www.amazon.com/dp/B012VYQNNU?axitk=5Zq0F7XCf2iDrcoOpZ4nbA&pd_rd_i=B012VYQNNU&pf_rd_m=ATVPDKIKX0DER&pf_rd_p=3365067662&pd_rd_wg=KRSIj&pf_rd_r=N3EZ8HHXB1S8Q8RYT1F8&pf_rd_s=desktop-sx-top-slot&pf_rd_t=301&pd_rd_w=752wA&pf_rd_i=micro+sd+card+reader&pd_rd_r=95ed8f83-ddff-4fff-b56b-f084c727a754&hsa_cr_id=5016811590401

*GREAT ARTICLE ON ALL CABLES INCLUDING USB-C.
<https://www.laptopmag.com/articles/usb-type-c-faq> Saved in folder

*Best Laptop Docking Stations for Dell, Lenovo, HP & More.
<https://www.laptopmag.com/articles/best-docking-stations>

*Rj45 adapters to rj45.
https://www.amazon.com/s/ref=nb_sb_noss_2?url=search-alias%3Daps&field-keywords=USB+to+Ethernet&rh=i%3Aaps%2ck%3AUSB+to+Ethernet&tag=laptop-magazine-20

*Amazon.com: iPhone 7 Adapter, Lightning to 3.5 mm Headphone Jack Adapter iPhone 7 Headphone Adapter for Apple iPhone 7 7 Plus X 8 8+(gray): Electronics

https://www.amazon.com/iPhone-Adapter-Lightning-Headphone-Apple/dp/B076CQS6YG/ref=dp_ob_title_wld

*Hot swapping. https://en.wikipedia.org/wiki/Hot_swapping

VGA Connector on its way out? https://en.wikipedia.org/wiki/VGA_connector

*GREAT cables page: <https://www.labnol.org/gadgets/visual-guide-to-computer-cables-connectors/10694/>

*Is VGA DEAD? <https://www.cnet.com/news/hdmi-vs-displayport-vs-dvi-vs-vga-which-connection-to-choose/> :

- [The Difference Between HDMI, DVI, and VGA](#)
- [VGA to DVI to HDMI - How can I make this possible?](#)
- [Hdmi to dvi D, better than vga to vga?](#)
- [Hdmi to Vga](#)
- [VGA vs HDMI](#)
- [Is hdmi better than dvi or vga ports?](#)
- [HDMI to VGA or DVI](#)
- [Which Radeon card for 4 displays? 2 DVI, 1 DP, 1 HDMI](#)
- [DVI & HDMI & VGA](#)
- [HDMI to VGA ADAPTER! 1080p? PLEASE HELP!](#)
- [Will a vga to hdmi cable work ?](#)
- [Hdmi to dvi or vga?](#)
- [HDMI or VGA for quality?](#)
- [HDMI to VGA - DVI to VGA](#)
- [Few HDMI question](#)
- [HDMI vs DVI/VGA/S-video..whats your preference?](#)
- [HDMI to VGA or HDMI to DVI. Need help](#)
- [HDMI](#)
- [DVI to HDMI](#)

*USBC to HDMI connectors. https://www.amazon.com/s/?ie=UTF8&keywords=usb-c+to+hdmi+adapter&tag=mh0b-20&index=aps&hvadid=78340207710056&hvqmt=e&hvbmt=be&hvdev=c&ref=pd_sl_60f1bx62fr_e

https://www.monoprice.com/pages/usb_31_type_c?msclkid=76019f48d9521592d336c409b3b223ba&utm_source=bing&utm_medium=cpc&utm_campaign=OD%20-%20NB%20-%20Exact%20-%20Returning&utm_term=usb-c&utm_content=USB%20C%20-%20Exact%20-%20Returning20Returning

*[Good information on Gender Changers](https://www.techwalla.com/articles/what-is-the-difference-between-male-and-female-hdmi-connectors). <https://www.techwalla.com/articles/what-is-the-difference-between-male-and-female-hdmi-connectors>.

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*WHAT IS THUNDERBOLT? <https://www.makeuseof.com/tag/thunderbolt-3-device-cable-can-everything/> <https://www.laptopmag.com/articles/thunderbolt-3-guide> Good Article for PICTURES!!!! HALF WAY THROUGH THE ARTICLE. SPEED PICTURES!!

*Craig Anderton Article: So Valuable!! <https://www.sweetwater.com/insync/what-thunderbolt-3-usb-c-mean-to-musicians/>

About Dr. Fred Kersten

Dr. Fred Kersten is currently and has been for nine years an Online Graduate Facilitator for Boston University. He works with graduate music education majors around the world who are completing their masters and doctorate degrees in music education. Currently he is instructor in charge of online music technology courses taught.

Fred holds five degrees in music and music education. He received the B.S. and M Mus degrees from Crane School of Music in Potsdam, New York. His M.S. in Elementary Education and Certificate of Advanced Study in School Administration are from SUNY, New Paltz in New York. The Doctorate (D Ed) in music education/administration was awarded by The Pennsylvania State University.

A veteran of public school music teaching in Choral, General and Instrumental areas, Fred has taught music from Nursery, and Kindergarten through Graduate Levels. His doctoral dissertation focused on Music for the Visually Impaired and was developed from his many years of teaching music to students with exceptionalities.

Interest in the recorder as a performing instrument led to study at Indiana University and he authored a book on Teaching Recorder that has been published by NAFME. His performance repertoire includes Bach, Handel, Telemann, and the vast repertoire of classical recorder literature.

His current interests are focused on music technology and his study of classical pipe organ, which was his dual major as an undergraduate in addition to clarinet and recorder.

