IDC | oppo

AI Smartphone White Paper

February 2024

Contents

AI has empowered many industries, but the user experience on mobile devices remains complicated

AI has empowered many industries

Manufacturing	Smart production management, automated defect detection	Internet	Intelligent coding assistance, data analysis, root cause analysis, IT operations
Finance	Financial market forecasting, smart customer service, risk control	Transport/ Healthcare	Intelligent vehicle and crew scheduling, AI-assisted imaging & diagnosis
Marketing	Image generation, web design, copy creation, user growth strategies, etc. for growth engineering	...	

The mobile device industry

Large user base

54% of the global population (roughly 4.3bn people) owns a smartphone

Close interaction

The phone has evolved from making calls to a wallet, music player, computer, key, and more, integrated into every aspect of lives

Long screen time

OPPO phone users spend 6 hours per day on average; phones are our constant companions

Source: GSMA report 2023

Source: OPPO statistics on phone users

How can AI empower users to focus on more meaningful tasks and live a more interesting life?

Fast-paced lives, fragmented time... Users want technology that frees up their energy and creativity

Phone use needs to be more efficient

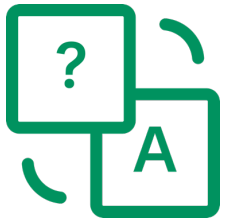
Taking a photo should be completed in one click

rather than switching between photo editing apps

Online media should be inclusive

rather than streamed with time-wasting ads and scams that discriminate less internet-savvy users

Language & culture should not be barriers



rather than sap our time and energy on translation and understanding culture differences

Time should not be wasted on admin

We still waste time and energy such as noting information and juggling schedules

Mission of AI smartphones : Solve the problems of fragmentation and admin tasks, so that users can focus on themselves and their value

Technology drives the evolution of mobile phones, enabling more productivity and creativity

Feature phones

2008
OPPO A103
First mobile phone: **Smiley Face**

Music phone
Defines a new industry form

Smartphones

Capacitive touchscreens revolutionized the form factor and the user interface

2013
ColorOS
Integrates hardware, software, and services

2013
OPPO N1
Camera phone

2023
OPPO Find X6
First phone with **main cameras**

Next-gen AI smartphones

Large models are transforming the way we use devices again

2024
OPPO Find X7
Leading the industry toward **next-gen AI smartphones**

AI opens up endless possibilities in the user experience; OPPO and our industry peers have the opportunity to define what the AI phone will be

What makes AI smartphone?

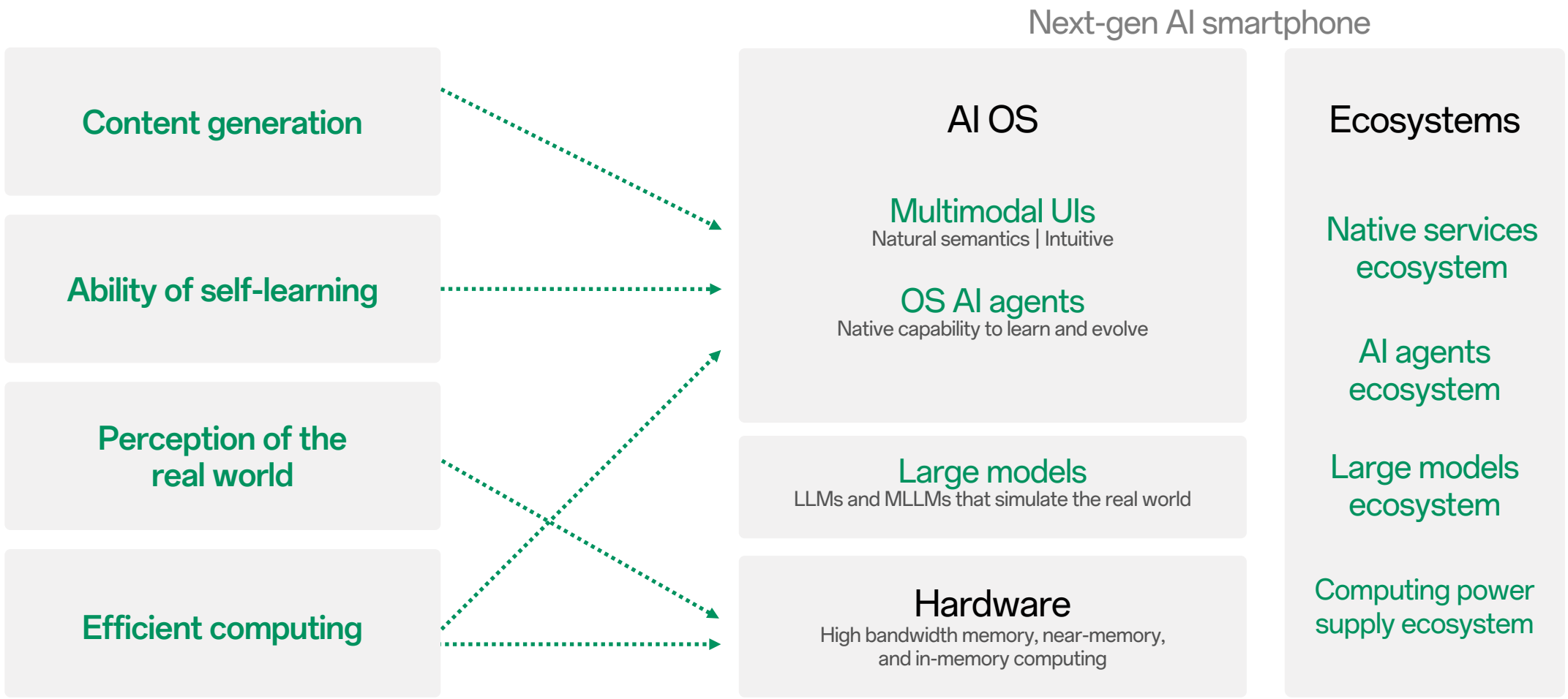
Efficient computing

Perception of the real world

Ability of self-learning

Content generation

Full-stack transformation and ecosystem restructuring of AI smartphones



Characteristics of AI smartphones

Open ecosystem of user-generate service

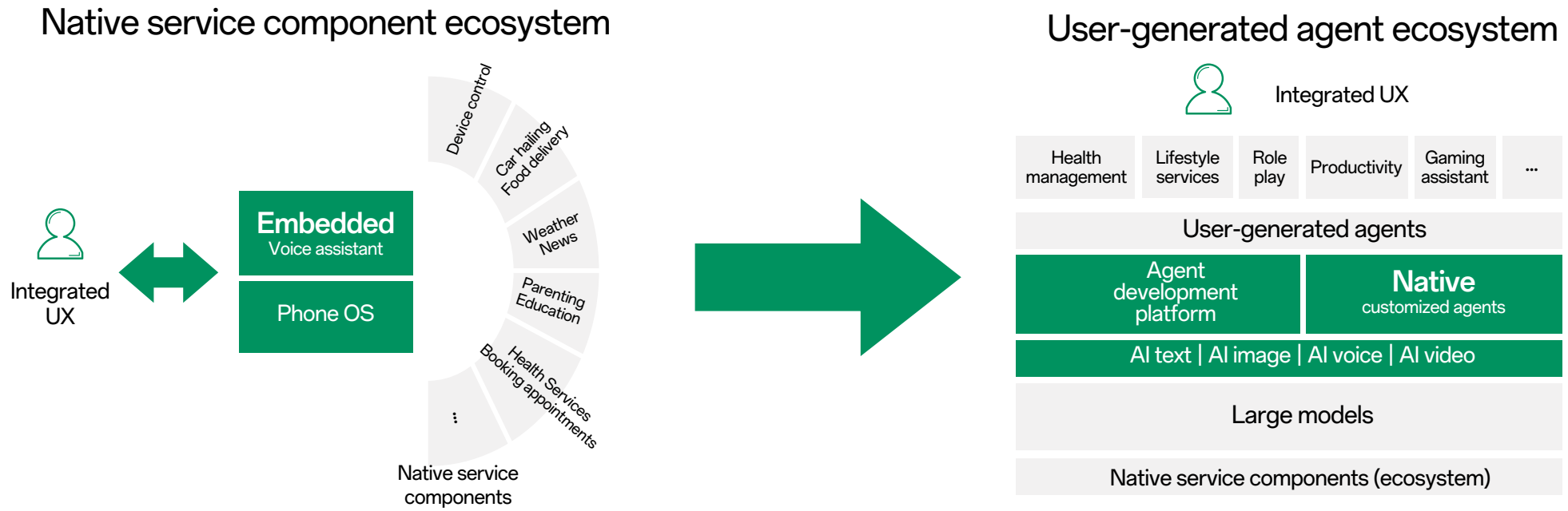
Context-aware, personalized AI OS

All-new multimodal UIs

Native AI agents

Device hardware supporting generative AI

Open ecosystem in both native components and user-generated agents



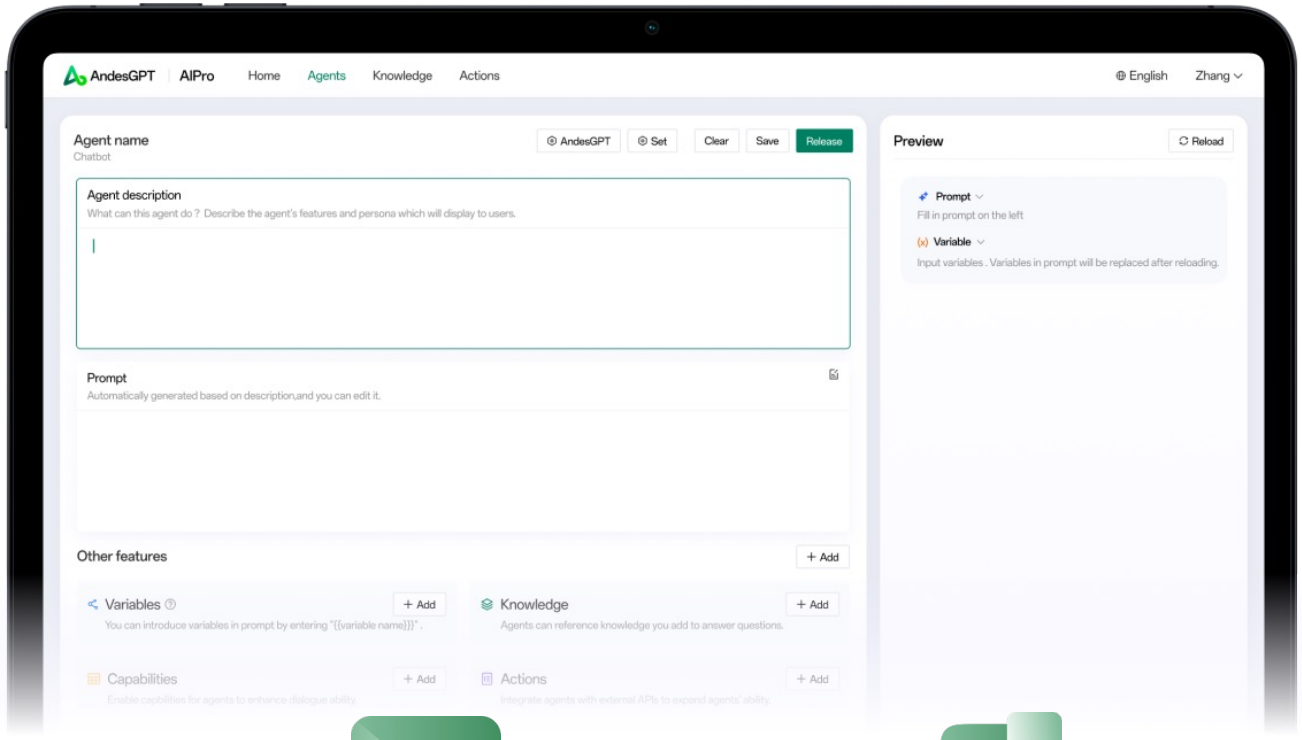
The open ecosystem of services built on LLMs for AI smartphones will include native service components provided by vendors and AI agents customized by users. For example, AndesGPT as a large model and Breeno as a customized agent.

Smart device manufacturers should build platforms for maximum openness in the AI services ecosystem

- Open computing platforms and technology
- Collaborative business models
- Ecosystem governance systems & industry alliances

The industry should set standards and ensure zero barriers to entry for developers, so that users can shape the ecosystem they want

Zero-code development | Everyone can define their own agents



Zero-code development

Streamlined app development process with easy prompt definition, data import, and selection of plug-ins

Private domain data

Quick connection with data lakehouses, databases, and local files to enlarge the knowledge base for models

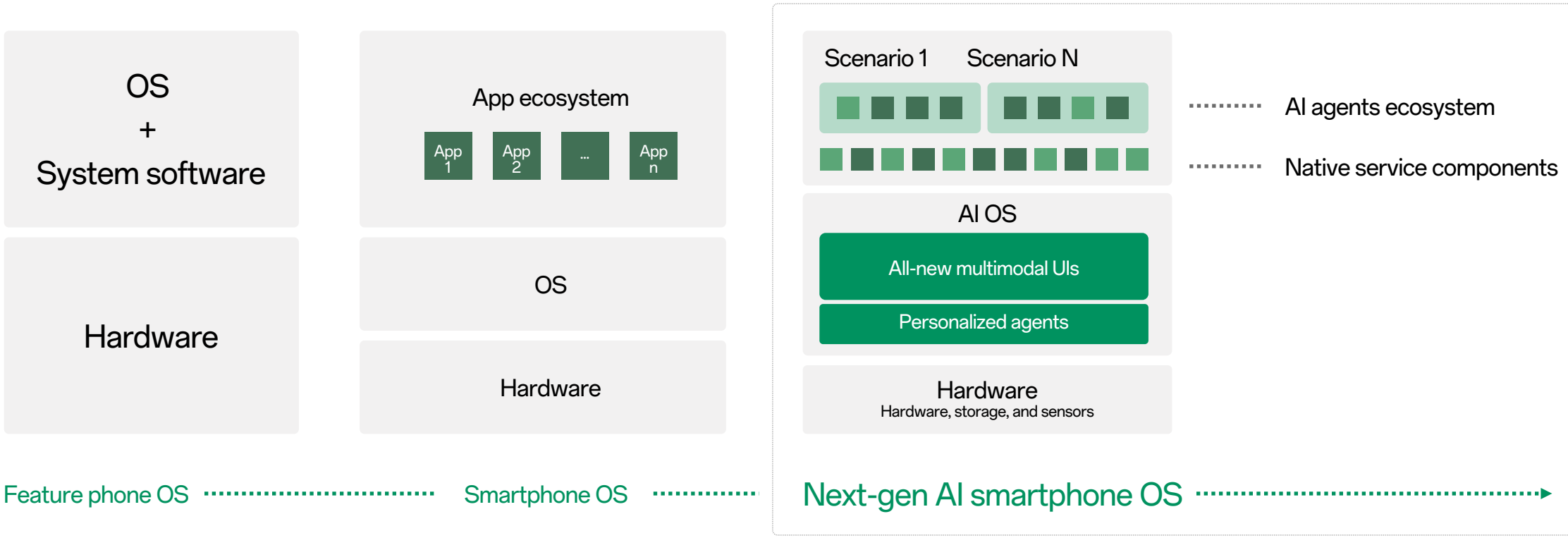
Plug-in components

A wide range of plug-ins such as Q&A, online search, lakehouse query, database query, document analysis

Flexible call options

Supports JavaScript embedding and API calls to models

Context-aware, personalized AI OS



The AI OS breaks out of the rigid vertical silo for everyone to have their own customized AI assistant, delivering the benefits of AI to all

All-new multimodal UIs

Personality | Natural interaction

Learning through interaction

Natural language interaction

Global interactions	Gestures	Native AI	Global search	Sidebar	...
App-specific interactions	System controls	Breeno	In-app plug-ins		
	Embedded UIs	Typing/writing	...		
System-initiated interactions	Aqua Dynamics	Ubiquitous service cards	Voice alerts		
	Cross-device notifications	Conversational UIs	...		
System windows	Immersive interactions	App companions	Transient floating windows	...	

The new user interface on an AI smartphone makes it a personal assistant at hand, more than just a consumer electronic device

Embedded personalized agents

Proactive / Efficient

Efficient
Automating complex and repetitive tasks

Creative / Revolutionary

Creative
Inspiring creativity

Adaptive / Personalized

Personalized
Learning through use to become a personal assistant

Large-scale CoT inference	Cloud-device fusion	Memory enhancement	Task planning	Use of other tools
Components (image analysis, image generation, text analysis, information analysis and structuring...)		User profiles		

Native AI agents learn and adapt to user preferences
to deliver an intuitive user experience

Example | Personal assistant: From standardized to personalized, from single-modal to multi-modal

An AI-powered personal assistant can understand complex needs and provide smarter, better, personalized services

Example: OPPO Find X7

Content generation
Speeches | Social media texts | Resumes | Slides outlining

Call with Breeno
Identify calls | Answer calls | Generate records

Chat with Breeno
Chit-chat | Open up | Brainstorm

Education
Role play | Tutoring | History Q&A

UI is in Chinese

Trends

Multimodal conversation

Natural conversation |
Multimodality integrated to OS |
Understanding voice, text, imagery, files, and video |
Control with voice and gestures

Trustworthy, useful, personalized

Guardrails for content | Hallucination eliminated |
Complex reasoning |
Task scheduling | Services ecosystem |
Customization |
Personalized answers & recommendations |
User-specific memory

Content generation

AI text | AI voice | AI images | AI video |
Creativity tools | Productivity tools |
Fun personalized skills

The era of AI smartphones has arrived, and will transform the speed and ease of content creation

Example | System apps: Now tackling complex tasks easily, evolving to cross-device AI

Multimodal AI built into the OS simplifies the process of using the phone

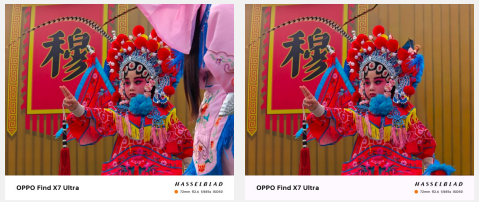
Example: OPPO Find X7

UI is in Chinese

AI Summarizer

Generate call summaries in one click

Call logs | Call summaries | To-dos | Sync notes |



Before After

AI Eraser

Snap photos, remove objects, and generate the background in one step

Smart circling | Removal | Background generation

Step 1: Add-on AI features (single-mode, single data source)

AI given discretion over interfaces and controls: power button, voice, Aqua Dynamics, ubiquitous service cards, image settings, text, video, and audio can be accessed by single-modal AI.

Step 2: AI embedded into OS (multimodal, single data owner/multiple data sources)

Images, text, video, and audio are combined to generate something new. For example, text and audio can be used to generate call summaries. The AI assistant understands and generates data and invokes personal services.

Step 3: Cross-device AI (multi-dimensional data, multiple data owners/multiple data sources)

Accurately identifies user's intentions using data from multiple sensors on multiple devices; makes intelligent decisions on service orchestration using data provided by different suppliers.

Cross-device AI experience enables seamless transitions between the digital and real worlds

Device hardware supporting generative AI

Accurate understanding of user intentions

Efficient computing for low power consumption, long battery life

Context-aware understanding of the user

OS capabilities + AI	Adaptive to environment	Adaptive to context	Adaptive to user	Virtualized	...
Smart components	Storage	Visual | Audio | Haptics	Controls | Position | Motion	...	

On-device heterogeneous computing resources	On-device personalized training	On-device & in-cloud inference

Current hardware does not yet support the new model; new SoCs and in-memory computing architectures will emerge

Benefits of AI smartphones: A personal assistant that provides intuitive interaction, context-aware intelligence, personal companionship, and reliable security

Intuitive interaction: Multi-modal capabilities and cross-domain knowledge

Smartphone: Supplies information → AI smartphone: Supplies knowledge and skills

User value: Access to the latest and most correct answers in a more natural and direct way

Context-aware intelligence: Instantly understands user intention and delivers suitable services

Smartphone: Able to chat → AI smartphone: Able to provide services

User value: Access to service at one click/command

Reliable security: Guardrails on content, privacy protection

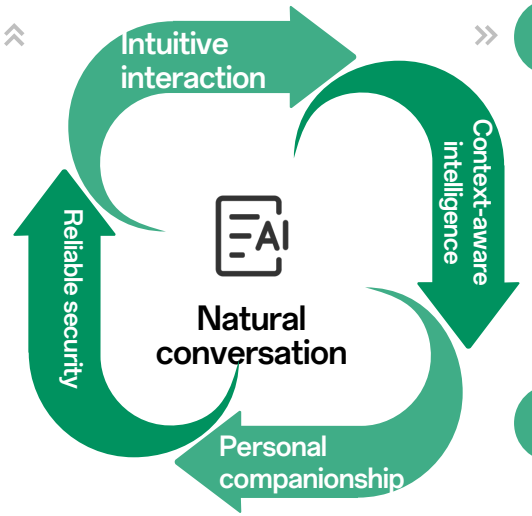
Smartphone: Privacy focused → AI smartphone: Privacy focused, also ethical and free of hallucinations

User value: Protection for personal data and reliable answers

Personal companionship: Personalization through model tuning and knowledge enhancement

Smartphone: Information platform powered by search AI → AI smartphone: Develops with personal knowledge

User value: AI smartphone grows with users by learning user preferences



Reliable security | Innovate to secure data, algorithms, and content; alignment with our values

Security compliance and ethical risks related to AI technology

Impact on user privacy

Privacy disclosure

Impact on country governance

- Sensitive information compromises national security
- Misinformation stirs up the public sentiment
- Infringements during AI training
- Challenges in delivering AI benefits to all and bridging knowledge gaps

Impact on user experiences

- Generation of offensive information
- Generation of outdated or inaccurate information
- Generation of unwanted content

Build secure, friendly AI with technology

Data security

Focusing on security, compliance, and objectivity of source data used in training

- Security of source data
- Compliance of source data
- Objectivity of source data

Algorithm security

Developing attack/defense and model calibration schemes

- AI firewalls
- Attack/defense and evaluation system
- Enhancement with knowledge graphs

Content security

Ensuring that compliant and satisfactory content is generated

- Traceability of generated info
- Labeling of generated content
- Evaluation criteria for generated info

Values alignment

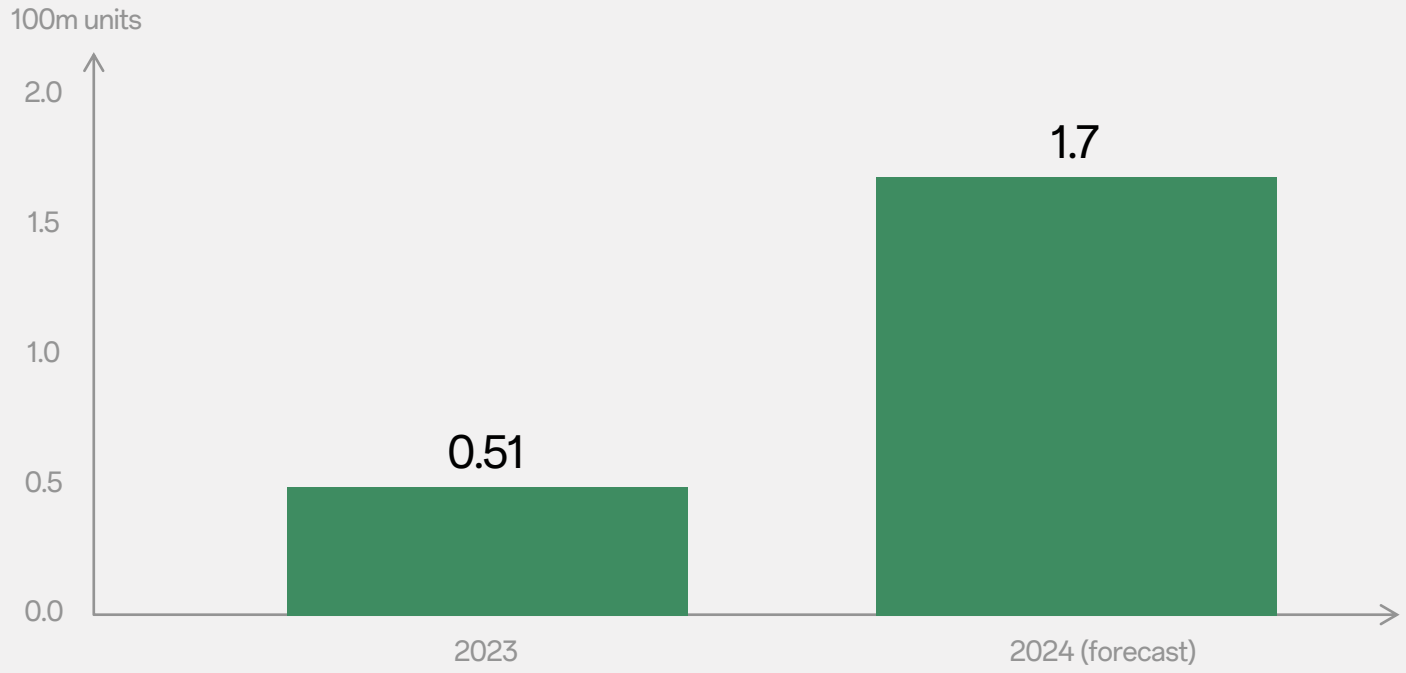
Building a complete calibration system to ensure consistency with human values

- Reinforcement learning from human feedback（RLHF）
- Constitutional AI for smart scenarios

Shipments of next-gen AI smartphones forecasted by IDC (global market)

IDC forecasts 170 million next-gen AI smartphones to be shipped in 2024, representing almost 15% of the total smartphone market.

IDC forecast of the next-gen AI smartphone market worldwide



Next-gen AI smartphones to be shipped worldwide in 2024

170 million units

15%

of total smartphone market worldwide

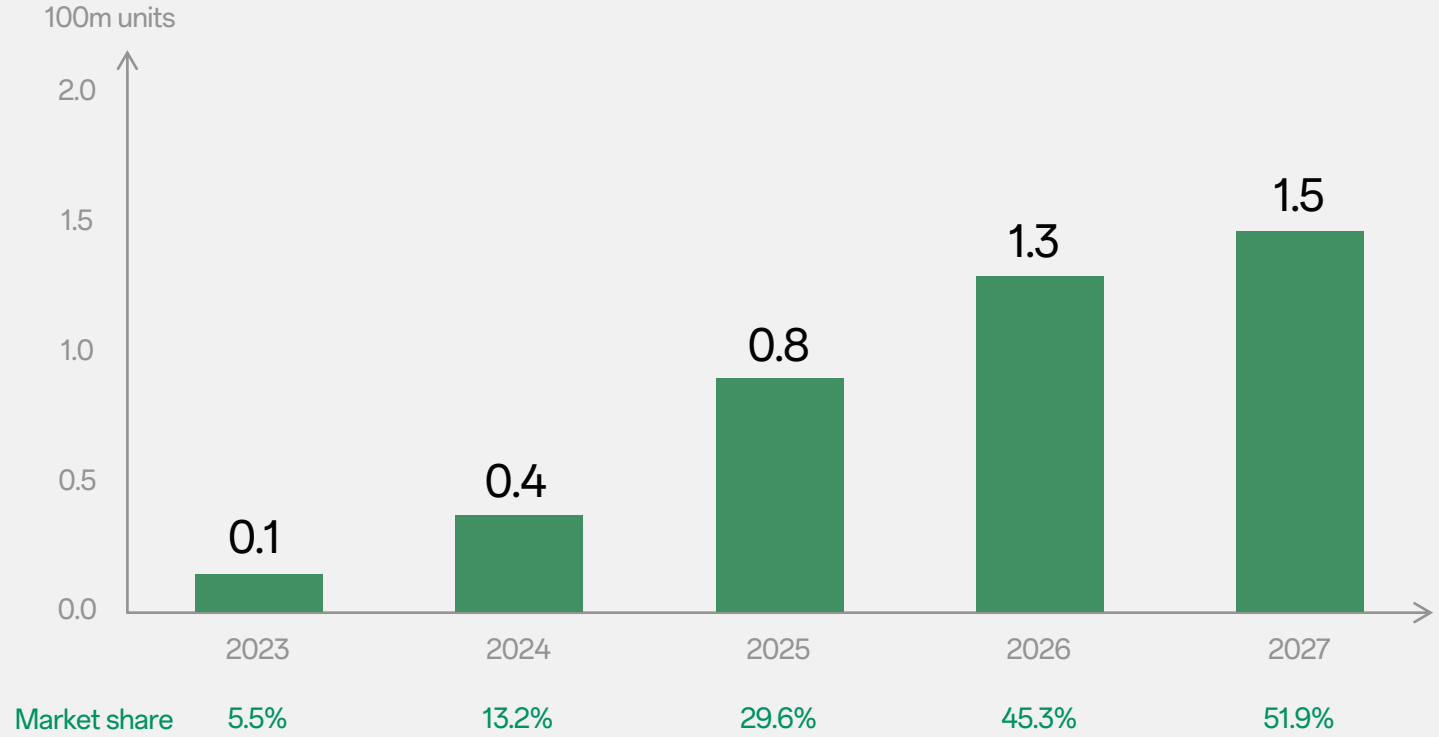
*Next-gen AI smartphones use SoCs capable of running on-device GenAI models more quickly and efficiently and have an NPU with at least 30 TOPS performance. Examples of on-device GenAI include Stable Diffusion and various large language models (LLMs).

Read more on IDC AI Smartphone Definition

Shipments of next-gen AI smartphones forecasted by IDC (Chinese market)

IDC's forecast suggests that the share of next-gen AI smartphones in the Chinese market will surge after 2024 to over 50% in 2027, amounting to 150 million units, as chipsets and user scenarios will iterate swiftly.

IDC forecast of the next-gen AI smartphone market in China



Next-gen AI smartphones to be shipped in China in 2027

150 million units

51.9%

of Chinese smartphone market

*Next-gen AI smartphones use SoCs capable of running on-device GenAI models more quickly and efficiently and have an NPU with at least 30 TOPS performance. Examples of on-device GenAI include Stable Diffusion and various large language models (LLMs).

Read more on IDC AI Smartphone Definition

Next-gen AI smartphones will transform the global smartphone industry

- 2024 onward, next-gen AI smartphone sales will explode, creating **a wave of phone sales**.
- **Flagship phones** will be an important driver of next-gen AI smartphones in the early stages.
- **16 GB RAM** will be the minimum spec for next-gen AI smartphones. SoCs and other hardware also need to be upgraded.
- Upgraded storage, displays, and cameras on next-gen AI smartphones will lead to **changes in hardware** and **higher costs**. Manufacturers may increase the ASP by leveraging technological innovations and AI-related selling points.
- Generative AI will spark a burst of new apps, which will in turn bolster AI smartphone sales. **AI apps deployed on smartphones** will offer more utility compared to existing apps.
- Chip makers, OEMs, and industry players will **accelerate the transformation of user scenarios**, advancing the development of next-gen AI smartphones.

Next-gen AI smartphones will transform content creation

AI interactivity integrating hardware, software, and services

Personal assistant
Customized agents
"AI smartphone that grows with you"

- Planning and recommendation
- Inquiries and chats

Productivity tool
Efficiency at work and play

- File browsing
- File editing
- Audio/video summarization

Easy creation
Create with ease, anytime, anywhere

- Photo touch-up
- Image generation
- Video editing

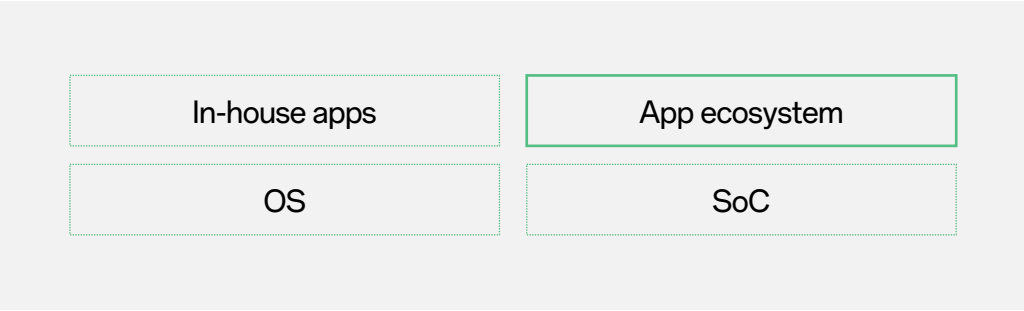
Fun personalization
Personalized expression with images, text, and video

- Copywriting assistant
- Personalized images
- Personalized videos

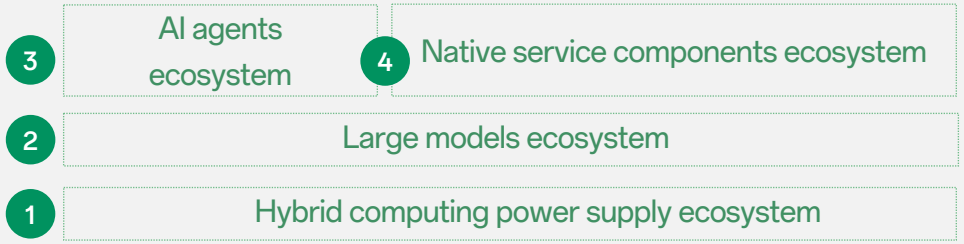
Personal creativity will become a habit, anytime, anywhere

AI smartphone ecosystem outlook

Existing ecosystem



Next-gen AI smartphone ecosystem



1 Hybrid computing power supply ecosystem

- Long-term mismatch between supply of computing power and demand for computing from AI products
- Call for concerted efforts with chipset makers to find satisfactory solutions

2 Large models ecosystem

- Persistent competition among large models
- Large model capabilities channeled by smart device makers to address user needs using hybrid expert models and other solutions

3 AI agents ecosystem

- Lower barriers to entry for agent development compared to app development, which will mean more customization
- Smart device makers with app ecosystem experience can duplicate their existing practices to deliver a richer agent ecosystem

4 Native service components ecosystem

- Large model plug-ins and native OS services will be the most common early applications
- Native services accessible to AI agents will support the growth of the AI ecosystem

OPPO will be an open, collaborative contributor as we kickstart the era of AI smartphone

Acknowledgments

Special thanks to the following contributors,
Bao Yongcheng, Zhang Jun, Chen Xiaochun, Li Feng, Luo Dan, Tao Yichen, Cao Dan, Wu Jiaxin, Pang Jianing, Zhang Kai, Li Tangsuo, Yang Zhenyu, Zheng Xiaochuan, Wan Yulong, Xie Qin, Zheng Aihua, Zhang Xin, Zhang Li, and Hu Xiaoqing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