

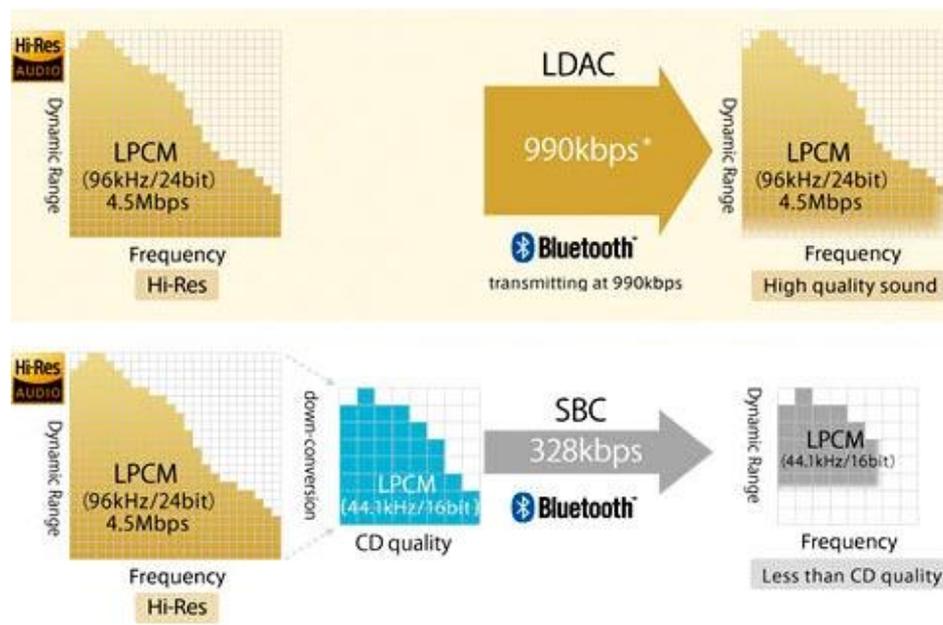
## LDAC: Experience your N8 through a wireless Hi-Res connection

### (1) Introduction

Bluetooth has always been considered as a convenient but low quality option for audiophiles. The situation was changed dramatically in past few years when new codec such as AAC and aptX gained popularity, and the latest LDAC Bluetooth codec developed by Sony has added fuel to the fire. LDAC allows streaming audio up to 24Bit/96kHz over a Bluetooth connection, and it has made full use of the bandwidth, offering a connection speed up to 990 kbps.

LDAC employs a hybrid coding scheme to squeeze the Hi-Res audio data into the limited bandwidth. It comes with 3 connection modes: quality priority (990 kbps), normal (660 kbps), and connection priority (330 kbps) respectively. The playback quality will be compromised when only lower speed options are feasible (either hardware limitation of environment constraint).

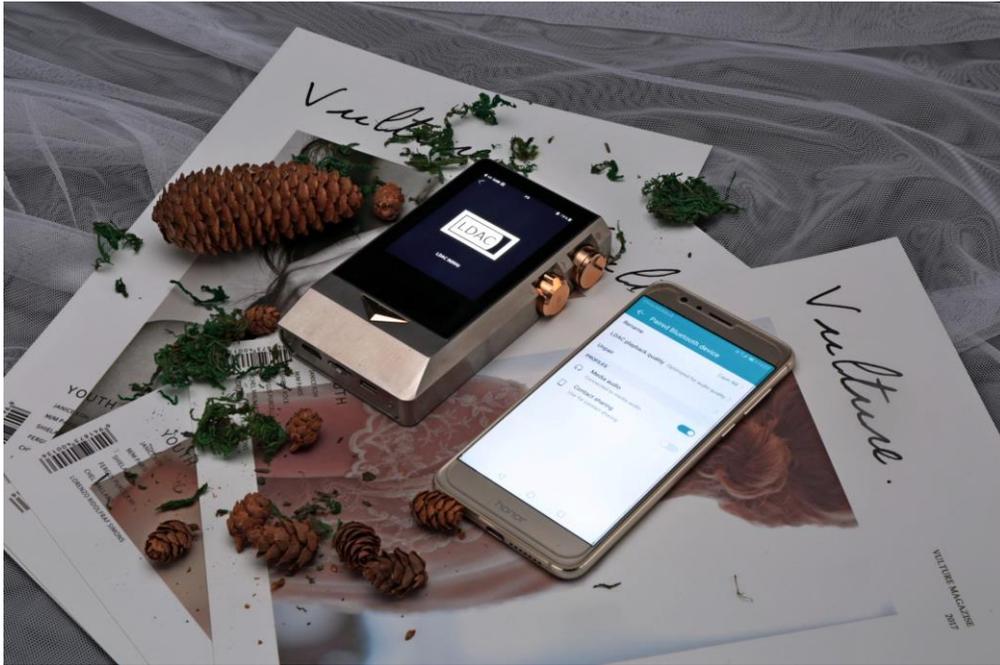
LDAC is a lossy compression codec. At Quality Priority mode, Sony promised CD-quality playback at quality priority mode and from what has been announced, 16Bit/44.1kHz bitstream will be transmitted as-is without any compression.



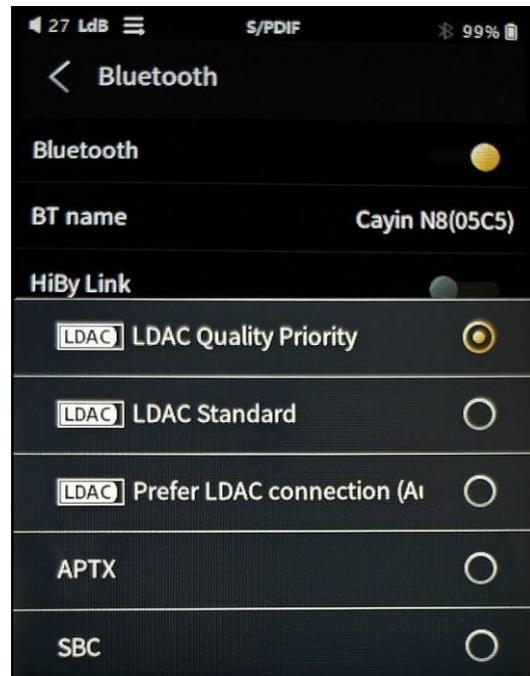
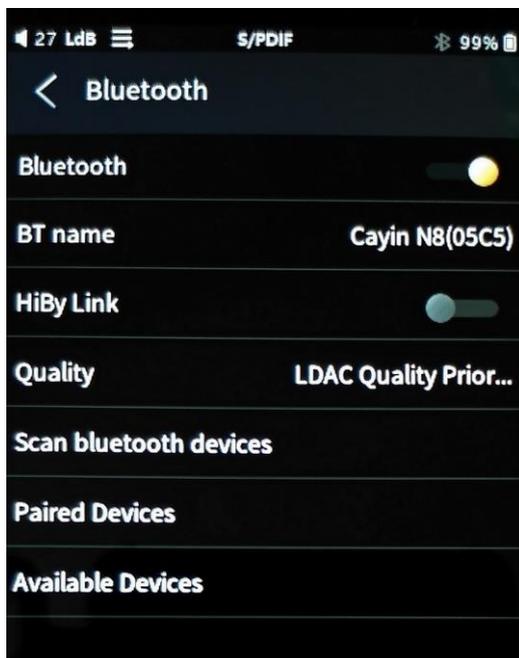
LDAC is used across a wide range of Sony products, including headphones, speakers, mobile phones, portable player and home theater systems. When Google announced Android O (aka Android 8.0 Oreo) at Mar. 2017, the mobile industry was surprised that Sony has become an Android partner and played a key role to improve the wireless audio capability of Android devices. Among the features enhancements and bug fixes, LDAC will be available as a part of the core Android Open Source Project (AOSP) code, enabling OEMs to support this Sony codec in their Android O devices freely.

### (2) N8 as wireless DAC (Rx mode)

If you want to listen to your music resource on your Android mobile phone through your N8 DAP, N8 will be connected in Receiver mode (Rx mode) through a pairing process and your mobile phone will take over the operation of the player once the pairing is completed.



1. Turn on the Bluetooth feature on your mobile phone.
2. Turn on the Bluetooth feature of your N8, and click the Bluetooth item on the System Setting menu to enter the Bluetooth control screen
3. Disable HiByLink because HiByLink connection will occupy the Bluetooth connection and stop you from using the LDAC feature.
4. Select "LDAC Quality Priority" mode under the Quality item

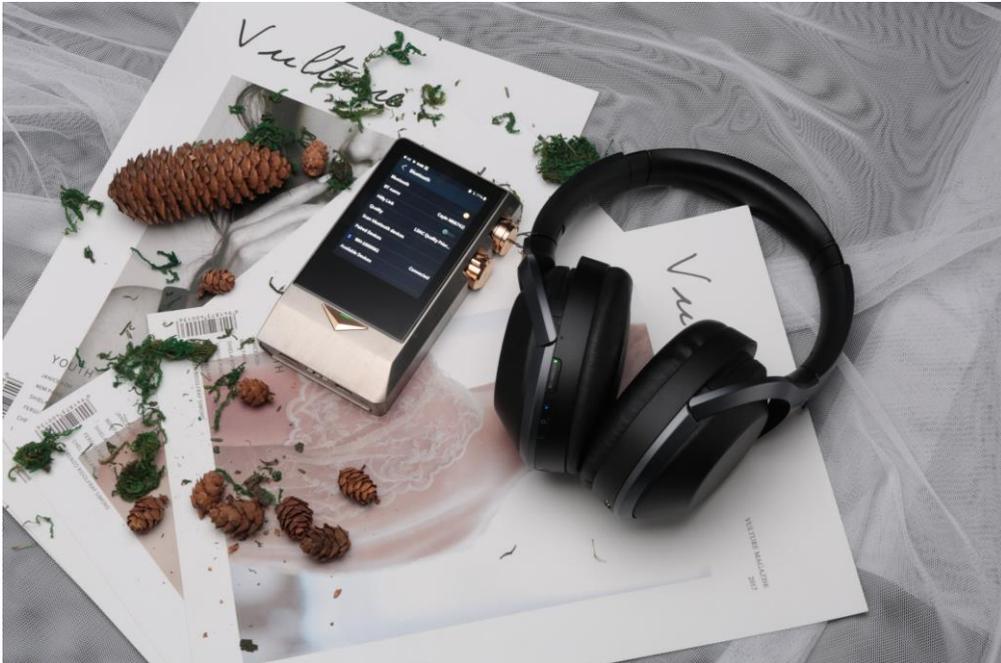


5. If you cannot see your mobile phone on the Available Device list, scan Bluetooth Device. If you still can't find the mobile phone after scanning, make sure you have set your mobile phone "discoverable" by other Bluetooth devices
6. Alternatively, you can search for N8 from the Bluetooth control screen of your mobile phone.

7. Click your mobile phone name on the N8 available device list, or click N8 on the mobile phone available device list to activate the pairing
8. When the pairing is completed, LDAC connection becomes available, and N8 will now display the Bluetooth connection screen. N8 will perform as a wireless DAC to your mobile phone from here on.
9. Start playing music on your mobile phone (streaming app such Tidal or locally stored songs from a Music Player app), you should be able to hear it from your N8 now.

(3) N8 as source (Tx Mode)

If you want to listen to your N8 music resource on a LDAC compatible output (Bluetooth speaker or headphone, N8 will be connected in Transmitter mode (Tx mode) through a pairing process. The following instruction assumes you'll be using a Bluetooth headphone in the pairing process. Please be reminded that the procedure can be slightly different, and you have to consult the manual of your Bluetooth output device for details.



1. Turn on the Bluetooth of your headphone.
2. Turn on the Bluetooth feature of your N8, and click the Bluetooth item on the System Setting menu to enter the Bluetooth control screen
3. Disable HiByLink because HiByLink connection will occupy the Bluetooth connection and stop you from using the LDAC feature.
4. Select "LDAC Quality Priority" mode under the Quality item
5. If you cannot see your headphone on the Available Device list, scan Bluetooth Device.
6. Click the headphone name on the N8 "Available device" list
7. When the pairing is completed, LDAC connection becomes available, depends on the feature of your headphone, it might inform you the status of the LDAC connection through a LED indicator.
8. Start playing music on your N8, and you should be able to hear it from your headphone now.

(4) Additional information on LDAC and related N8 operation

1. Communicating with LDAC requires both transmitting and receiving devices support LDAC at the same time.
2. LDAC is not available to iOS device currently.
3. LDAC offers high quality audio playback at the expense of consuming more power than regular Bluetooth connection,
4. “LDAC Quality Priority” mode is prone to interference. If you experience audio drop of high background noise, please try to move away from routers, phones or RF wireless device or downgrade your connection to Standard mode.
5. LDAC is a lossy compression algorithm, so your N8 will not receive a bit-perfect copy of the music from your mobile phone. In addition, your mobile phone might implemented SRC (Sample Rate Conversion) on the Bluetooth output and always convert the audio output to a specific sampling frequency. That explained why the sampling rate will remain unchanged on your N8 LDAC connection screen when you playback different Hi-Res format on your mobile phone.
6. LDAC employs Bluetooth's Enhanced Data Rate (EDR) technology to squeeze Hi-Res audio data into the 990 kbps connection. EDR is an optional feature in Android system only, so it is possible that some Android 8 device has not implemented the EDR and therefore do not support the LDAC coded. If you are in doubt, please contact your mobile device manufacturer or more details.
7. EDR speeds allows up to 3 Mbps theoretically but in reality, most Android devices can only achieve 1.4 Mbps, with 1 Mbps being recommended as the minimum stable connection. That probably explained why Sony's LDAC specification selected 990 kbps as the connection speed limit. In other word, new Bluetooth code in near future will not be able to exceed this threshold at 990 kbps
8. Once N8 is connected in Rx mode, the mobile phone become the “Master” and N8 will operate in “Slave” mode, that explained why you cannot manipulate the pull-down menu of N8 from there on. Any menu operation will terminate the Bluetooth connection. For this reason, please setup your N8 to intended settings (e.g., Gain setting, Tube/Solid State output, ... ) before you engage the LDAC connection.

(5) Extended Readings

Find out what Sony said about their LDAC technology

<https://www.sony.net/Products/LDAC/>

Media review of LDAC technologies

<https://www.androidauthority.com/sony-ldac-codec-790690/>

The limitation of LDAC technologies

<https://www.soundguys.com/ldac-ultimate-bluetooth-guide-20026/>