IDC

AI-Powered All-Scenario Noise Cancellation for Emerging Markets

Emerging Markets | Localized AI Noise Cancellation | All-Scenario Adaptation | Cross-Ecosystem Reuse

Brought by TECNO

Emerging markets fuel mobile industry growth, but noise pollution in regions like Southeast Asia and West Africa undermines call quality. Clear communication is essential, yet challenging in noisy environments with low headset use.

AI noise cancellation is now a decisive technology, addressing both common and local sounds. Manufacturers are creating adaptive solutions to meet these specific needs and stay competitive.

Drawing on field research, this report shows how localized data improves AI models, guiding product and market strategies—demonstrating how R&D delivers real user value.

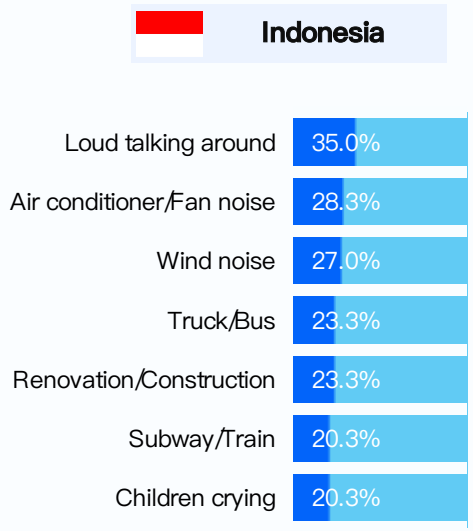
Smartphone AI Noise Cancellation

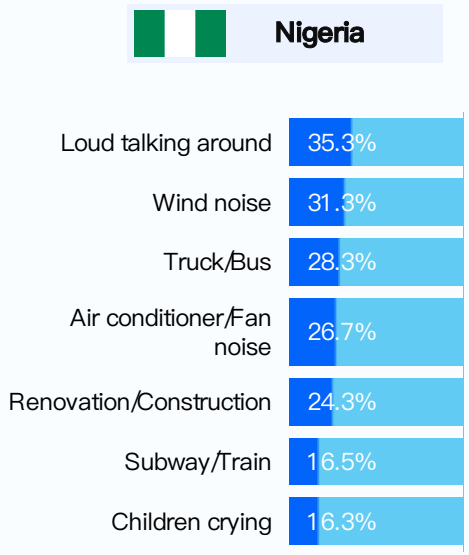
User Needs and Challenges

The Common and Localized Noise in Emerging Markets

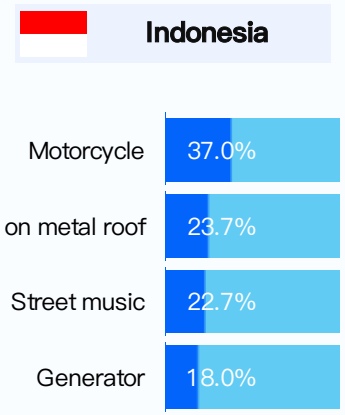
While technology improves lives globally, in densely populated emerging markets like Southeast Asia and West Africa, noise pollution severely degrades the mobile phone experience. Here, effective noise cancellation is not a luxury but a necessity. Recent IDC research in Indonesia and Nigeria underscores this critical demand. In this research, noise interference in mobile phone use is categorized into two types: common noise and localized noise.

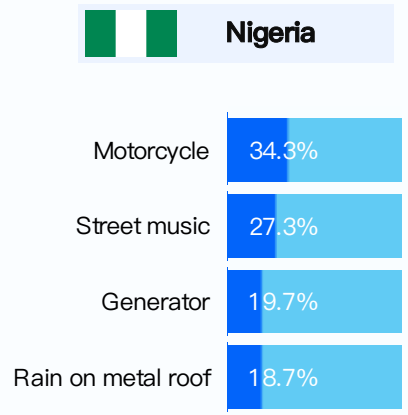
Common Noise refers to everyday sounds from urban and indoor environments. In Indonesia and Nigeria, loud conversations are the most frequent, followed by wind, air conditioning or fan noise, and traffic sounds from trucks, buses, subways, and trains.





Localized Noise exhibits distinct regional and situational variations. Motorcycles, for example, serve as a primary mode of transport in both Indonesia and Nigeria, making their noise particularly prominent.

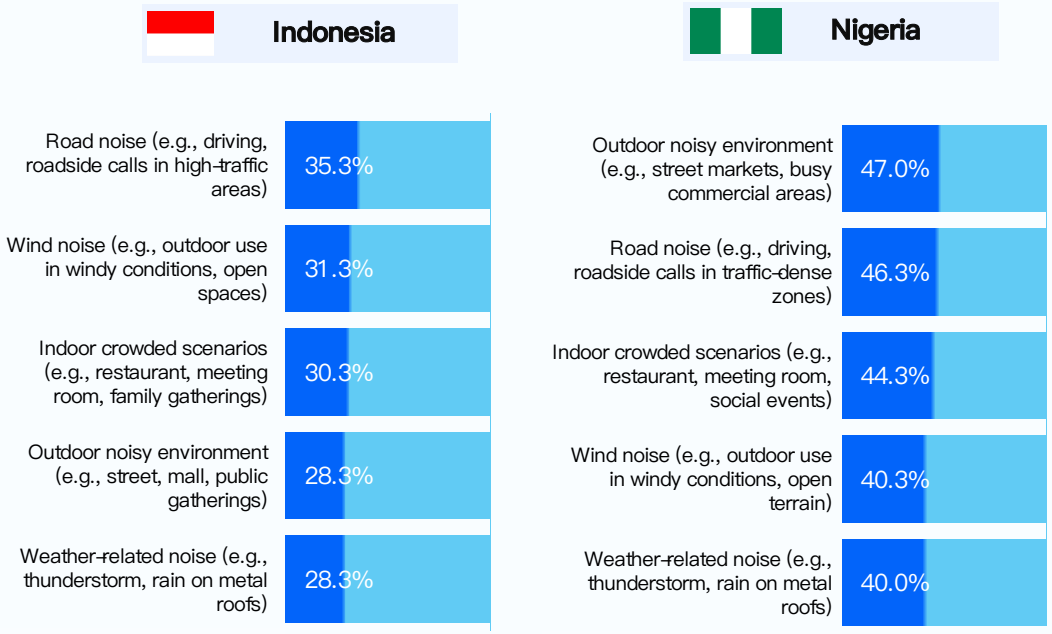




Frequent Noise, Scarce Headsets

Necessitate Built-in Phone Noise Cancellation

Noise that occurs four or more times per week is defined as frequent noise, and users in both regions frequently experience such disturbances. Road noise affects 35.3% of users in Indonesia and up to 46.3% in Nigeria, while wind noise troubles 31.3% and 40.3% of users in the two markets, respectively.



Low Bluetooth headset penetration highlights the necessity of built-in phone noise cancellation.

. Some outdoor workers have exBluetooth headset adoption remains low in Southeast Asia and West Africa due to pricing and use habits pressed safety concerns regarding their use. This contradiction between high-noise environment and low Bluetooth headset usage makes built-in phone noise cancellation the most practical solution.

Indonesia

Usage Frequency	Worker	Outdoor Worker	Vendor	Office Worker	Student	Others
Never use	12.5%	18.8%	21.1%	3.3%	15.0%	12.0%
Seldom use (only in special circumstances)	6.3%	11.6%	7.0%	8.2%	10.0%	4.0%
Occasional use (1-2 times per month or once per week)	68.8%	56.5%	29.8%	29.5%	50.0%	32.0%
Frequent use	12.4%	13.1%	42.1%	59.0%	25.0%	52.0%

Nigeria

Usage Frequency	Student	Worker	Outdoor Worker	Vendor	Office Worker	Others
Never use	4.9%	19.6%	14.8%	27.9%	23.8%	34.8%
Seldom use (only in special circumstances)	2.4%	17.6%	19.7%	8.2%	9.5%	0.0%
Occasional use (1-2 times per month or once per week)	78.0%	60.8%	49.2%	35.1%	31.7%	21.7%
Frequent use	14.7%	2.0%	16.3%	28.8%	35.0%	43.5%

Better Experience the User Demand for Noise Cancellation

Users in Indonesia and Nigeria demonstrate significant demand and reliance on effective phone noise cancellation:

High Priority

65.6% (Indonesia) and 69.3% (Nigeria) of users report a strong need for this feature.

Purchase Driver

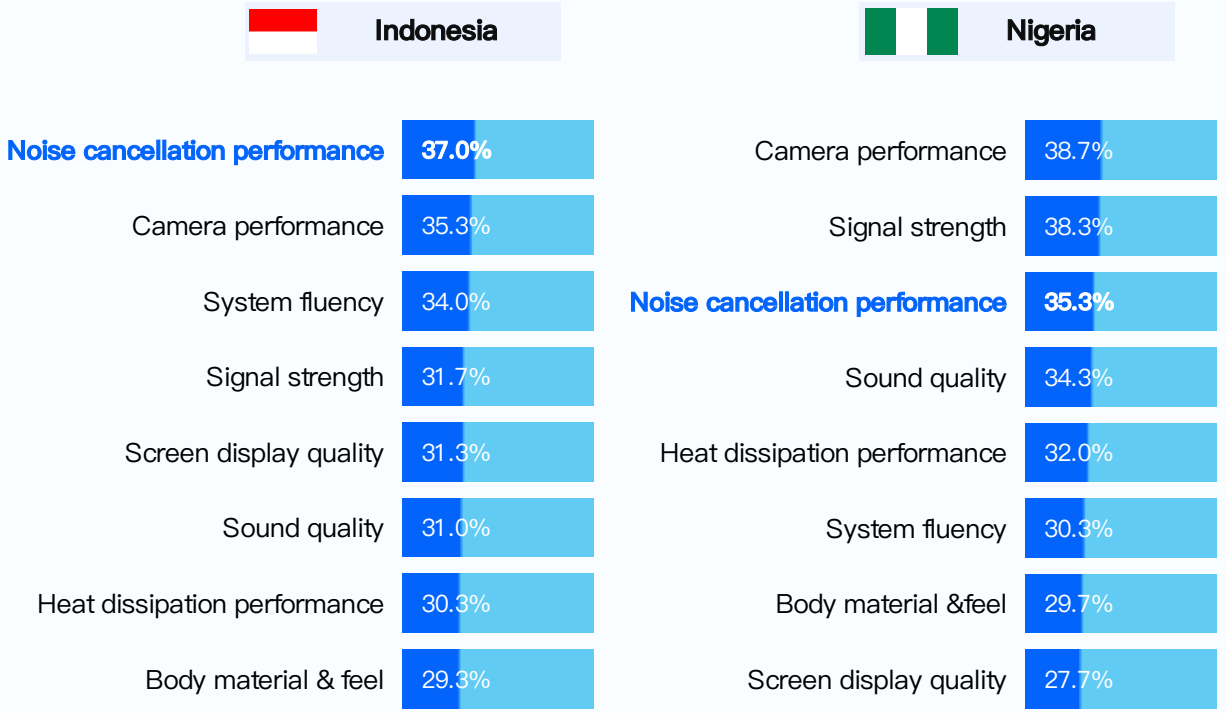
It is a key consideration for 37.3% (Indonesia) and 31.7% (Nigeria) of buyers.

Frequent Pain Points

Weekly, 37.0%-46.0% of users struggle to hear callers due to background noise, while 34.3%–43.3% experience muffled voice quality.

Clear Demand for Improvement

Noise cancellation is the top-cited feature needing enhancement (37.0% in Indonesia, 35.3% in Nigeria), surpassing traditional metrics like system fluency.



Across Scenarios Noise Cancellation Becomes a Foundational Need

As mobile phones have evolved from traditional communication devices into fundamental tools covering multiple scenarios in both work and daily life, phone noise cancellation technology has also expanded beyond conventional calls to the following high-frequency application scenarios, encompassing frequent-use environments such as commuting, office work, and the outdoors:

Call, Voice Message

These two remain core scenarios. AI noise cancellation can effectively filter out background noises such as market vendor shouts and generator roars, making recorded content clearer and more practical.

AI Dialogue

Voice assistant usage is growing, and noise cancellation is key to improving recognition. Phone makers are embedding AI for on-device processing and cloud collaboration.

Audio/Video Recording, Live Streaming

Content creation and live streaming impose more refined requirements for noise cancellation. For both entertainment and commercial production, AI noise cancellation ensures clear audio and can also intelligently balance the ambient atmosphere.

Online Meeting

AI noise cancellation suppresses environmental noise to ensure the accurate transmission of key information such as quotes and orders during meetings.

Inherent Challenges Confronting Traditional Noise Cancellation Techniques

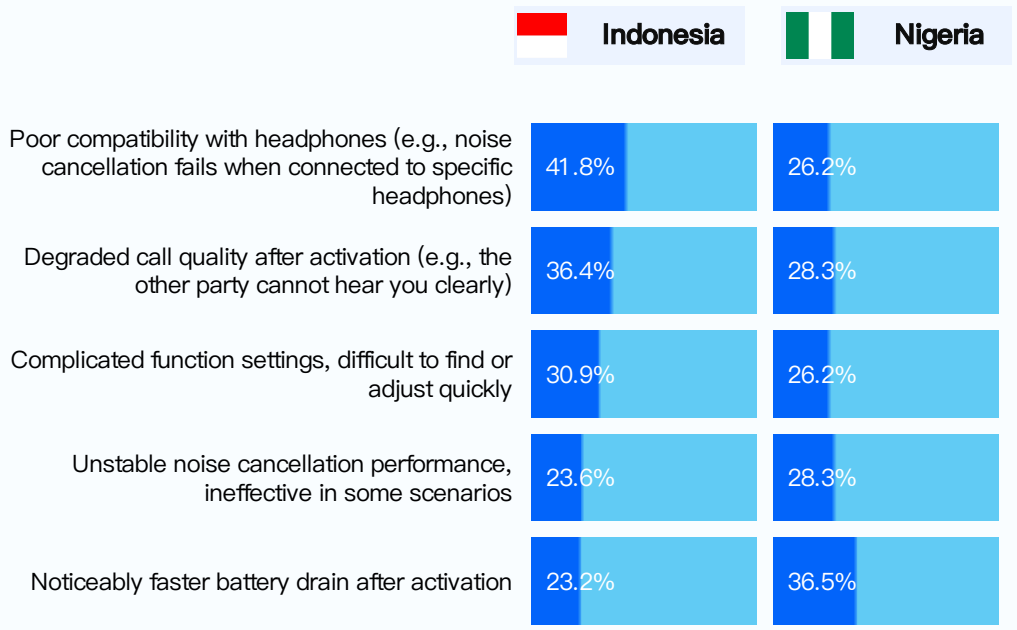
Traditional noise cancellation technologies struggle with the complex soundscapes of emerging markets, revealing clear technical and practical limitations.

Inherent Technical Flaws

These methods rely on preset noise models suited for steady, predictable sounds like fans or air conditioners. However, real-world noise—such as bells, wind, or street activity—is often dynamic and irregular. Traditional processing tends to either over-suppress speech (causing distortion) or under-suppress noise (leaving it unfiltered).

Frequent User Pain Points

Survey data highlights these shortcomings. In Indonesia, 36.4% of users report degraded call quality and 41.8% experience poor headphone compatibility. In Nigeria, 36.5% note significantly faster battery drain. Additionally, 23.6–28.3% of users find noise cancellation unstable or ineffective in certain scenarios, while 26.2–30.9% describe the settings as overly complex.



Using AI to Build Noise Cancellation Adapted to Local Scenarios

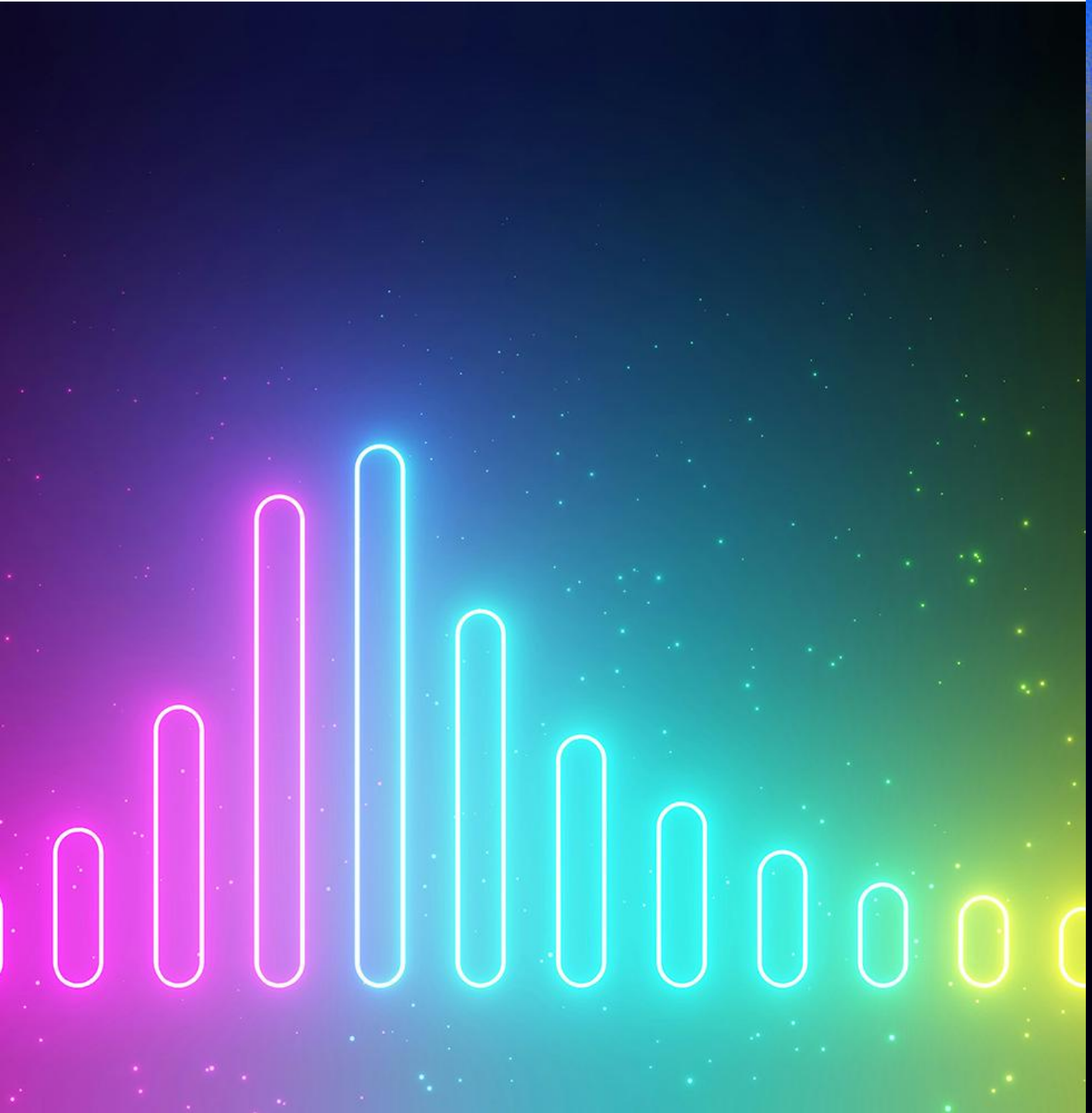
Emerging markets like Indonesia and Nigeria have distinct acoustic environments—such as motorcycle traffic, market crowds, and generator noises—requiring AI noise cancellation to be highly localized. This is especially critical for users whose income depends on clear calls, like small traders and delivery workers.

Indonesia

User needs are closely tied to local living and working conditions. As the world's fourth-most populous country, Indonesia has densely packed cities where traffic congestion in hubs like Jakarta and Surabaya is severe. Motorcycles are the primary mode of transport, making calls amid noisy streets and gridlocked traffic a daily reality. Additionally, the country's vibrant market culture and communal family structures often place users in loud environments such as crowded markets and lively family gatherings.

Nigeria

As the world's sixth-largest population and Africa's most populous nation, Nigeria is experiencing rapid population growth and urbanization. Major cities like Lagos and Abuja are filled with overlapping noise from honking vehicles, market vendors, and other street activity. An unstable power supply makes small generators commonplace in both residential and commercial areas, with their operational noise significantly impacting call quality. For core users of mid- to low-tier smartphones—such as small-scale traders, neighborhood delivery personnel, and informal sector workers—clear phone communication is essential to their livelihood. Noise-induced call disruptions not only reduce efficiency but can also lead to tangible business losses.



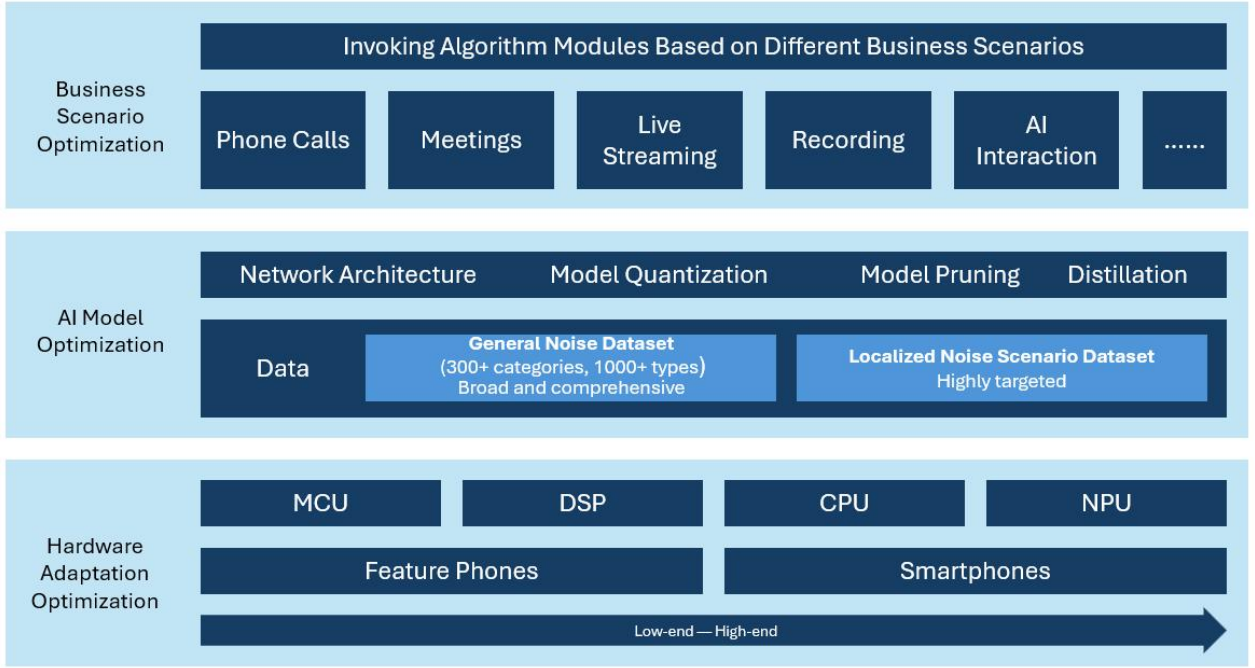
Smartphone AI Noise Cancellation

Paths for Coordinated Optimization

Scenario-Driven AI the New Core of Smartphone Noise Cancellation

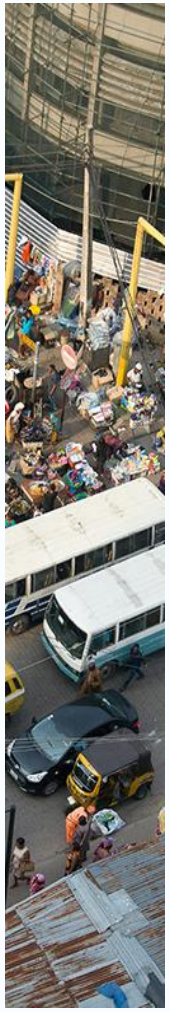
Different usage scenarios require tailored noise cancellation: meetings prioritize voice clarity, while recording preserves ambient sound. Phones adapt by invoking specific algorithm modules, using environmental awareness to recognize scenes dynamically. This relies on multidimensional optimization:

- **Business Scenario Targeting:** Addresses the varied demands of scenarios like calls, meetings, live streaming, and diverse environments such as meeting rooms or subways. By integrating scenario features with noise reduction technology, it delivers precise, scenario-optimized performance.
- **Algorithm Optimization:** Employs network architecture refinement, quantization, pruning, and distillation to maximize noise reduction capability on edge devices.
- **Data Compatibility:** Combines a general noise database with localized scene-based datasets to train the algorithm for optimal noise suppression in specific acoustic conditions.
- **Hardware Universal Customization:** Adapts AI noise reduction across feature phones, smartphones, and varied chip platforms (MCU, DSP, CPU, NPU) through deep optimization and customized models, ensuring stable, efficient deployment on all devices and chipsets.



AI has evolved from a supportive tool to the core driver in mobile noise cancellation. Its data-driven, adaptive approach overcomes the limitations of rule-based methods and handles complex real-world noise. Scene-specific training data is now a key competitive differentiator, while on-device NPUs enable real-time processing, shifting advanced algorithms from the cloud to the phone.

Localized Data to Build Regionally-Adaptive AI Noise Cancellation

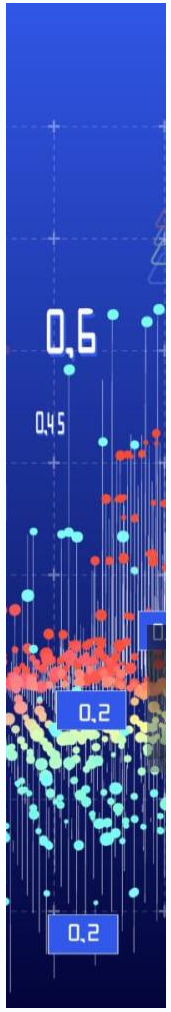


Localized Scenario Sampling

In global markets, mobile users face noise with distinct national characteristics. Traditional AI models trained on generic datasets fail to adapt to these localized environments. By capturing country-specific high-frequency noise scenes—such as traffic patterns, market ambiance, or generator hum—manufacturers can build region-aware models that turn noise cancellation into a key competitive advantage in international markets.

Key Approach:

- Identify noise scenes that are unique, frequent, and disruptive in each country, based on its environment, urban layout, and cultural habits.
- Extract localized acoustic signatures, dynamic patterns, and speech-noise interaction profiles through dedicated on-ground sampling.
- Use this data for localized training, algorithm adjustment, and validation; shift from broad noise suppression to targeted, country-specific cancellation.
- Outcome: Enhanced practical performance in real-world conditions and stronger market differentiation through tailored acoustic solutions.



Localized Data-Driven AI Noise Cancellation

In recent years, advancements in AI have enabled smartphones to more intelligently distinguish between human voice and complex background noise, performing real-time separation and suppression for improved call and audio clarity.

Data-Intelligent Adaptive Processing: AI noise cancellation actively adapts through data-driven feature learning, reshaping the noise reduction process across noise modeling, signal separation, and real–time optimization.

Technical Mechanism: Neural networks differentiate noise from voice characteristics to separate signals. Common models include CRNN, RNN, DCCRN, DeepVQE, FRCRN, and DeepFilterNet, which enhance speech in complex settings via masking, clean speech generation, and temporal modeling.

Difference from Traditional Methods: Unlike traditional rule-based approaches, AI noise cancellation uses data-driven real-time adaptation to handle non-stationary noise, moving from general filtering to precise, scenario-aware suppression.

Leading manufacturers now employ deep learning-based noise cancellation, and differences in scene granularity of training data can cause a noticeable 5–10 dB gap in noise reduction in varied regional and social environments.

Algorithms & Hardware in Sync: Perfecting Noise Cancellation

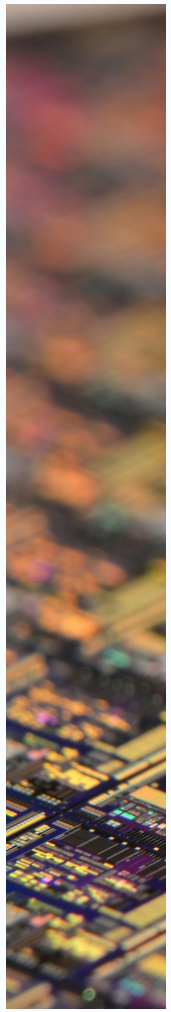
Evolution of Algorithm Models

Noise cancellation has evolved from traditional signal processing (e.g., spectral subtraction) and statistical learning to deep learning. Key advances include CNNs for feature extraction, RNNs/LSTMs for temporal context modeling, and GANs for realistic signal generation and detail preservation.

Current Frontier —Voiceprint Noise Cancellation: This advanced technique personalizes noise cancellation by matching unique voiceprint features. It intelligently classifies noise and performs targeted suppression, overcoming the limitations of traditional methods.

- **How it works**: The system captures the user's voiceprint (pre-registered or analyzed in real-time). In noisy environments, it locks onto and enhances the target speaker's voice while filtering out other sounds.
- **Core Advantage**: It suppresses only noise outside the target voiceprint's frequency bands, fully preserving the speaker's voice and effectively eliminating interference from other talkers—a common failure point for standard AI noise cancellation.

This evolution marks a shift from general, rule-based filtering to intelligent, adaptive, and personalized audio enhancement.



Evolution of Hardware

Mobile noise cancellation has advanced from passive physical designs to intelligent, multi-microphone systems. The shift to dual and then multi–microphone arrays with beamforming significantly improved voice clarity by focusing on the speaker.

- **Advanced Microphone Arrays:** Evolving from dual-mic setups to high–SNR MEMS arrays with beamforming, enabling precise voice tracking across varied environments.
- **AI-Powered Algorithms:** Deep learning models have progressively advanced from CNNs for feature extraction to RNNs/LSTMs for temporal context modeling and GANs for detail preservation, now integrating scene detection for real-time adaptation.
- **Increased On-Device Compute:** Rising chip performance allows complex AI models to run in real time, bringing high-quality noise cancellation to more devices.

Implementation & Validation:
Effective cancellation requires full system optimization—from efficient algorithms and modular frameworks to hardware-software co-design. Performance is validated through combined lab testing and real-world trials in diverse acoustic environments, ensuring reliable user experience.

Smartphone AI Noise Cancellation

Development Status of Ecosystem

Vendors Race to Excel at AI Noise Cancellation

Call noise reduction is fundamental to mobile audio. Leading manufacturers now use AI to shift from "enabling calls" to "enabling clear calls," with key advances in complex noise separation and real-time adaptation. As content creation grows, AI noise reduction also helps phone recording bridge the gap with professional gear. Furthermore, for remote meetings, brands apply AI—inspired by professional systems—to deliver clear and comfortable audio, directly boosting efficiency.

Leading mobile manufacturers are enhancing AI noise cancellation with extensive, localized sample libraries that cover diverse scenarios—from offices and streets to country-specific environments. Competition now hinges on scenario-reproduction precision. Top players combine local noise data with simulated "voice-noise-reverb" samples to better recognize device owners' voices, reducing error rates.

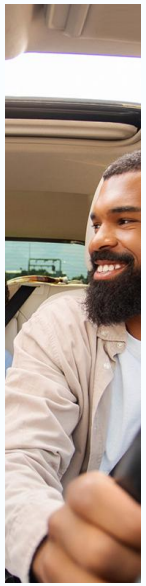
Three common trends have emerged:

Hardware collaboration	Sample precision	Personalized adaptation
		
Multi-mic arrays and dedicated AP/NPU compute provide foundational support.	Expanding scenario coverage and improving fidelity optimize model performance.	Dynamic adjustment based on user habits and acoustic environments.

Differences among brands reflect their focus on specific scenarios and technical details, tailored to target users. Ultimately, it is the granularity of scenario-based training data that defines the user experience gap.

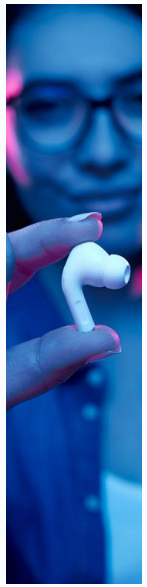
Expanding Landscape of AI-Based Noise Cancellation

Smartphone-derived noise-cancellation technologies—hardware, algorithms, and scenario data—are becoming a reusable asset across product categories, enabled through licensing, chip integration, and industry collaboration.

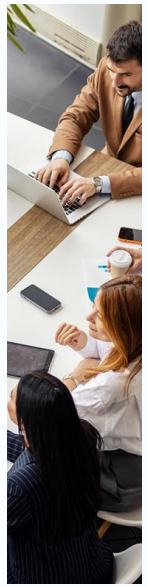


Automotive applications: The multi-microphone noise reduction technology from smartphones is reused. By optimizing parameters for low-frequency wind and tire noise (200–500 Hz) during driving, a noise reduction depth of >25 dB is achieved, significantly improving voice command recognition accuracy.

Smart home devices: A simplified sound-field adaptive algorithm is adopted. Using an array of three or more microphones to locate the user's position, it suppresses ambient background noise (60–70 dB), increasing wake-up accuracy by >15% above the industry average and ensuring consistent acoustic experience across devices.



Wearable devices (e.g., TWS earphones): the smartphone-derived adaptive wind-noise model is reused. Trained on massive outdoor data, it cancels wind noise from speeds below 5 m/s in real time with a suppression rate >80%, complementing phone call noise reduction for seamless all-scenario performance.



Office meeting equipment: echo-cancellation technology shared with smartphones is employed (ERL ≥40 dB, overall echo suppression >45 dB). Combined with multi-microphone sound-source localization, it keeps the speaker's voice clear even when moving and effectively suppresses ambient noise (e.g., projector fan noise at 45–55 dB), ensuring meeting clarity.

The ecosystem follows a "scenario commonality → technology reuse → experience upgrade" cycle. Core capabilities from smartphones—multi-mic arrays, AI scene detection, large datasets—form a universal foundation that is optimized for each new context. This path is turning noise cancellation from a phone-specific feature into a basic experience standard for all connected devices.

Smartphone AI Noise Cancellation

A Scientific Evaluation System

Evaluation Framework for AI Noise Cancellation Performance

As AI noise cancellation evolves, a comprehensive and scientific evaluation system is essential for guiding development and informing user choice. Performance is not determined by a single metric, but by how scenario-specific factors interact with multiple assessment dimensions, defining the practical limits of each algorithm.

A complete evaluation combines objective metrics, system performance, and human perception.

Speech Quality

- POLQA: Scores processed speech for clarity, naturalness, and low distortion.
- STOI: Measures speech intelligibility on a 0–100 scale.

Noise Suppression

- ΔSNR: Quantifies noise reduction capability (top models achieve 40–50 dB improvement).
- 3QUEST: A subjective test rating Speech quality (S-MOS), Noise suppression (N-MOS), and Overall balance (G-MOS).

System Performance

- Power Consumption Test
- Memory Usage Rate

Subjective Listening

- MUSHRA: Listeners rate audio quality on a 5-point scale.
- 3AFC: Tests the perceptibility of noise reduction.
- ITU-T P.835: Separately scores Speech quality, Background noise, and Overall experience

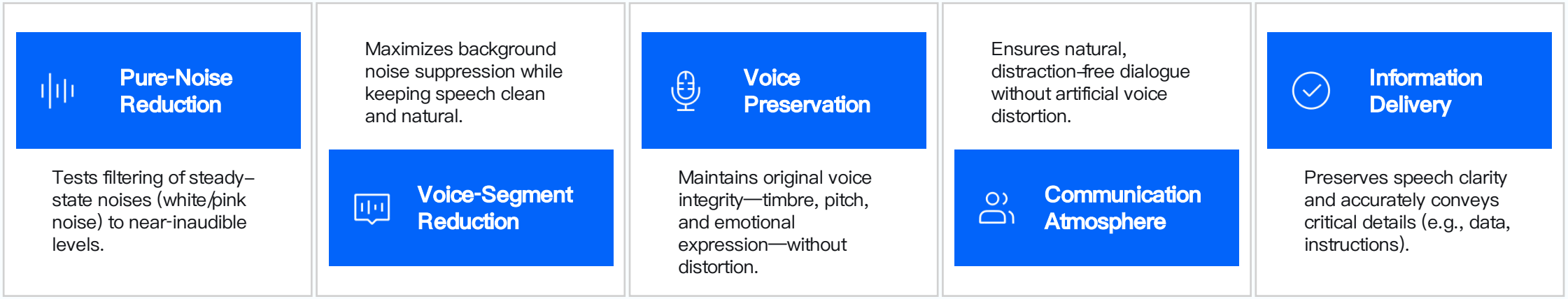
Scenario Adaptability

- Multi-noise Environment Adaptability
- Long-term Operational Stability

Evaluation Methods in Practice for AI Noise Cancellation

The ultimate measure of noise cancellation is **speech intelligibility in real use**, influenced by algorithm accuracy, voiceprint recognition, spatial enhancement, and hardware acoustics.

From a practical usage standpoint, evaluating the intelligibility of speech after noise reduction serves as the ultimate practical metric for assessing noise-cancellation effectiveness. The performance in this dimension relies not only on algorithmic optimization but is also closely linked to the accuracy of voiceprint-based noise reduction, the effectiveness of spatial directional enhancement, and the quality of acoustic components and airtightness.



In consideration of the specific usage, testing dimensions should also include the "uplink/downlink" of audio and the mode of "handset" and "speakerphone".

Advanced Testing Methods
Professional testing combines environmental simulation (e.g., recreating real-world settings like cafés) with objective measurements (e.g., SNR, distortion) and subjective listening panels to fully assess AI noise-cancellation performance and user experience.

Smartphone AI Noise Cancellation

Tech and Awareness Challenges

Tech & Awareness the Current Challenges in AI Noise Cancellation

Despite significant progress, AI-powered noise cancellation faces technical and user-adoption challenges in key markets.

Key Technical Challenges

- **Scenario-Specific Needs:** Noise cancellation requirements vary by use case—meetings demand complete suppression of non-voice sounds, video recording requires preserving ambient and animal sounds, and human-machine interaction needs to isolate the target voice.
- **Balancing Act:** In some mid- to low-end models, excessive noise suppression distorts voice quality.
- **Power Drain:** In Nigeria, where power supply is unstable, increased battery consumption (reported by 36.5% of users) is a major concern. This is often because these devices use the main processor for noise cancellation instead of a dedicated, efficient chip.
- **Performance vs. Efficiency:** Complex AI models must be optimized to run in real-time on devices without overloading hardware.

User Awareness & Usability Challenges

A significant knowledge gap hinders effective use:

- **Low Awareness:** ~34% of users in both markets are unaware their phone has the feature.
- **Poor Proficiency:** Even among aware users, nearly half (43–49%) use it only occasionally and lack confidence.
- **Complex Controls:** 26–31% find the settings hard to locate or adjust, as interfaces are often not designed for local usage habits.
- **Experience Inequality:** The performance gap between high-end and budget models further limits broad acceptance and satisfaction.

These combined technical and usability barriers prevent noise cancellation from delivering its full potential value to users in these high-demand regions.

Market-Specific Pain Points

- **Indonesia:** 36.4% of users report degraded call quality after enabling noise cancellation, often due to over-aggressive algorithms that mistakenly filter out speech.
- **Nigeria:** 36.5% cite significantly faster battery drain, creating anxiety for users who rely on long battery life.

Smartphone AI Noise Cancellation

The Future and Innovations

Consistent Upgrade of Experience and Technology

Experience Upgrade Direction

Evolves from single-function noise suppression to integrated acoustic processing

Incorporates voiceprint and emotion recognition for synergy with voice assistants

Shifts from global to localized, country-specific optimization based on regional speech and noise patterns

Enables multi-modal (audio, visual, sensor) on-device AI via NPU for real-time scene adaptation

Technology Evolution

Advances through adaptive learning, personalizing noise cancellation per user and environment

Dedicated voice-processing chips will improve efficiency and enable local AI without cloud reliance

Technology will expand from flagship to mid-range devices, making premium audio widely accessible

Will integrate with multi-mic arrays, spatial audio, and 5G/IoT for immersive, clear communication in all settings

Innovation Plan of TECNO in AI Noise Cancellation

Comprehensive Noise Database

TECNO has not only achieved technological breakthroughs in AI-powered noise cancellation for smartphones but has also contributed to driving innovation in the mobile industry and shaping the future direction of noise cancellation technology. Also, TECNO has built an extensive noise library with 300+ categories and 1,000+ scenarios, ranging from daily life and industrial sounds to traffic and nature.

Technology

- –Voiceprint Noise Cancellation Technology
- –All-Scenario Coverage
- –Training with Local Noise Databases

Industry

- –Democratizing Technology for Budget Devices
- –SGS Certification for Industry Recognition

Future

- –Adjusting Noise Cancellation Based on Situational Awareness
- –Open Platform Enabling Integration with 3rd-Party Applications

Category	Specific Scenarios for Noise Database
Daily Life	Human voices (conversations, laughter, etc.), household appliance sounds (air conditioner, washing machine, etc.), kitchen cooking sounds (clanging pots, stove flame, etc.), pet sounds
Transportation	Vehicle sounds (engine noise, horns, etc.), train sounds (rail friction, train whistles, etc.), airplane takeoff/landing sounds (engine roar, airflow, etc.), motorcycle sounds, bicycle bell sounds
Industrial	Factory machinery sounds (lathes, milling machines, drilling machines, etc.), generator sounds, construction site sounds (pile driving, electric drills, chainsaws, concrete mixing, etc.)
Natural	Wind sounds (breeze, strong wind, gale, etc.), rain sounds (light rain, moderate rain, heavy rain, storm, etc.), thunder, bird calls, ocean waves
Public Spaces	Mall noise (background music, etc.), market noise (vendor calls, etc.), library page-turning sounds, hospital noise (human voices, equipment sounds, etc.), school playground noise

Localized Noise Adaptation

Focused on overseas markets, TECNO has curated 20+ common local noise scenes, such as busy markets, motorcycles, and construction sites. By analyzing and distinguishing these noises from speech, the system applies targeted cancellation to enhance call clarity in real-world environments.

About TECNO

TECNO

TECNO is an AI-driven innovative technology brand with a presence in over 70 markets across five continents. Committed to transforming the digital experience in global emerging markets, TECNO pursues the perfect integration of aesthetic design with the latest technologies and artificial intelligence.

Today, TECNO offers a comprehensive ecosystem of AI-powered products, including smartphones, smart wearables, laptops, tablets, smart gaming devices, the HiOS operating system, and smart home products. Guided by its brand essence of "Stop At Nothing," TECNO continues to pioneer the adoption of cutting-edge technologies and AI-driven experiences for forward-looking individuals, inspiring them to never stop pursuing their best selves and futures.

For more information, please visit TECNO's official site: www.tecno-mobile.com.

- First mass deployment of voiceprint noise cancellation technology in overseas smartphones
- AI noise cancellation trained on localized noise data
- Scenario coverage: supports recording, video, calls, in-game voice, etc.
- SGS-certified noise suppression: 50dB reduction, significantly above the industry average of 30dB
- AI noise cancellation available on entry-level smartphones and feature phones

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