

Qualcomm® Snapdragon™ Tech Summit 2017

#SnapdragonSummit



Hear, Listen...now Speak

Hi-Fi Audio & Voice UI Evolution

Ravi Satya

Sr. Director, Product Management

Qualcomm Technologies, Inc.

12/7/2017

@qualcomm





Audio: Having a Renaissance



Wireless



Wired
(Analog & Digital)



Smartphones



Smart Speakers

Qualcomm Aqstic & Qualcomm aptX

Qualcomm Aqstic
3.5mm jack



Bluetooth
aptX

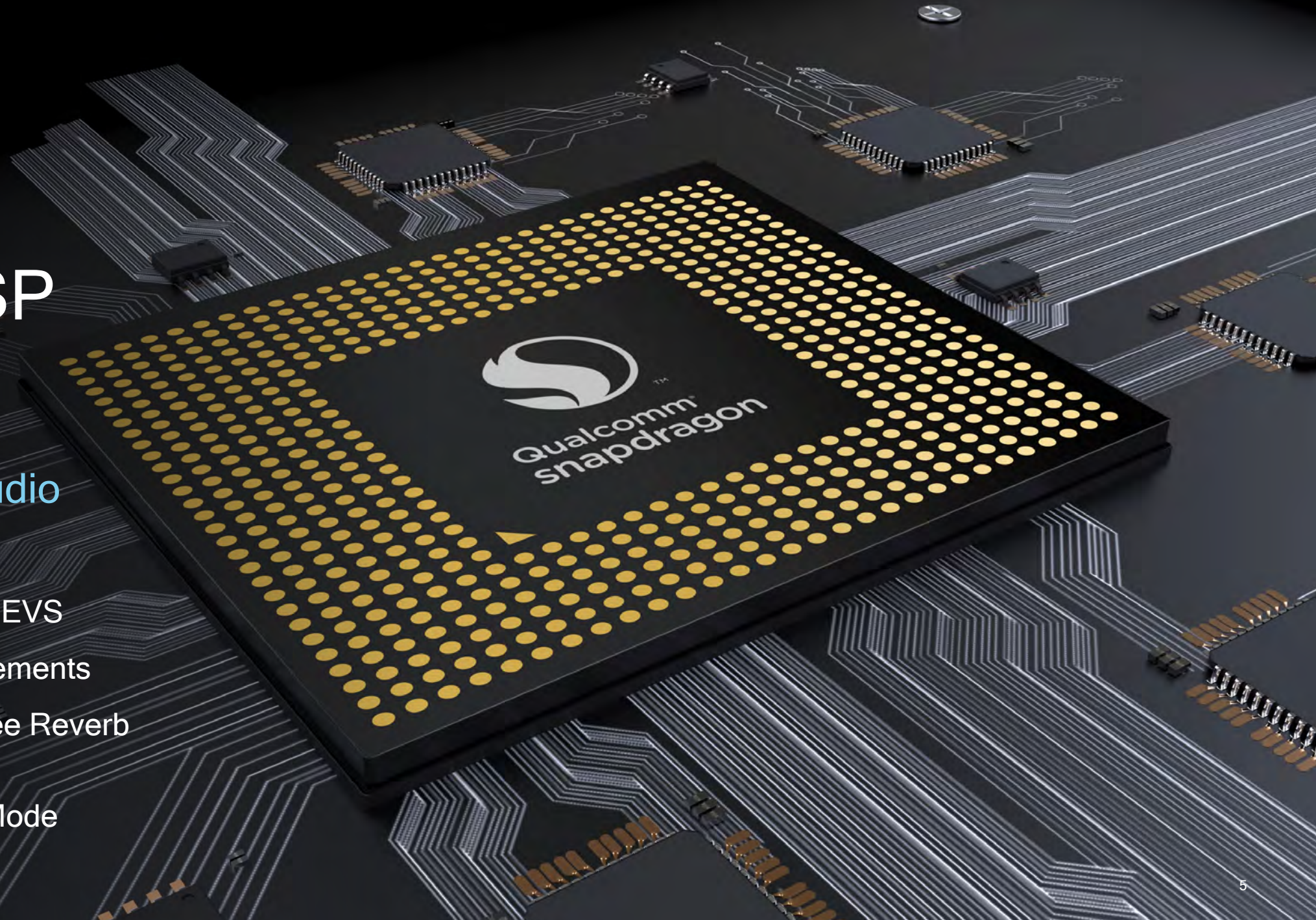
Qualcomm Aqstic
USB Type-C



Hexagon Audio DSP

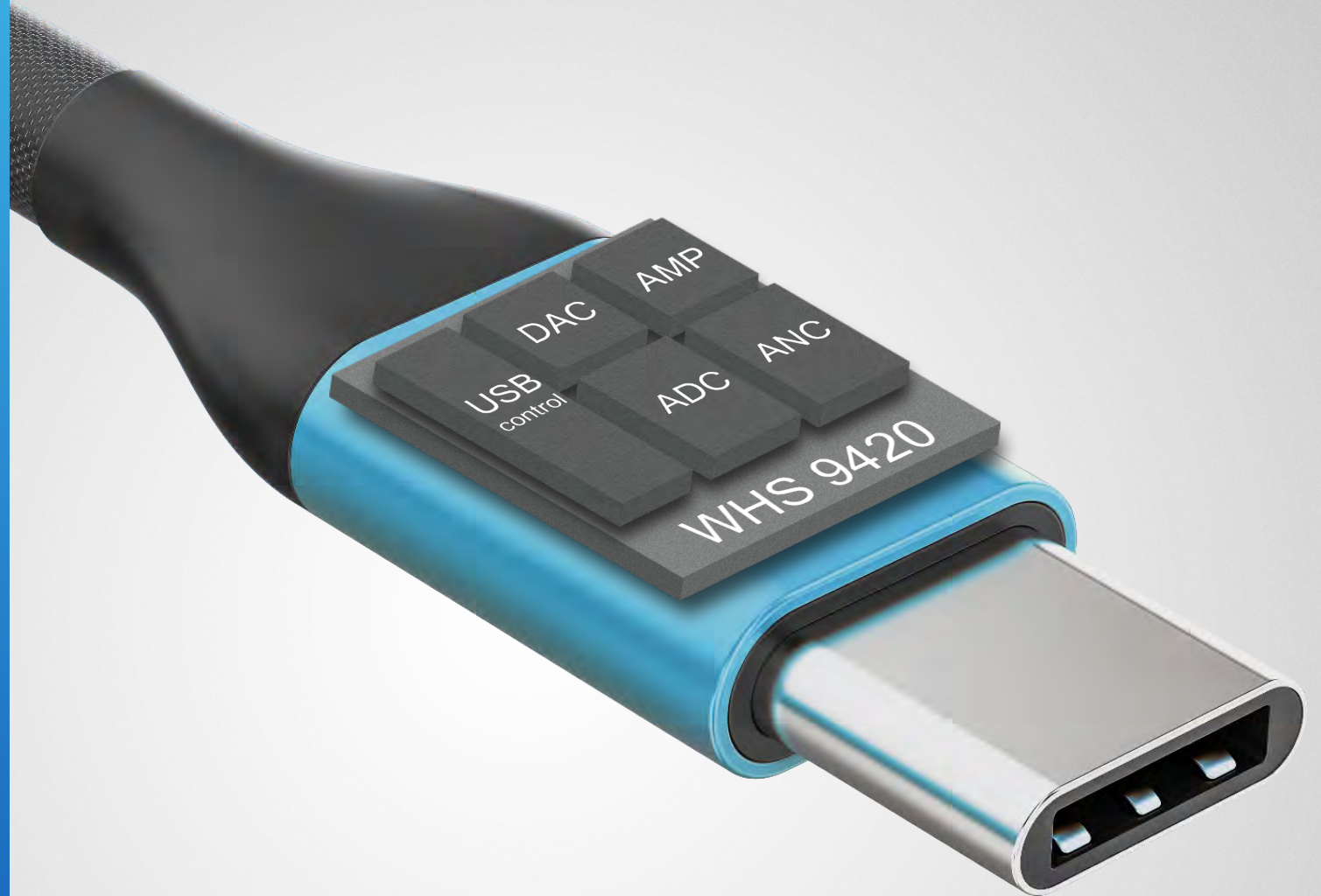
First DSP
dedicated to audio

- Super Wideband EVS
- Voice UI enhancements
- Virtual latency-free Reverb and audio effects
- USB3.0 Tunnel Mode



Aqstic USB-C Headset codec (WHS9420)

- Extremely low power
- Hi-Fi DAC
 - Up to 384kHz, 32bit
 - Dynamic range > 120dB
 - THD+N <-100dB
- ANC (Active Noise Cancellation)
- Hi-Fi ADC
- Binaural recording



Introducing

Qualcomm Aqstic Hi-Fi DAC: AQT1000

Designed with Hi-Fi audio in mind.



Aqstic Hi-Fi DAC AQT1000

QTI's first dedicated
Hi-Fi audio DAC

Low power playback

Native DSD

384kHz / 32bit

Dynamic range: 123dB

THD+N: -105dB






USB Type-C →



← Analog headphone jack

Aqstic audio codec family

High Fidelity for almost every purpose

	Audio Codec (WCD)	Type-C Audio Codec (WHS)	Audio DAC (AQT)
Hi-Fi DAC (DSD)	●	●	●
Hi-Fi ADC	●	●	
Built-in ANC	●	●	
Voice UI DSP	●		
Low power consumption	●	●	●
Device	 Smartphone	 Headsets  Dongles	 Smartphones  Hi-Fi DACs

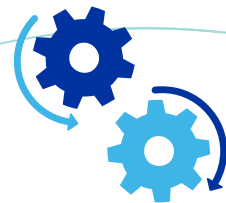
Qualcomm® aptX™



The modern Qualcomm® aptX™ audio ecosystem



Smartphones
& Tablets



Operating
Systems



In-car entertainment
systems



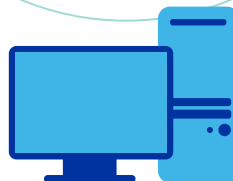
Networked
speakers



Bluetooth
speakers



Headphones
& headsets



PCs & laptops



Soundbars

Qualcomm® aptX™ HD: High-res wireless audio

- Wide dynamic range
- 24-bit audio resolution
- SNR of 129dB. Wider than any ADC/DAC
- Lower THD
- Moderately increased bit rate compared with classic aptX



Qualcomm® aptX™ HD audio momentum

Evolving ecosystem – source devices



Astell & Kern
A&ultima
P1000



Astell & Kern
Kann



Astell & Kern
AK320



Astell & Kern
AK380



Astell & Kern
AK300



Astell & Kern
AK70



LG
G5



LG
G6



LG
V20



LG
V30



LUNA
TG-L900S



Vertu
Constellation
Octane



OnePlus 3



OnePlus 3T



OnePlus 5



Onkyo
Granbeat



Sharp
SH-03J



Sharp
SHV39



Sony
Xperia ZX1



Sony
Xperia ZX1
Compact



Sony
NA-40 Series



Sony
NZX300



TRINITY
NuAns Reloaded



Google
Pixel 2 and Pixel 2 XL

Qualcomm®
aptX™ HD



Qualcomm® aptX™ HD audio momentum

Evolving ecosystem – sink devices



Naim Uniti
Core



Naim Uniti
Atom



Naim Uniti
Nova



Naim Uniti
Star



VIFA
Copenhagen



DALI
Calisto



Inateck
BR1006



Astell & Kern
XB10



Beyerdynamic
Aventho
Wireless



Beyerdynamic
Xelento
Wireless



LG
Tone Active+



LG
Tone Platinum



i.Tech
Stereo Pro2



Audio-Technica
ATH-DSR7BT



Audio-Technica
ATH-DSR9BT



BlueWave Audio
GET



Bowers and Wilkins
PX Wireless



Sony
WH-1000XM2



Sony
WI-1000X



Sony h.ear on 2
WH-N900N



Sony h.ear on 2
Mini Wireless
WH-H800



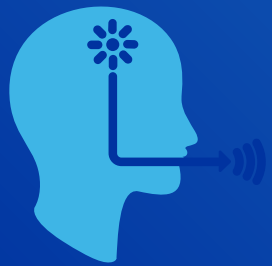
Sony h.ear on 2
WI-H709



Nuarphones

Qualcomm®
aptX™ HD



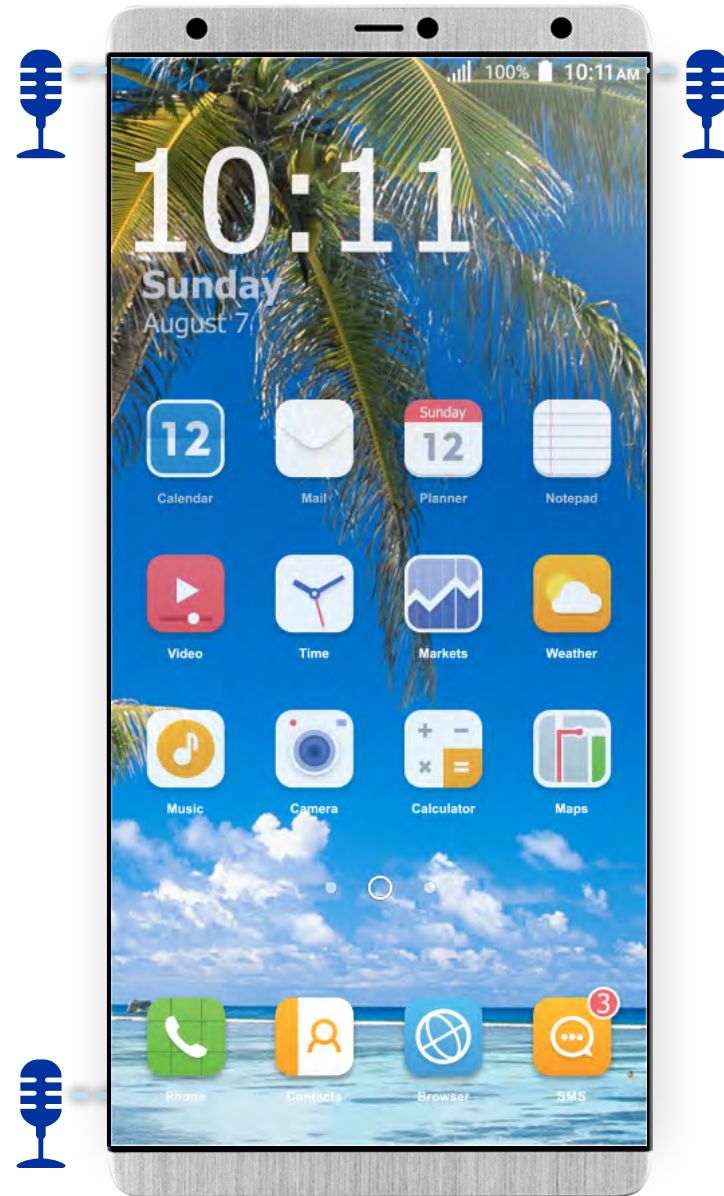


Aqstic Voice UI



Aqstic Voice UI

Low power voice activation
with Aqstic Voice suite



Google

amazon alexa

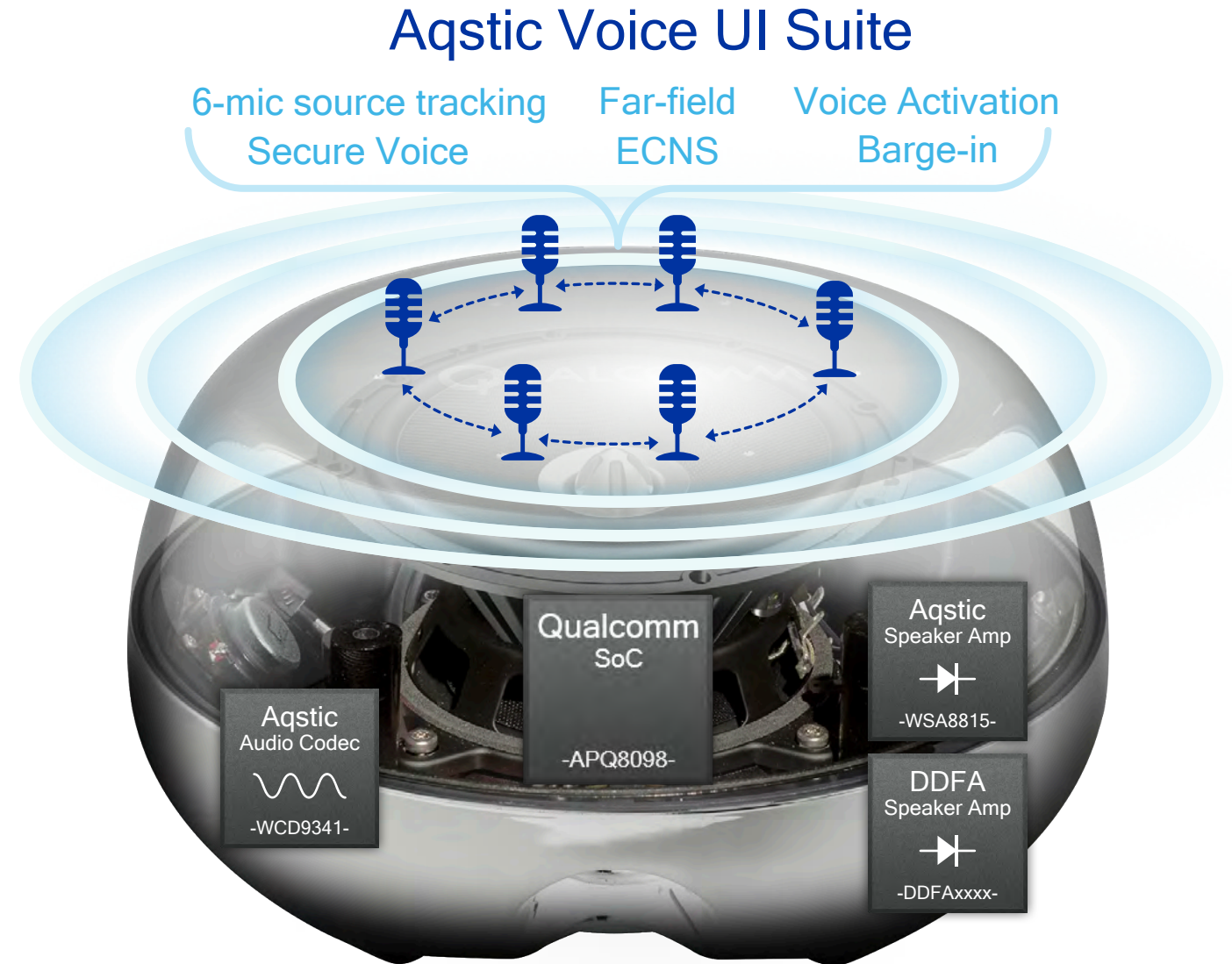
Baidu 百度

Smart Speaker Reference Design

Comprehensive solution

Create superior premium smart speakers with key audio technologies

Combined hardware and software across our platforms





QUALCOMM[®]

Bai du 百度



DUER OS

Baidu's Conversational AI platform

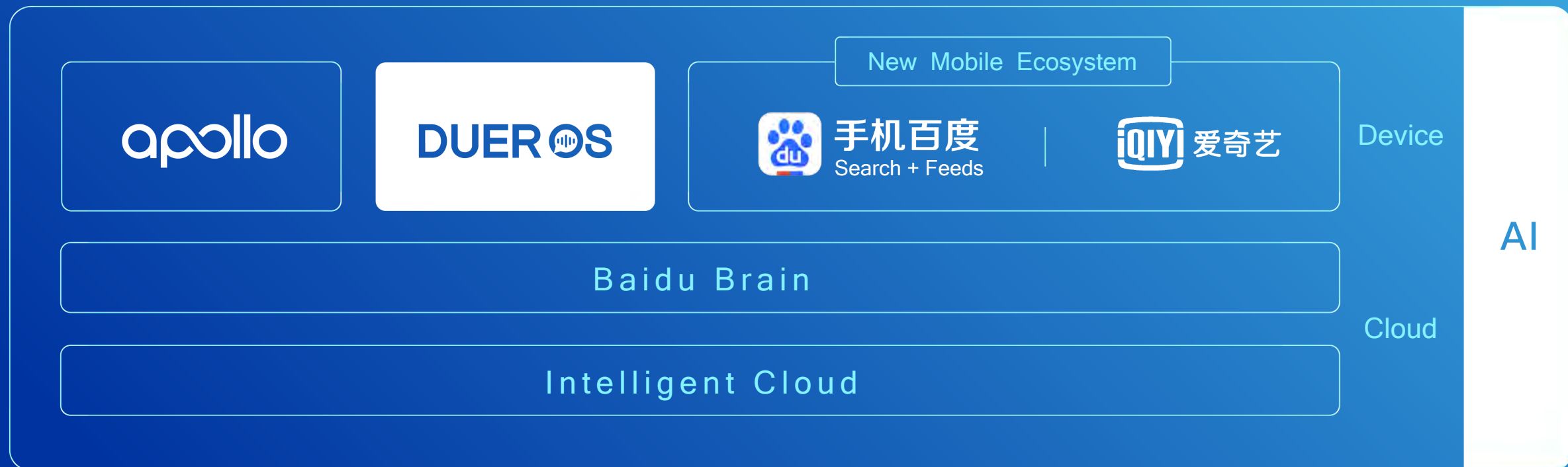
Jing Kun

General Manager of Baidu DuerOS

Dec 2017



Baidu : All in AI



3 essentials of voice conversation platform

Hearing

Understanding

Fulfillment

3 essentials of voice conversation platform

Hearing

Apply advanced
speech technologies
in daily acoustic
environment

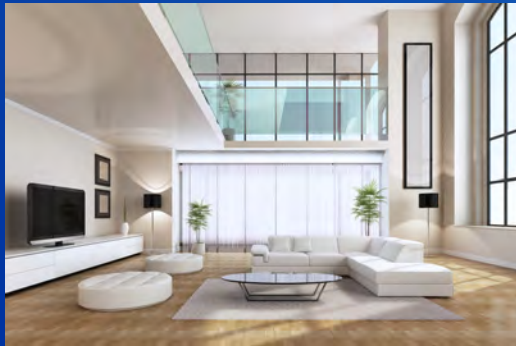
Understanding

Fulfillment

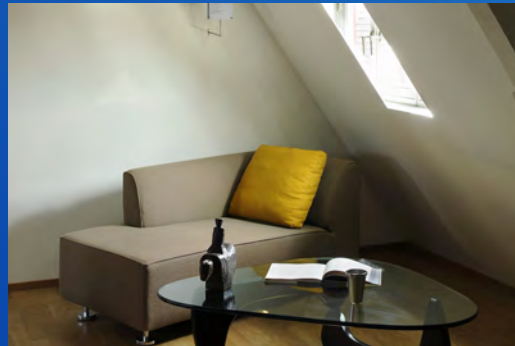
Hearing

Baidu's speech recognition accuracy: **97%+**

Far-field technologies: Microphone array, acoustic echo cancellation, beamforming, wake word detection, far-field automatic speech recognition



Large room



Small room



Vehicle



Noisy environment

3 essentials of voice conversation platform

Hearing

Understanding

Leverage machine learning algorithms, knowledge graph and big data to understand user needs

Fulfillment

Knowledge graph and big data

10M

User profile labels

100M

Multi-turn conversation sessions /
global POIs /daily navigation
mileages

100B

Hundreds of billions of
images /
Trillions of web pages

1B

Knowledge graph entities/
voice requests / audio
Content

10B

Entity relationship/ search
queries/ video content

Machine learning technologies

Deep Learning Technology

Widely used in search, advertisement, conversation understanding, etc.

Huge computing power in Baidu's cloud

Multi-turn Conversation Technology

Multi-turn conversation system based on deep learning and reinforcement learning

The first multi-turn conversation system tailored for devices and scenes

NLP Technology

Over 10 years of Chinese NLP experience

Leading in all Chinese NLP sub-fields

Search Technology

World's first multimodal search with voice/image/text

Leading in the shift from keyword based search to semantic based search

3 essentials of voice conversation platform

Hearing

Understanding

Fulfillment

Fulfill user needs
with information and
services

DuerOS' 10 Categories and 100+ Native skills

Audio & Video

Music Video
Film Audio books
Drama Radio
TV Show
.....

Information

News Sports
Weather Q&A
Stock Image
Flight
.....

Entertainment

Chats Games
Jokes
Poem composition
.....

Services

Food Shopping
Movie Taxi
Delivery Topping
Hotel
.....

Smart Home

Control
Status inquiry
Users' guide
Customer service
.....

Location services

Map
Navigation
Local search
Traffic condition.....

Tools

Translation
Dictionary
Calculation
Exchange rate.....

Phone Control

Phone call Contacts
Text App Control
Alarm
Calendar
.....

Personal Assistant

Schedule Memo
Alarm Notes
Remainder
.....

Knowledge & Education

Encyclopedia Idiom
Story Parenting
Children's song Book
.....

50,000

Dramas

1,500,000

Cars

400,000,000

Q&As

30,000,000

Video clips

1,000,000

Games

190,000

Real estates

45,000

Attractions

20,000,000

Songs

2,800,000

Singers

870,000

Novels

Premium contents

347,000

Hotels

20,000

Films

6,000

Funds

1,000,000

Manga

1,200,000

Reviews

15,000

Stock

26,000

Car models

48,000

Car dealers

50,000

Global Weather

30,000,000

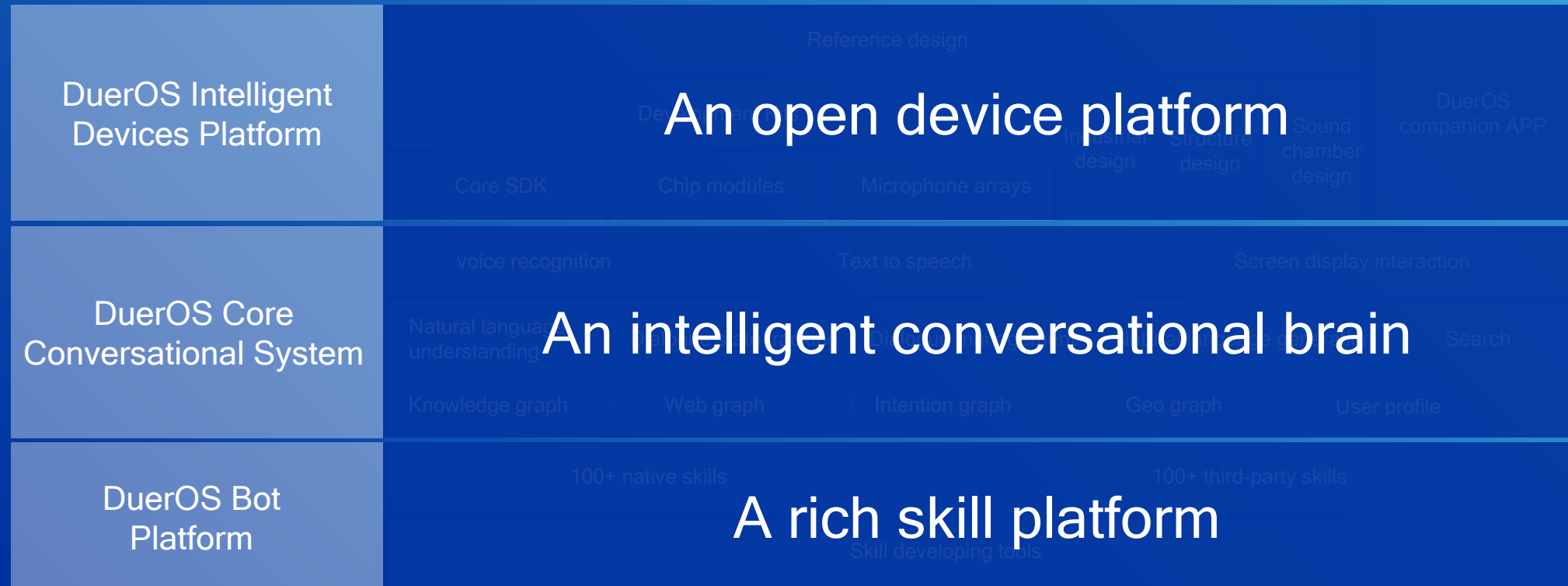
Job positions

600,000,000

Merchandise

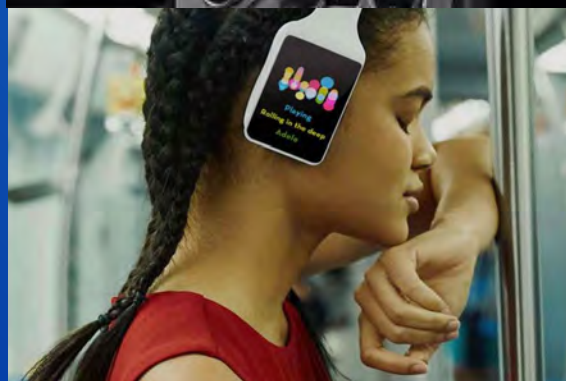
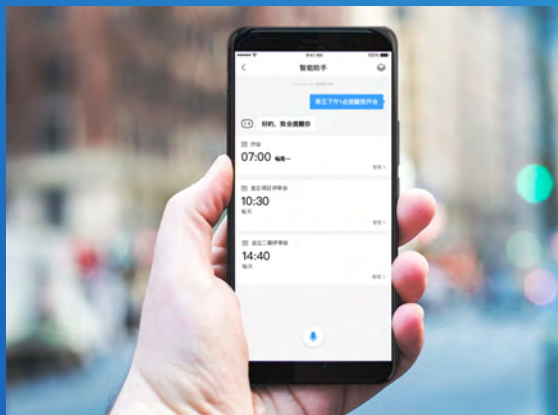
DuerOS Architecture

Conversational AI OS for everyone and everywhere



DuerOS is Everywhere

Cross-scene and cross-device experience



Morning

On the road

At work

Back home

DuerOS + Qualcomm
Bring more possibilities for smartphones



Qualcomm Aqstic & Qualcomm aptX


- Focused on supporting premium Hi-Fi audio quality requirements
 - Building comprehensive Voice UI platforms for driving new experiences
-





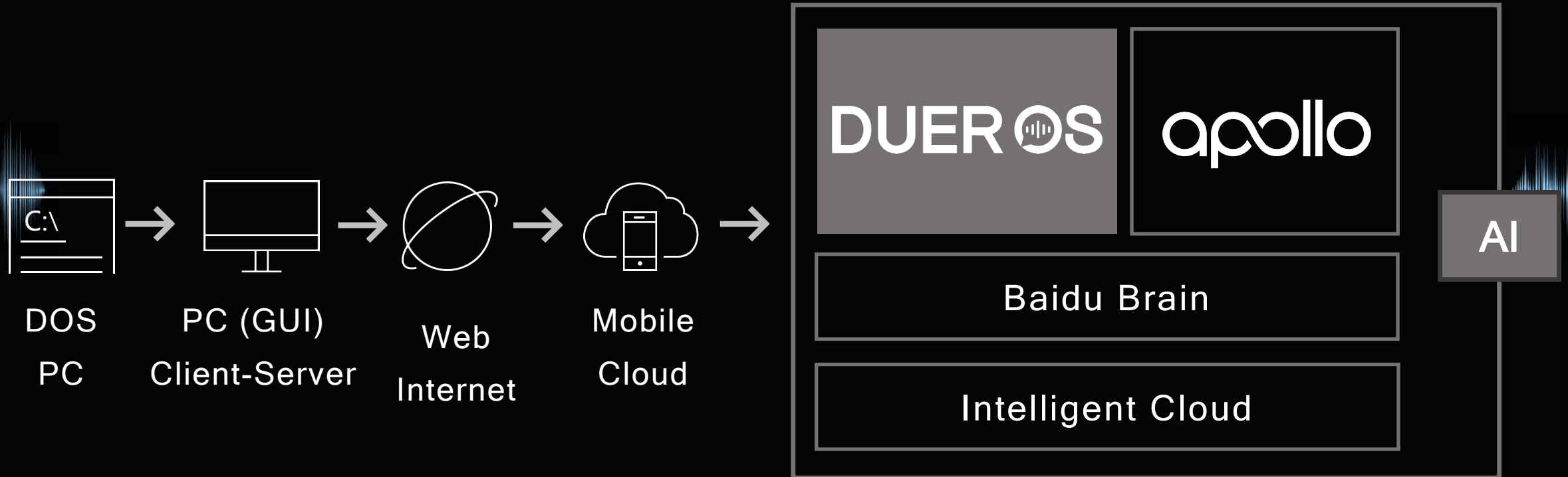
DUER OS

Conversational AI OS for everyone and everywhere



Baidu : All in AI

DuerOS Baidu's conversational AI platform



3 essentials of voice conversation



Hearing

Understanding

Fulfillment



Far-field, Real-world environment



Duer OS + Qualcomm
Bring more possibilities for smartphones

Duer OS + All Our Partners
Create a brighter future

Qualcomm TrueWireless™ Stereo

Completely wire-free Bluetooth™
stereo headset audio

- Earbud style headset
- Ultimate freedom without wires
- Streaming media
- Making phone calls
- Monitoring activities such as heart rate (with sensors)



Thank you

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