



# Fraunhofer

IIS

FRAUNHOFER INSTITUTE FOR  
INTEGRATED CIRCUITS IIS

## LOW COMPLEXITY COMMUNICATION CODEC PLUS (LC3PLUS)

HIGHER AUDIO QUALITY AND LOWER POWER  
CONSUMPTION FOR WIRELESS ACCESSORIES



Fraunhofer IIS and Ericsson developed the LC3plus audio codec to solve fundamental shortcomings present in today's wireless audio accessories, which prevent users from enjoying high speech and audio quality. The new codec brings super-wideband phone calls to Digital Enhanced Cordless Telecommunications (DECT) or VoIP, and enables high-quality audio streaming on wireless headsets or speakers.

### **Low energy, high quality**

LC3plus features operation modes ranging from medium bit rates for optimal voice transmission to high bit rates for high-resolution music streaming services. At the same time, the codec operates at low latency, low computational complexity, and low memory footprint. By reducing the required bit rate by roughly 50 percent compared to legacy codecs for wireless platforms and accessories, LC3plus paves the way for low-energy services that prolong battery life and facilitate the creation of smaller products.

### **Plus – Providing additional features and use cases**

Besides, LC3plus offers functionalities for transmission robustness, extremely low-delay use cases, and high-resolution audio transmission.

### **Landline telephony**

- LC3plus enables super-wideband quality for VoIP use cases. The number of communication channels stays the same as for wideband.
- Thanks to its inclusion in the 2019 DECT standard, LC3plus brings super-wideband speech/audio quality to DECT. For wideband, the capacity of calls doubles compared to the preceding standard.
- In terms of robustness, LC3plus channel coding – which was specifically designed for DECT channel characteristics – allows the transmission of LC3plus payloads over heavily distorted

DECT channels. This enables phone calls without interruption, even if the handset is far away from the base station or in locations with adverse Radio Frequency (RF) channel characteristic.

### High-resolution streaming

With its dedicated high-resolution audio mode, LC3plus provides an audiophile level transmission link of 24 bit and 96 kHz audio data. It achieves best-in-class Signal-to-Noise (SNR) ratio and Total Harmonic Distortion and Noise (THD + N) values. This makes LC3plus the ideal codec to bring high-transparency audio streaming to high-quality and high-resolution wireless accessories such as headsets or loudspeakers.

### Open standard

LC3plus has been standardized by ETSI as TS 103 634, making it the first and only open standard to provide the quality of high-resolution music streaming services also over wireless accessories. This in turn allows manufacturers to remain independent from proprietary, vendor-specific technologies.

### Availability

LC3plus software is available from ETSI.

With regards to patent licensing, please contact Fraunhofer IIS.

Also, Fraunhofer IIS can provide support with the implementation of LC3plus in devices based on the Bluetooth A2DP profile: upon request, we offer a specification of the transport mechanism and Android patches for LC3plus HR via Bluetooth A2DP.

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