Synchronous Collab Performance Online: The Future Is Today!
5G Meets MIDI 2, & "ElkLIVE!"

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Presenter:
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Abstract

      This presentation will describe and demonstrate new developments in music technology that arepresently being implemented and will directly influence teaching and performance in the near future. MIDI 2.0, 5G, and ~~Aloha~~ ElkLIVE will be considered. Each of these tools is in development/implementation stages and presently appearing on the market.

      Kersten will illustrate how new data transfer technologies will provide instantaneous synchronous performance opportunities over thousands of miles and describe their influence and revolutionary possibilities for music educators as they perform, share, and teach online synchronously.

Presentation Outline

Exciting new developments for sophisticated music data sharing are presently occurring. Upgraded MIDI 2.0 (Bidirectional dialogue); 5G (blazing speed--many bright prospects through currently developing networks); and ElkLIVE (low-latency, synchronous performance) are all on the horizon. This presentation will: a. explore all three, b. provide important specifics for understanding, and c. illustrate the sophistication/advantages of these music technology tools for teachers/students as better learning and musical creation take place. Examples will be provided and supported with video descriptions.

Descriptions will be provided for the following:
5G
*Synchronized Reality
*Virtual performances—Concerts, Classes, Live Shows Streamed to Large Groups
*Group Ensemble Rehearsals (Worldwide)
*Universal Band, Orchestra, Choral Ensembles
*Transfer Speed Demographics
*Latency*Setup and Implementation

*Limitations, Development Problems
   *Musical Importance to the Professor/Student

   MIDI 2.0
   * MIDI Capability Inquiry (MIDI-CI):
        a. Profile Configuration
        b. Property Exchange
        c. Protocol Negotiation
*Bidirectional dialogue--synchronous devices talk to each other--Mixer to Synthesizers
*High Resolution Availability
*New Musical Expressive Controllers--32-High-Resolution Velocity
*Futuristic Construction Specifications
*Hardware/Software Communication
*USB Internet Connections
*Ample Space for Expansion

   ElkLIVE
*Presently in Use (Operationalized--June, 2021)
*Current—in market sales and promotion
*Connectivity Hardware and Internet Requirements
*Elk Audio OS-its Value and Current Status
*Audio Latency:1 ms-Signal Sent Audio; 1 ms Signal-Received Audio
*Live Share: Jazz Ensemble Jams, Choral/Instrumental Rehearsals
*Collaboration Sync Opportunities: (Lessons, Performances, Ensemble Development)

MIDI 2.0

*MIDI 2.0 is an update of MIDI 1.0 language and accepts bidirectional communications betweenvarious controllers and synthesizers. To the present day, MIDI 1.0 has limitations, permitting only asynchronous communications between devices. The new language included in MIDI 2.0 will provide more channels (past MIDI 1-16 channel protocol) and better resolution (overall resolution of MIDI 2.0 from MIDI 1 will update from 128 steps at seven bits of data to 4 billion steps at 32 bits).

5G

*5G will provide extensive data transfer at unbelievable speeds up to 10 times faster than presentdata networks. Musicians will be able to perform synchronously over vast distances almost instantaneously with low-latency communications.

ElkLIVE

*ElkLIVE. previously Aloha (a beta-level interface, which allows for low-latency synchronous music interaction), is a hardware/digital protocol that provides instant performance connectivity.ElkLIVE has just now joined the commercial market. It illustrates the advancing future for low-latency sharing between individuals through distance performance.

DETAILED RESOURCES

MIDI 2 References

*MIDI 2 Bing. Comprehensive list of MIDI 2.0 resources.
https://www.bing.com/search?q=MIDI+2+&mkt=en-us&httpsmsn=1&msnews=1&rec_search=1&refig=008b85227a194caf8f1730d660cf0e1e&sp=-1&pq=midi+2+&sc=8-7&qs=n&sk=&cvid=008b85227a194caf8f1730d660cf0e1e&first=8&FORM=PERE

*MIDI 2.0 Is Around The Corner (And This Is Why You Should Care)
https://producerhive.com/ask-the-hive/what-is-midi-2-0/

*MIDI 2.0 spec confirmed: "the biggest advance in music technology in decades" | MusicRadar

https://www.musicradar.com/news/midi-20-spec-confirmed-the-biggest-advance-in-music-technology-in-decades

*Full MIDI 2.0 specifications https://futuremusic.com/2020/02/10/midi-manufacturers-association-ratifies-midi-2-0-specification/

*MIDI 2 - Bing video videos on midi 2 Check this out possible video

https://www.bing.com/videos/search?q=MIDI+2&qpvt=MIDI+2+&FORM=VDRE

*MIDI 2.0 Explained - What Is MIDI 2 & Why Does It Matter? GREAT!!!

https://www.pmtonline.co.uk/blog/2020/01/31/midi-2-0-explained-what-is-midi-2-why-does-it-matter/

*General MIDI 2 (GM 2) https://www.midi.org/specifications-old/item/general-midi-2

*What is MIDI 2.0, and what does it mean for musicians and producers? | MusicRadar

https://www.musicradar.com/news/what-is-midi-20-and-what-does-it-mean-for-musicians-and-producers

*MIDI 2.0: What Actually Matters for Musicians https://www.sweetwater.com/insync/midi-2-0-what-actually-matters-for-musicians/

*MIDI 2.0 Bing collective. https://www.sweetwater.com/insync/midi-2-0-what-actually-matters-for-musicians/

*MIDI 2 Video https://youtu.be/QvJhLQnuktg Adam Neely-New Horizons in Music
Jan 19 NAMM Conference.

*MIDI Manufacturers Association (The MIDI Association) Organization that governs the development and promotion of MIDI. https://www.midi.org

MIDI 2.0 Environment
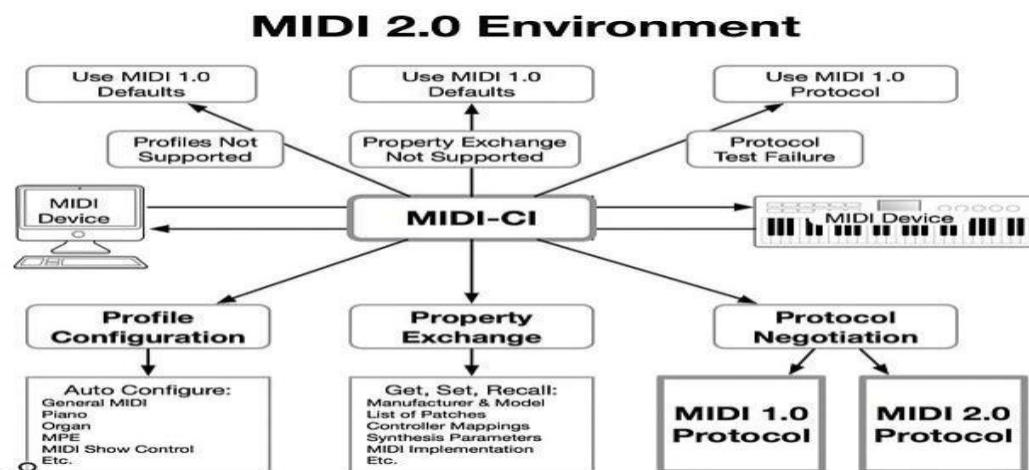
MIDI CI: Reference: This illustration and information was referenced from
https://www.soundonsound.com/music-business/introducing-midi-20

https://www.bing.com/search?q=5G+influences+on+music&form=PRUSEN&mkt=en-us&httpsmsn=1&msnews=1&rec_search=1&refig=92521a99deb743fc96d9d78d7fbdcd38&sp=-1&pq=5g+influences+on+music&sc=1-22&qs=n&sk=&cvid=92521a99deb743fc96d9d78d7fbdcd38

~~Aloha~~ ElkLIVE References

*Aloha web page https://alohabyelk.com/
https://elk.audio/elk-audio-os-update/
 YouTube video jam online—has been downloaded https://youtu.be/I5_G4A_-bBg

Elk Audio Picture https://elk.audio/elk-audio-os-update/

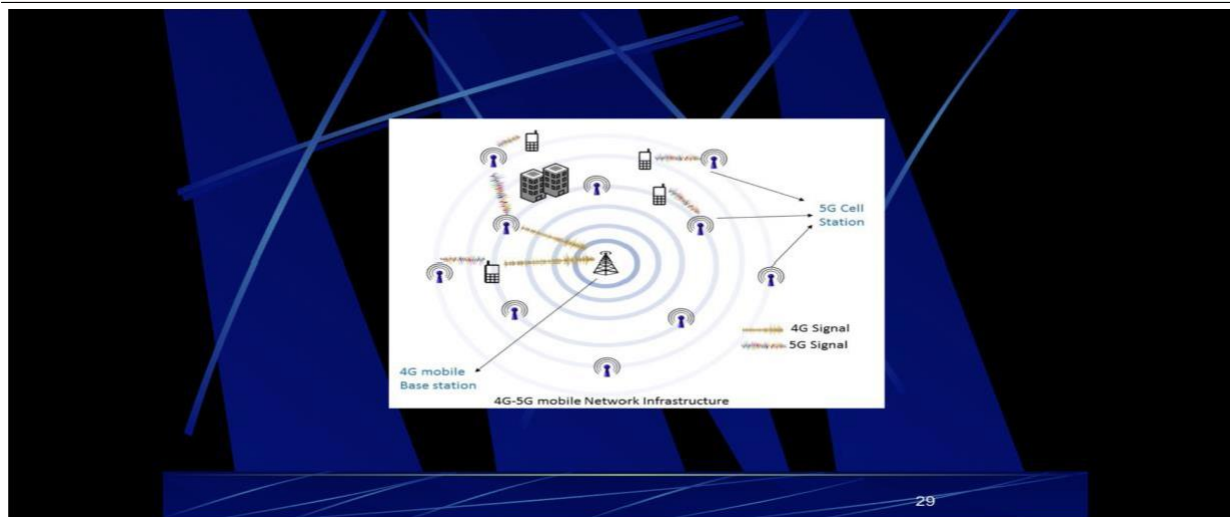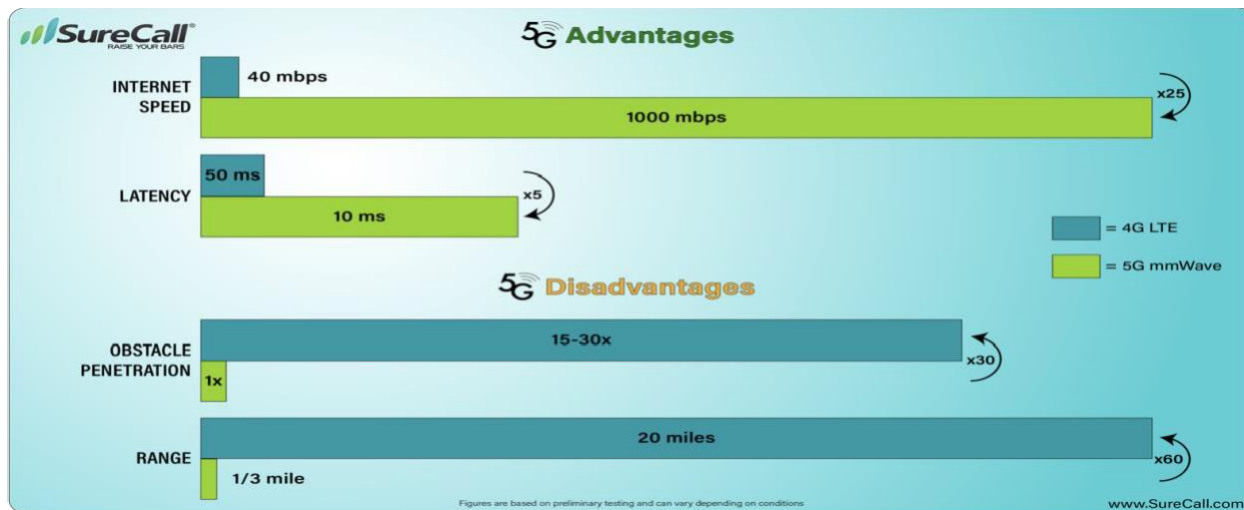Elk Audio update page https://github.com/elk-audio/elk-pi/releases/tag/0.9.0

*San Francisco Opera Collaboration

https://www.businesswire.com/news/home/20210330005146/en/San-Francisco-Opera-Pilots-Aloha-Real-Time-Remote-Collaboration-Music-Service-to-Prepare-for-Live-Performances

Web page downloaded
&San Francisco Collaborative Video https://youtu.be/s32qs3-52a0

5G References

*The big differences between 4G and 5G – CNN https://www.cnn.com/2020/01/17/tech/5g-technical-explainer/index.html

*You Tube Video of multiple instantaneous video performance https://youtu.be/OX-HAHqkWk8 5G music

*CES 2021: 5G's Impact On Education, Entertainment And Beyond LOOK THIS UP!!

https://www.alistdaily.com/technology/ces-2021-verizon-ceo-hans-vestberg-on-the-impact-of-5g/

*5G Research on the influence of 5G on music education. .PDF can be saved.

http://www.iadisportal.org/ijcsis/papers/2019140103.pdf

*5g technology &music performance online - Bing video

https://www.bing.com/videos/search?q=5g+technology+%26music+performance+online&qpvt=5g+technology+%26music+performance+online&FORM=VDRE

*LOOK AT THIS *A GLOBAL PERSPECTIVE OF 5G NETWORK PERFORMANCE OUR ANALYSIS OF NETWORK PERFORMANCE AND USER EXPERIENCE RESULTS FROM SUB-7.125 GHZ AND MILLIMETER WAVE 5G NETWORKS IN EUROPE, ASIA, AND NORTH AMERICA *October 2019 Prepared by Signals Research Group* www.signalsresearch.com   White Paper on 5G importance to music The .pdf file on this topic can be downloaded. https://www.qualcomm.com/media/documents/files/signals-research-group-s-5g-benchmark-study.pdf (signals research.pdf).

*5 reasons why 5G will be amazing for music lovers and producers | MusicRadar

https://www.musicradar.com/news/5-reasons-why-5g-will-be-amazing-for-music-lovers-and-producers

*5G Is Coming: So What Does This Mean for Music (If Anything)?

https://www.digitalmusicnews.com/2019/01/13/5g-music/

*Is the Music Industry Ready for 5G? Embracing the Future of Music Beyond Streaming | by Sergey Bludov | HackerNoon.com | https://medium.com/hackernoon/is-the-music-industry-ready-for-5g-embracing-the-future-of-music-beyond-streaming-18867590a2e5

*5 reasons why 5G will be amazing for music lovers and producers | MusicRadar

https://www.musicradar.com/news/5-reasons-why-5g-will-be-amazing-for-music-lovers-and-producers

*neXt Curve Inspiring our Digital Future Untethering the Live Music Experience with 5G

https://next-curve.com/2021/01/28/untethering-the-live-music-experience-with-5g/

*5g technology &music performance online – Bing

https://www.bing.com/search?q=5g+technology+%26music+performance+online&go=Search&qs=n&form=QBRE&sp=-1&pq=&sc=0-0&sk=&cvid=5DD2D555B08244C492687B3F6F017146

PackMill References

*PackMill: toward per-Core 100-Gbs networking. PackMill provides a way to speed up software packet processing for faster processing of data.

https://dl.acm.org/doi/abs/10.1145/3445814.3446724
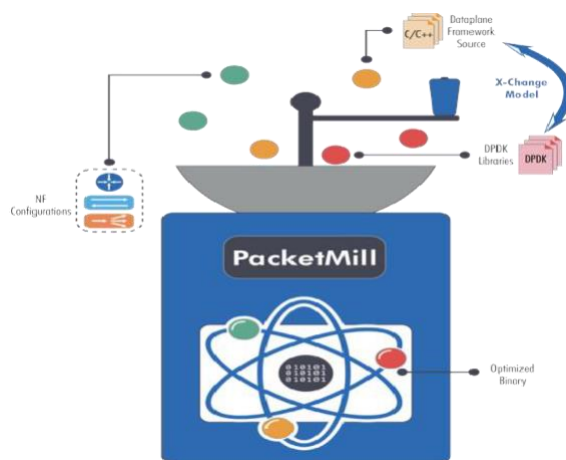
DWDM-Dense Wavelength Division Multiplexing (DWDM) is a mature and well-established technology capable of improving fiber efficiency by multiplexing multiple wavelengths over a single fiber.
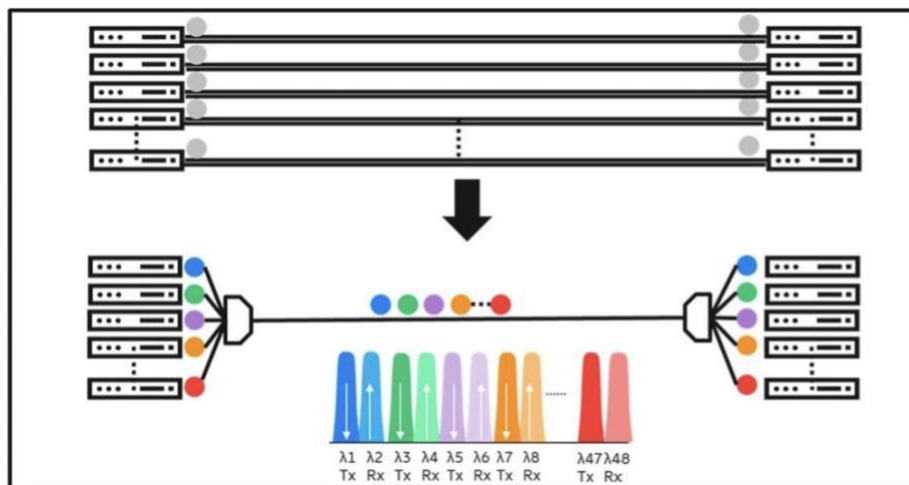
Traditional transmission foresees that each optical signal (grey optic) is transported via a fiber pair

DWDM leverages on colored optics: signals have different color can be multiplexed over a single fiber strand

Ericsson Worldwide Resources and References

*A real-time music collaboration powered by 5G technology. – Ericsson

https://www.ericsson.com/en/cases/2020/a-real-time-5g-music-collaboration
*Verizon 5G: This is 5G Built Right | Verizon https://www.verizon.com/5g/*Ericsson

Communications Company a world leader in the rapidly changing environment of

communications technology – by providing hardware, software, and services to enable the full

value of connectivity. https://www.ericsson.com/en

* Edge Computing next frontier of 5G https://www.ericsson.com/en/edge-computing

Mobile Edge Computing, MEC, or Multi-Access Edge Computing, provides execution resources

(compute and storage) for applications with networking close to the end users, typically within or

https://www.ericsson.com/en/mobile-transport/optical-fronthaul DWDM image to include

Dense Wavelength Division Multiplexing.

Video Resources Locations
https://www.ericsson.com/en/cases/2017/kings-college/education Kings College Talk about
Piano learning

*Video Reaching New Audiences through Connected Music
https://www.ericsson.com/en/cases/2018/connected-music-with-kings-college

Video sources Verizon and 5G Verizon and
5G. https://www.bing.com/videos/search?q=Verizon+5G+and+music&qpvt=Verizon+5G+and+music&FORM=VDRE. https://www.bing.com/videos/search?q=Verizon+5G+and+music&qpvt=Verizon+5G+and+music&FORM=VDRE

*Bristol, London, Manchester Video source. Valuable and important! https://
www.youtube.com/watch?v=vEv8-Ii8I3g Full Live Coverage: World's First 5G Music
Lesson with Jamie Cullum –WATCH THIS!!

About The Presenter

Dr. Fred Kersten:

Fred Kersten is currently and has been for twelve 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.

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.