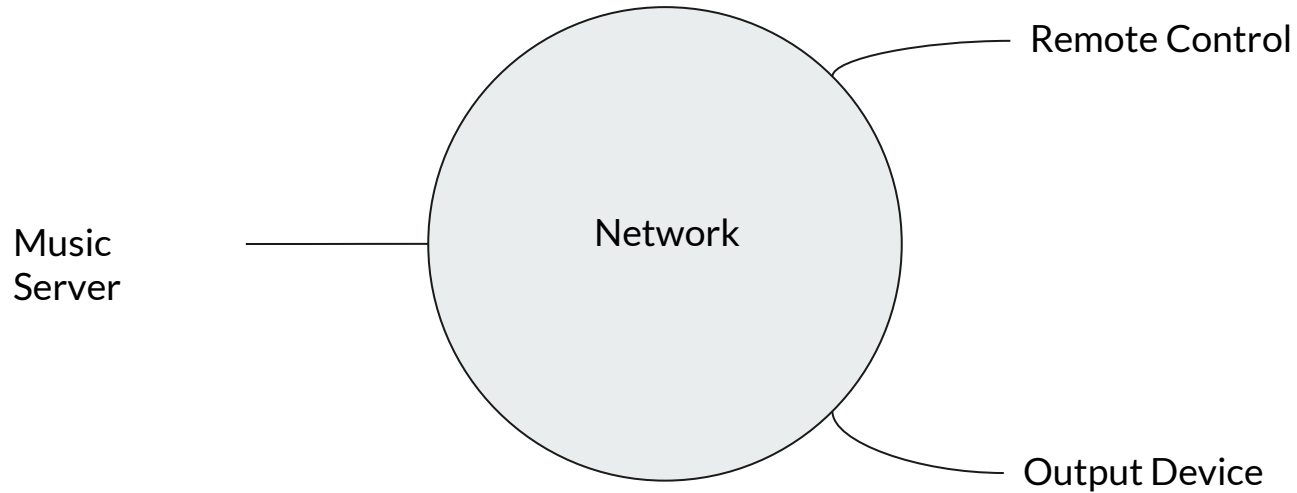


Music Streaming De- Mystified

What you need to know to get started or take your streaming game to the next level

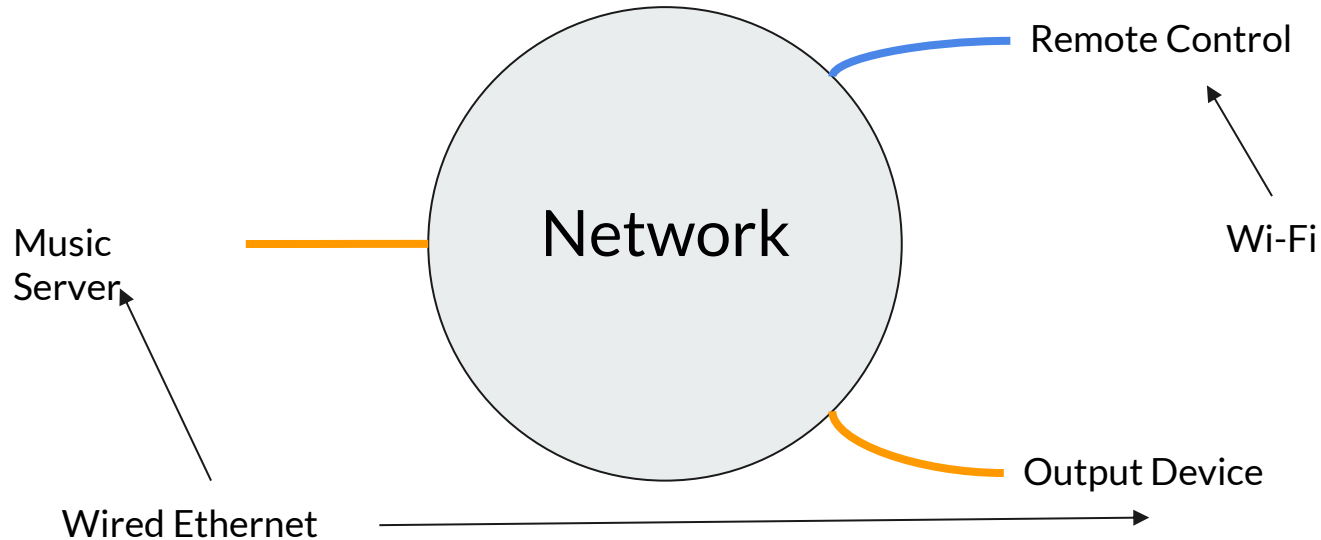


The Essentials of High Fidelity Streaming



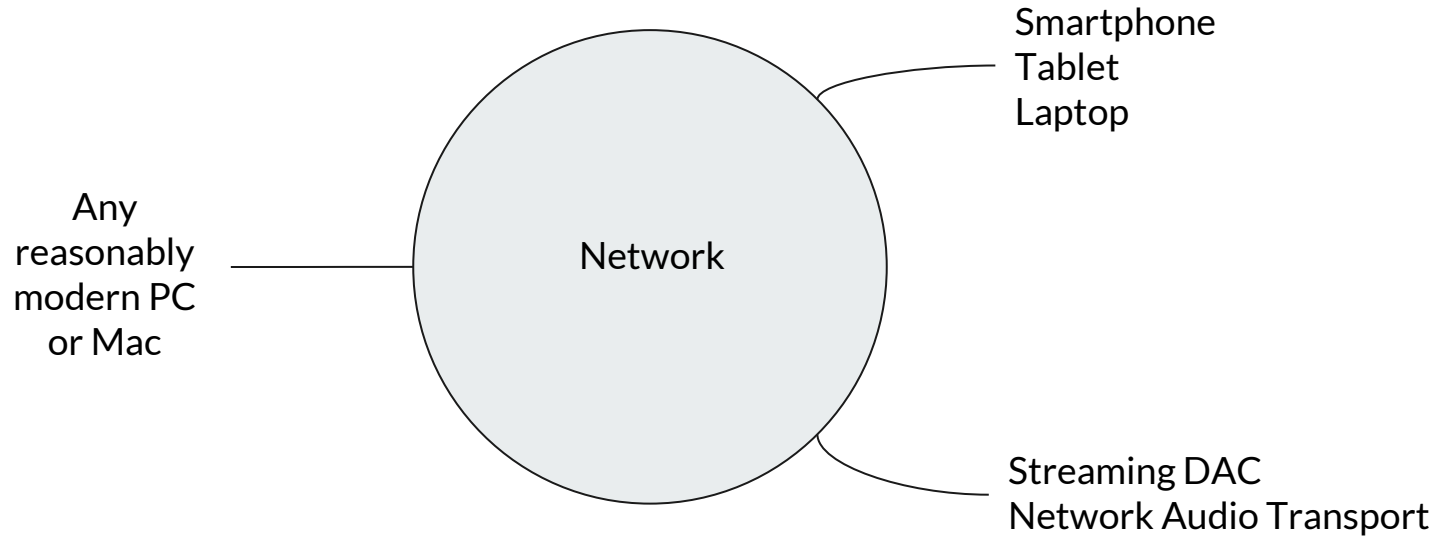


The Essentials of High Fidelity Streaming



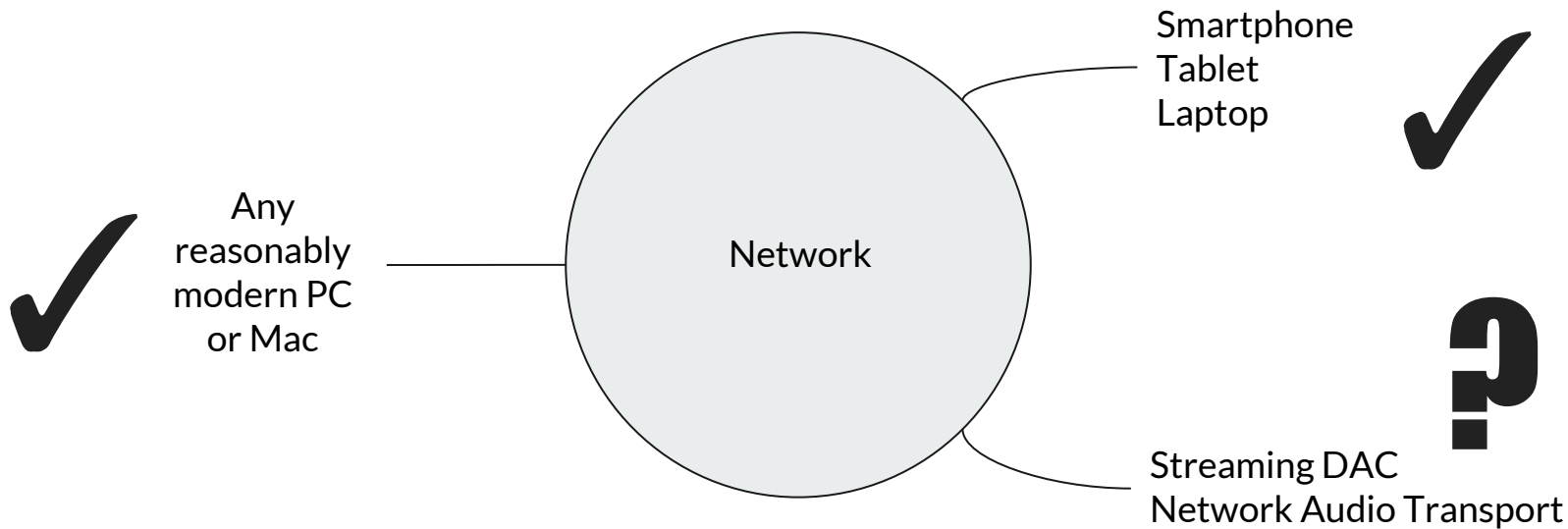


The Essentials of High Fidelity Streaming





The Essentials of High Fidelity Streaming





The Essentials of High Fidelity Streaming

Examples:

- Desktop PC running Windows 10
- Android Smartphone
- Mytek Brooklyn Bridge Streamer



The Essentials of High Fidelity Streaming

Examples:

- Desktop PC running Windows 10
- Android Smartphone
- Mytek Brooklyn Bridge Streamer
- Mac running macOS 10.1x
- Apple iOS Smartphone
- PS Audio DirectStream DAC with Network Bridge II



The Essentials of High Fidelity Streaming

Examples:

- Desktop PC running Windows 10
 - Android Smartphone
 - **Mytek Brooklyn Bridge Streamer**
 - Mac running macOS 10.1x
 - Apple iOS Smartphone
 - **PS Audio DirectStream DAC with Network Bridge II**
-
- PC or Mac (see above)
 - Smartphone or Tablet
 - USB or S/PDIF DAC and **Allo USBridge Signature Player**



The Essentials of High Fidelity Streaming

Examples:

- Desktop PC running Windows 10
 - Android Smartphone
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- PC or Mac (see above)
 - Smartphone or Tablet
 - **USB or S/PDIF DAC and Allo USBridge Signature Player**
 - PC or Mac (see above)
 - Smartphone or Tablet
 - **USB or S/PDIF DAC and Raspberry Pi or NanoPi**



Q&A and Music Break #1

1. How do artists get compensated when music is rented rather than owned? Is it an equitable arrangement? Is it better or worse than the old days?
2. Digital sharing and legal ramifications
3. How to simplify the process and keep system from becoming obsolete in a year or two at reasonable cost



Streaming (history, definitions, applications)

- Streaming is not new, so why the big focus on it now in 2020?
- Streaming defined:

“A one-way audio transmission over a data network. Unlike music files that are downloaded and played at any time in the future, a streamed song is played immediately after a small amount of audio data is received, and the song file is not stored permanently in the destination device.” – PCmag.com



Streaming (history, definitions, applications)

On-Demand Streaming vs. Live Streaming

- On-demand is like familiar audio sources such as CD, Vinyl, tape, etc.
- Live is like FM broadcasts...you have little control over what music is played or when it starts



Streaming (history, definitions, applications)

Internet streaming vs. Local Streaming

- Internet – audio transmission over the public Internet
- Local – audio transmission among devices within your home



Streaming (history, definitions, applications)

Uncompressed vs. Lossless and Lossy

- Uncompressed – within your home
- Lossless – eg. Qobuz, TIDAL HiFi, Deezer HiFi, Amazon Music HD
- Lossy – eg, Spotify, Google Play Music, Apple Music, SoundCloud, Pandora



Streaming Architectures

Integrated

(everything in the listening room)

Aurender, Innuos, Auralic, Volumio



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Mesh (no central server)

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SONOS®, Denon HEOS™, DTS Play-Fi,
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Distributed

(noisy bits away from the listening room)

HQPlayer, LMS, Roon, Plex Media Server



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Distributed

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Point-to-Point

(player to renderer)

BubbleUPnP, Apple mconnect Player,
Audirvana, Apple AirPlay



Q&A and Music Break #2

1. What's your take on the controversy over whether up-sampling digital music (e.g. from 48/24 or 96/24 to 192/24 makes that music sound better or not - or even worse?
2. Which component (DAC, Streamer, or Cables) have the greatest impact on sound quality
3. I have over 40 years of records and CDs (SACD) that I enjoy! I will not pay for music I may have already, so why should I care about streaming?



Computer Audio for Streaming

The shortest signal-path principle does not always apply

There's no such thing as "generation loss"

Harmonic vs. non-harmonic distortion



Computer Audio for Streaming

Keep noise out of the listening room

- Fan noise and vibrations
- HDD noise and vibrations
- RFI, EMI, ground plane contamination
- Proper grounding (exactly one path to ground)



Computer Audio for Streaming

Minimize processing in the listening room

- A busy CPU is a noisy CPU
 - Prefer low power CPUs that are mostly idle
 - Do no processing on endpoints
- Bursty data transfer is noisy
 - Prefer small buffer sizes



Computer Audio for Streaming

General best practices

- Isolate and shield analog signals and DC power from data signals
- Garbage In / Garbage Out (source quality matters)
- The “A” in DAC stands for “Analog”
 - Clean, stable power is important
 - Pay attention to input/out impedance
 - Quality interconnects



Computer Audio for Streaming

Most data transfer is bit-perfect and without generation loss

- File copies on and between storage devices
- Over your home network
- Over the public Internet



Computer Audio for Streaming

Some data transfer is not guaranteed to be bit-perfect (error detection only)

- Isochronous (real-time) USB (yes, even asynchronous)
- S/PDIF (timing)
- HDMI (noise contamination from the video signal)
- CD Ripping



Computer Audio for Streaming

Tweaks and problem solvers

- Galvanic Isolation
- Fiber Optic media converters
- Audiophile networking?
- Power Conditioning
- Vibration Dampening



Computer Audio for Streaming

Music file resolution – what's it all about? MP3, CD quality, high resolution, MQA, DSD

- For most of us, high-rez has more to do with playback optimization than resolution
- What format does your DAC like most?
- Streaming can enable you to always feed your DAC its favorite format
- Priorities should be performance, recording/mastering, matching to the DAC, and then delivery format
- High-rez has implied but never guaranteed great mastering!



Q&A and Music Break #3

1. How to escape iTunes.
2. What are the fundamental, audible differences in the various components that make up the streaming audio chain?
3. Which streamers sound the best for the money, and what features do I really need.



Home Networking

Must Haves for Streaming

- A reliable Internet connection (latency is more important than bandwidth)
- A reliable home network (wired Ethernet to at least two different rooms)

Nice to Have

- Network Attached Storage (for local files)



Home Networking

Home Network Topologies

- Direct Internet Connection
- Integrated Broadband Gateway
- Star
- Distributed Star
- Balanced Distributed Star



Home Networking

Home Network Topologies

- Direct Internet Connection
- Integrated Broadband Gateway
- **Star**
- Distributed Star
- **Balanced Distributed Star**



Home Networking

Where does lossless streaming music come from?

- TIDAL HiFi
- Qobuz
- Deezer HiFi
- Amazon Music HD
- HIGHRESAUDIO (currently EU only)



Home Networking

Where does lossy streaming music come from?

- Apple Music
- Spotify
- Pandora Radio
- SoundCloud
- Google Play Music



Home Networking

Don't forget local files...

- CD Rips
- Needledrops
- Digital Downloads



Home Networking

What do you need to stream music to your stereo?

1. A **component** in your stereo that can receive digital audio over your home network
2. A networked **computer** somewhere in your house to manage your library, respond to remote control requests, and stream to output devices
3. A beautiful but otherwise not distracting **remote control** device



Q&A and Music Break #4

1. Is high res streaming really audibly better?
2. Network switches to improve direct ethernet filtered connection.
3. Very interested in the DIY side of the world
4. Does the quality of the streaming service transmission equipment vary, or does the quality of this equipment far exceed the quality of any receiving equipment?



Putting It All Together (sample configurations)

Streamers

- [Bryston BDP-π Player](#) (\$1,495)
- [Cary Audio DMS-600 Network Audio Player](#) (\$5,495)
- [dCS Rossini Player](#) (\$28,499)
- [Mytek Brooklyn Bridge](#) (\$2,995)
- [Orchard Audio PecanPi Streamer](#) (\$499.99)
- [Allo Katana Player](#) (\$339 - \$488)
- [Allo Boss 1.2 Player](#) (\$129 - \$318)



Putting It All Together (sample configurations)

Network Audio Transports (you provide the DAC)

- [Sonore ultraRendu](#) (\$875)
- [SOtM sMS-200 Neo Network Player](#) (\$450)
- [Allo USBridge Signature Player](#) (\$249 - \$622)
- [Allo DigiOne Signature Player](#) (\$315 - \$464)
- [dCS Network Bridge](#) (\$4,750)
- [ELAC Discovery Series DS-S101-G](#) (\$1,249.98)
- [Pro-Ject Stream Box S2 Ultra](#) (\$849)
- [NanoPi NEO2](#) (\$39, but some DIY work required)



Putting It All Together (sample configurations)

Tell me about your system, and I'll make recommendations...



Putting It All Together (sample configurations)

Stop and think about what's possible that you might not have considered...



Putting It All Together (sample configurations)

Why you should be considering Roon if you're not already a subscriber

Roon Terminology

- Core (Roon desktop app, RoonOS/ROCK, Nucleus)
- Control (Roon desktop app, Roon Remote)
- Output (Roon Ready™ devices, Roon Bridge, Others)



Putting It All Together (sample configurations)

Pro-Tips for your Roon Trial

- Start your Roon and TIDAL or Qobuz (pick only one) trials at the same time
- Learn about functionality with the desktop app, but don't judge sound quality
- Don't worry about the folder structure of your media library. Roon does not expose this.
- If you don't use embedded metadata, you may have to help Roon identify albums
- Radio mode is enabled by default. Turn it off if you don't want to play music forever
- FLAC/ALAC no longer have a disadvantage
- Add a Control (Roon Remote App) once you have a feel for it
- Enable more outputs
- Try zone transfer/grouping and headphone DSP



Putting It All Together (sample configurations)

Pro-Tips for Best Sound Quality with Roon

- Never connect a DAC to Core
- Enable album volume leveling on all outputs (-14 to -18 LUFS)
- Pay attention to power and grounding
- Use RAAT protocol wherever possible



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