5G New Calling: Revolutionising the Communication Services Landscape

GSMA Foundry

RELEASE DATE
SEPTEMBER 2023

Security Classification: Non-confidential

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Acknowledgments

The document has been created thanks to the following contributors:

Editor: CMCC, GSMA
Contributor: AIS, Huawei, Itaú, iFlytech, UNISOC, Xiaomi, Zain Kuwait
Reviewer: China Broadnet, Honor, MediaTek, Meizu, OPPO

1 Executive Summary

- 5G New Calling (5GNC) promises to usher in a new era of communications by leveraging the capabilities of 5G networks and the IP Multimedia Subsystem (IMS) to deliver high quality, multimedia and secure interactions between consumers, as well as between businesses and consumers.

- 5GNC can enrich voice and video calls with features that are readily accessible from smartphones without the need to install and keep applications up to date. The functionality could also be used to enable more immersive experiences and ultimately facilitate access to the metaverse.

- As the deployment of 5G networks gathers momentum, businesses and application developers will be empowered to deliver advanced, highly-customised services that make use of 5G's ultra-low latency, exceptional bandwidth and predictable quality of service, as well as artificial intelligence (AI), virtual, mixed and AR.

- 5GNC is not a futuristic concept. Grounded in 3GPP IMS specifications and adopting the existing profiles and the GSMA's Permanent Reference Documents (PRDs) for voice and video over IMS, networks and devices already support sufficient functionality for operators to start experimenting.

- Moving forward, 5GNC will greatly expand operators' capabilities by harnessing the IMS Data Channel (DC), which is being developed in a number of international consortia, including 3GPP, the GSMA, W3C and IETF. IMS data channel devices are already available for demonstrations and proof of concept.

- When 5GNC is enriched by the IMS DC, operators will gain access to a wealth of experience in web technology among the large community of JavaScript developers, creating a new ecosystem.

- As 5GNC reaches full maturity, operators will have at their disposal a powerful platform to develop, deploy and manage a wide variety of services that are tailored to address disparate use cases, while being able to offer new capabilities to third party application developers to distribute and enhance their own services.

- With 5GNC, operators could utilise their IMS assets and set up win-win relationships with over-the-top players (OTTs) by making available, through globally defined APIs, the advanced capabilities of their 5G networks.

2 A new dawn for communication

2.1 The evolution of operator communication services

2.1.1 Voice service

For many years, voice calling was the primary use case of cellular networks and instrumental to the phenomenal adoption of mobile devices. Most traditional voice service was fully based on the fixed voice service: In general, it used the same numbering scheme, the same circuit switched technology, the same set of supplementary services with added support for added mobility and the possibility to personalise the experience.

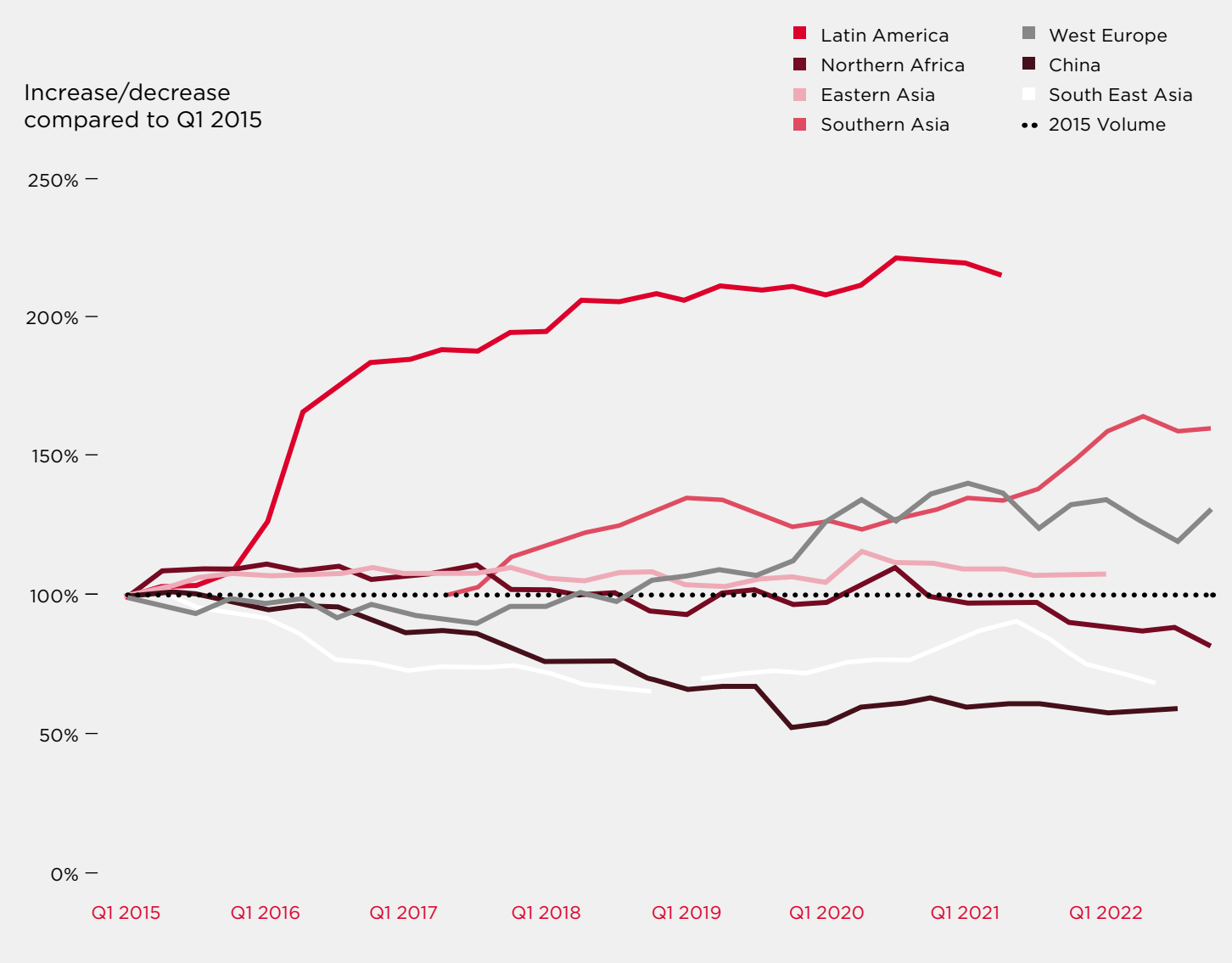
With 4G making mobile broadband available, several alternative voice services emerged, either as standalone applications (e.g. Skype, Viber), or as extension of messaging services (e.g. WhatsApp, WeChat) or as part of social media platforms (e.g. Meta, X). These alternative services are perceived to be convenient and free, and even if they do not provide a consistent quality of service, they deliver an acceptable experience for many users.

In response, operators upgraded their voice services using Voice over LTE (VoLTE), which offers incremental advantages compared to circuit switched voice. In fact, it is designed to remain fully backwards-compatible and, therefore, offers full feature parity and is largely indistinguishable from the legacy voice service.

Even though support for VoLTE roaming has been slow, voice calling remains an extremely important component of operators' service mix. After an initial impact following the introduction of non-operator voice service, many operators have been reporting stable (or even increasing) Minutes-of-Use (MoU) per mobile connection for the past five years (see Graph 1).

Graph 1

Percentage increase/decrease of operator voice usage compared to usage in 2015 Q1 for selected operators



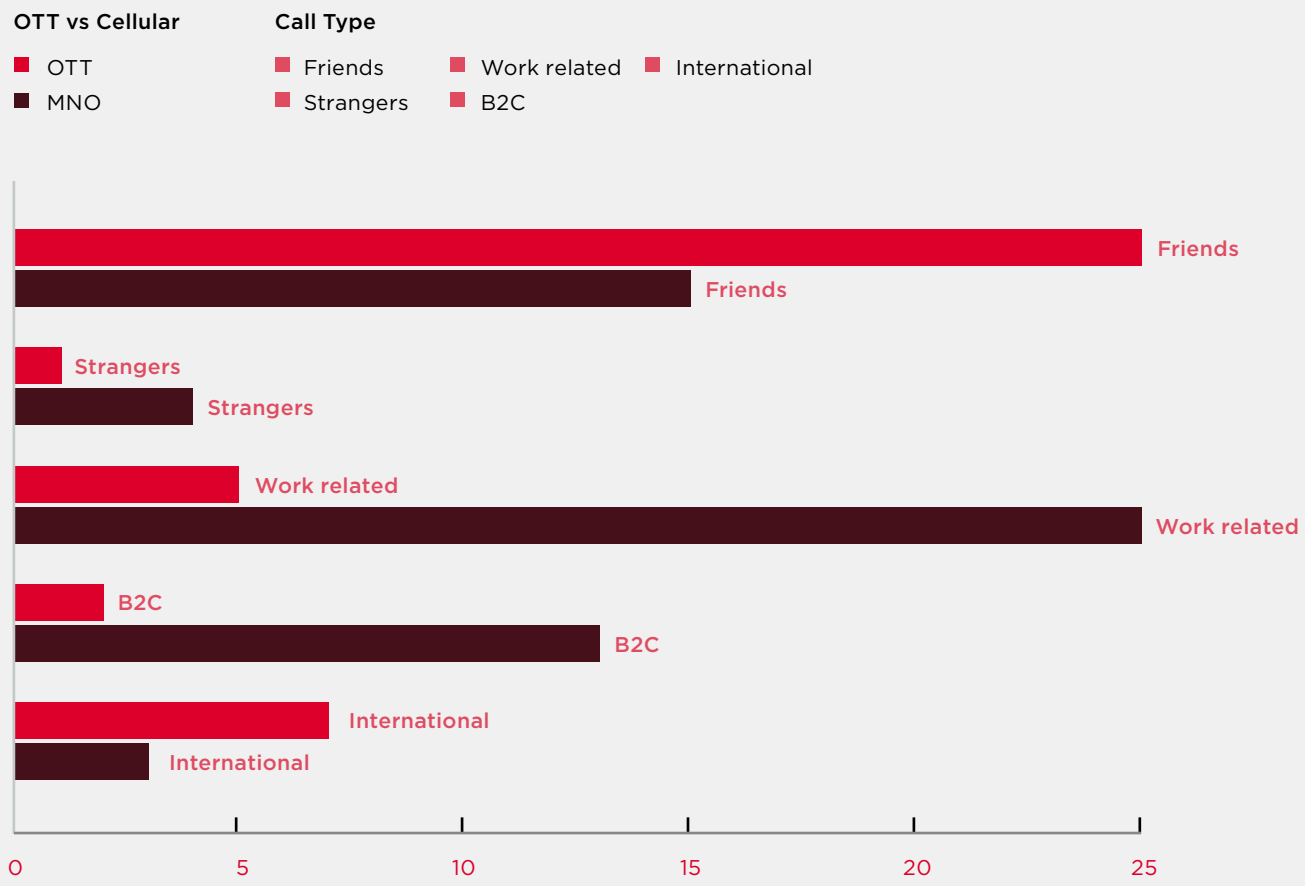
Source: *GSMA Intelligence*

The impact of alternative voice providers' on operators' voice traffic has been significant for certain types of voice communication, such as international/roaming owing to cost, or calls to acquaintances who are likely to use the same alternative providers (see Graph 2 & 3). But the decline is less apparent for work-related calls where quality of service is considered essential as well as for calls to strangers and B2C calls, probably because the caller wants to avoid the need to pre-establish a connection over an alternative voice service provider. The preferred way for enterprises to communicate with customers is likely to remain the operator voice service.

The preferred way for enterprises to communicate with customers is likely to remain the operator voice service.

Graph 2

Illustrative: voice calling split between operator provided and non-operator provided voice service by destination



Source: *Huawei*

2.1.2 Video service

Video call has been supported by standards for more than 10 years, as part of the Multimedia telephony (MMTEL) Service specifications, and work has been carried out in the GSMA to create profiles facilitating the configuration of networks and devices. Operators even experimented with video call in 3G networks, but, with the exception of some markets, operator video call has not been widely adopted.

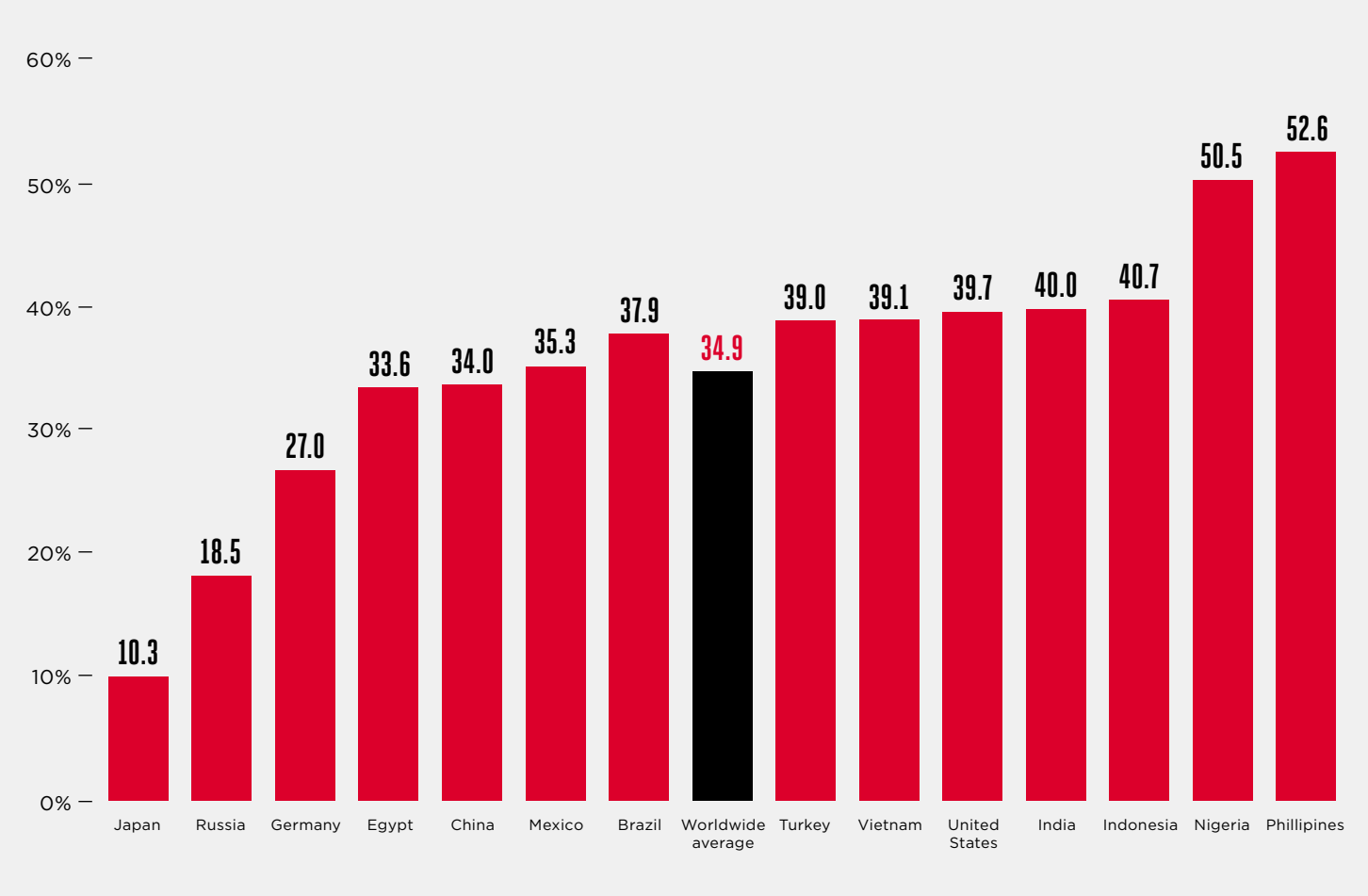
There are several reasons for the difficulties telcos have had in bringing video communications to consumers:

- Most operator IMS networks were not interconnected, so video calls between two parties belonging to a different network were not possible
- Support in devices was not widespread
- The functionality to manipulate the video media (add/remove video, accept/reject) were not included in the dialler and there was no indication whether the other party could support video communications
- Charging principles were not uniform
- Unlike voice call, video call could not fall back from 4G to legacy networks therefore dense 4G coverage with good quality connection was needed for both participants in the call.

On the other hand, video communications natively supported by operating systems (Google Duo, Facetime) or provided as add-ons to messaging apps, are now quite successful, despite suffering from many of the above problems. However, there is still the opportunity for operators to compete with other players in this space with video service (see Graph 3).

Graph 3

Worldwide average percentage of users making video calls with their mobile – selection of countries with largest population



Source: *Statista.com*

2.2 Operators' advantages

Mobile operator services, especially voice calling, still have significant advantages compared to alternatives in the market, namely:

Global reach. Over-the-top apps and native OS applications restrict the communications to members of the same community, but mobile operator services can provide universal reach (call any number) including legacy mobile systems and non-mobile users, in case of voice services.

Integration in the smartphone. Unlike competitive communication services, operators' services work out-of-the-box, not requiring pre-installation of any software or separate subscription/identity.

Carrier-grade service. Operator communication services can leverage the quality of service framework of the mobile system to guarantee a minimum level of performance. This becomes more critical as new types of services emerge that require stringent connectivity KPIs to work correctly (for example, AR communications require ultra-low latency).

Regulatory compliance. Operator communication services support emergency calls and other regulatory requirements, such as lawful intercept if mandated. Through the tight interworking of the service with the network, it is possible to provide the location of the user, call back if an emergency call is dropped, and prioritise handling of an emergency call in the device and the network.

Transparent charging regime. Voice is treated as a telecommunication service, rather than a data connection as is the case in OTT, meaning operators can make charging more transparent (e.g. apply calling party pays model).

Operators can preserve the above benefits while introducing a raft of exciting new features both for the benefit of the consumers and enterprises.

5GNC represent a golden opportunity to enable operators to re-enter the service provision area, leveraging their strengths and reversing the current decline.

2.3 What is 5G New Calling?

By harnessing 5G networks and new technologies, such as AI and AR, 5GNC supports innovative, user-friendly and convenient call enhancements and applications. A 5GNC solution offers the following "new" features:

A new experience.

The call is enhanced from a pure voice and video communication to a ultra-high-definition, intelligent, and interactive experience.

New capabilities.

Media and data interaction capabilities can be seamlessly integrated into voice and video calls to create rich applications that transform a regular call into a more rewarding or more efficient communication medium.

A new ecosystem.

5GNC will create a new ecosystem where many different types of industries will be able to reach their customers through mobile connections by leveraging well known web technology that works out-of-the-box. This paper refers to these applications as New Calling Mini-Apps. New Calling Mini-Apps can be developed by operators, device manufacturers and third party developers, forming an open ecosystem for the 5GNC. An example of a restaurant booking Mini-App is shown in Image 1, which is loaded onto the device when a call is made and provides an interactive menu.

New Calling Mini-App

The "New Calling Mini-App" is an application stored on the operator's network and that is pushed to the user terminal during the call.

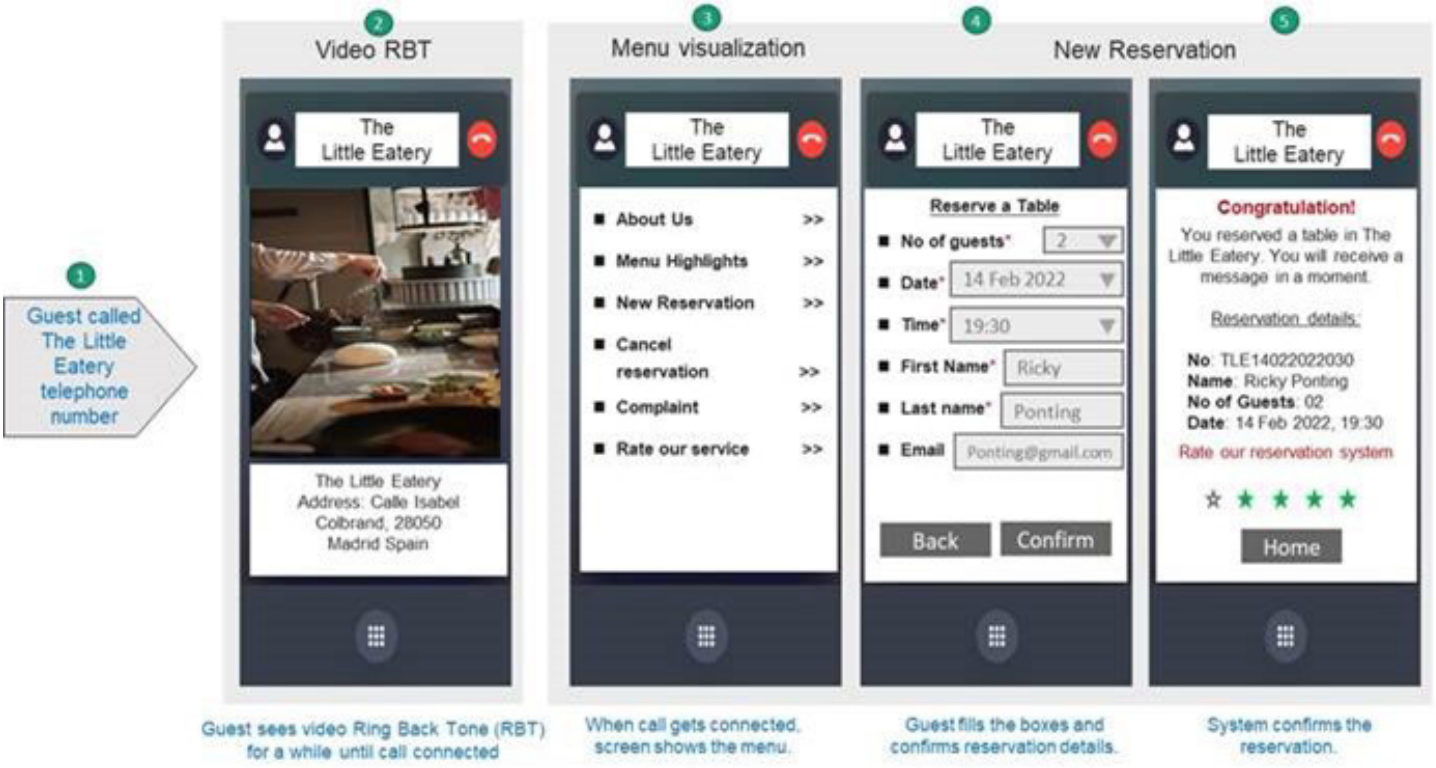
Compared to regular applications, the New Calling Mini-App is more akin to WebApps currently being defined in the W3C Consortium. A New Calling Mini-App is generally invoked during a call or prior the completion of the call establishment to provide multiple features for users to improve their experience.

The "New Calling Mini-Apps" rely on native features of the device, but unlike regular apps consumers are familiar with today, they do not require pre-installation , and are always up to date, secure, not tied to a specific ecosystem and make use of the biding between user identities and mobile number. In terms of security, the guidelines outlined in GSMA PRD NG.134[4] are applicable to "New Calling Mini-Apps" that adhere to the IETF security framework and meet the necessary standards.

4/ GSMA PRD NG.134 "IMS DC"

Image 1

Example of restaurant booking Mini-App



2.4 Business Opportunities

5GNC offers a straightforward route for operators to be more than simple connectivity providers. In summary, operators are likely to adopt a two-pronged approach by launching 5GNC targeting both consumers and enterprises.

With 5GNC, consumers will be able to enjoy the benefits of carrier-grade communication services that are at least at functional parity with (if not better than) equivalent services offered by OTTs. The services will work out-of-the-box, without the need for installation, upgrading and with superior security and well-defined costs. At the same time, 5GNC will provide enterprises with greater reach to their customers. Enterprises can work with operators to create bespoke Mini-Apps, which take advantage of operators' quality of service, security, global reach and many other capabilities.

The control of the connectivity, as well as the hosting of the application servers that realise the advanced service logic, will ensure operators maintain a strong presence in the value chain

Additionally, 5GNC will bring the following benefits for mobile operators:

- Monetise existing IMS assets
- Boost migration of voice call from circuit-switched to more cost-efficient packet-switched technologies
- Boost adoption of video over IMS
- Leverage capabilities of 5G networks, such as low latency and high throughput, in the consumer segment
- Bring service parity with OTT communications propositions

3 Use cases and examples

3.1 Consumer use cases

3.1.1 Smart translation

Smart translation enables a user to enjoy effective video communication with a contact that speaks a different language or may be hearing impaired.

The smart translation service supports both voice transcription and real-time translation. When voice transcription is activated, the audio stream of the other party is converted into text and overlaid in real time as captions on the video stream. The real-time translation function goes one step further displaying the captions translated into the desired language.

To activate smart translation, users of basic video call terminals can simply configure the preferred settings and enable this function by contacting the operator. They can also adjust some settings during the call using specific digit combinations on the dialler. Using smart translation is even easier if the device supports IMS DC; in this case the smart translation is presented on the screen of the device as a Mini-App that can be launched during the call. The user can interact with the Mini-App's graphical interface to modify settings, switch function and so on.

Besides the obvious scenario of using smart translation to talk with someone who speaks a different language (for example to book a table at a restaurant while abroad), there are other scenarios where the smart translation and captioning functions are valuable. They can, for example, enable communications that would otherwise be difficult, such as calls in noisy environment or communicating with hearing impaired users.

The smart translation service can also be used as a powerful business tool by helping to remove the language barrier that is a major impediment for many commercial transactions. An example screen shot of the smart translation service is shown in Image 2.

Image 2
Real-time translation and captioning in action

3.1.2 Augmented Reality (AR) Calling

AR Calling is designed to provide users with a fun, rich and interactive video call experience. AR Calling enables the user to include a virtual background, stickers and an avatar in a video call. This functionality is particularly likely to appeal to younger generations who enjoy sharing their presence and emotions. Example screen shots of AR Calling are shown in Image 3.

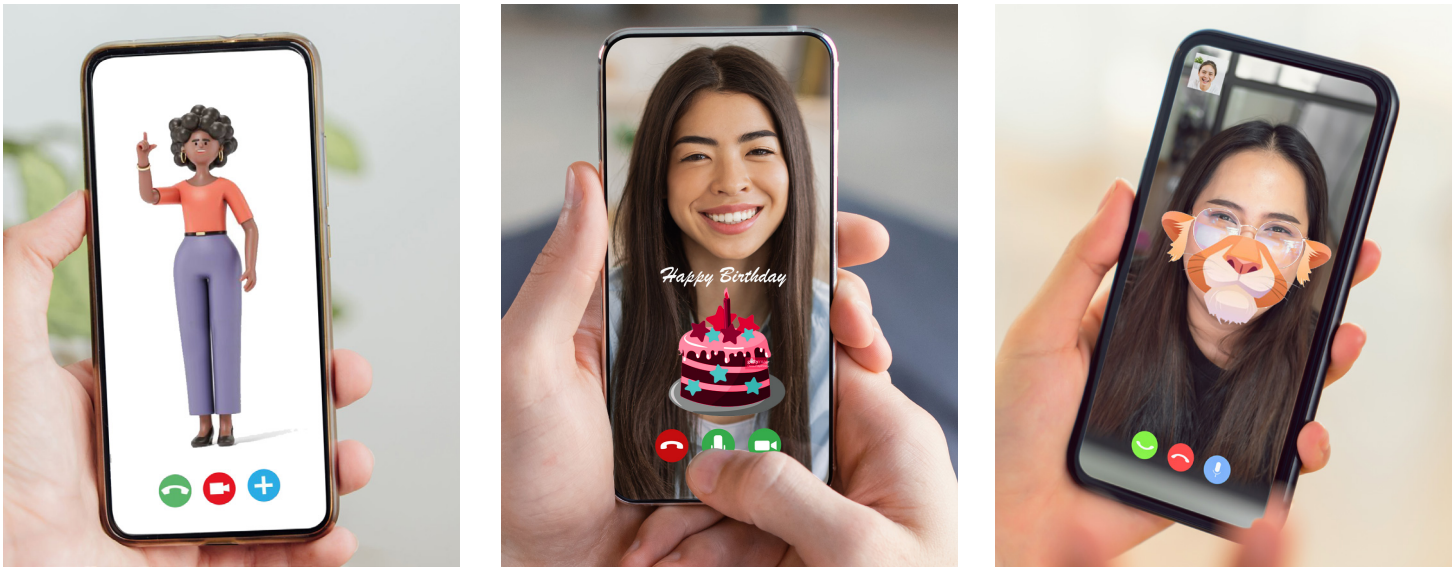
The virtual background function allows users to set the background of the video call to be displayed to the other participants during the video call. With the stickers function, certain effects can be triggered when specific words are spoken or when the user makes a specific gesture or action during the video call. Both sides' videos will overlay the corresponding emoticon effect for that specific word or gesture.

Example: A user is on a business trip away from home and cannot participate in a birthday party his friends are holding, so he chooses to make a video call to his friend to wish him happy birthday. The user enables the AR Calling function and sets the "Happy Birthday" panel as the virtual background in advance, which replaces the existing background with the caller's greetings. His friend picks up the call, and when the caller says "Happy Birthday", a large birthday cake with candles lit up instantly appears on the screen, and when he sings "Happy Birthday", countless ribbons accompany the cake. In short, AR Calling can make video calls more fun and bring people closer together.

AR Calling functions are activated in a similar way to smart translation. Whether an individual is using a video call device or a device that support IMS DC, they can access AR Calling functions through simple steps.

Image 3

Examples of avatars, stickers and fillers for AR Calling



3.1.3 Content sharing

Content sharing is a collection of 5GNC functions implemented via IMS DC technology. If both parties use devices that support IMS DC, users can send each other photos, share their location, send files and business cards, and share screens.

A user can select any photos and files on the device and transmit them to the other party without having to interrupt the call.

Location sharing encompasses two functions: “send location” and “real-time location sharing”. The other party will receive the location in the form of a map.

Both parties can also choose to use the screen sharing function during the call, which allows the receiver to see the sender’s screen in real time. Both parties can then annotate the screen.

These content sharing functions all require terminals that support IMS DC and are realised through a New Calling Mini-App that is automatically provided by the network to both devices during the call (no need for installing or updating).

Businesses can employ content sharing to share files and information with customers.

Image 4

Example of content sharing

3.2 Enterprise use cases

3.2.1 Enterprise Caller ID

Enterprise Caller ID will provide new opportunities for enterprises to reach users. The key features of the Enterprise Caller ID are:

- Enterprise Caller ID enables businesses to create exclusive and verified business cards through operators.
- When customer services staff call users, the user's screen will display the enterprise's business card and call purpose.
- This enhances user trust, and improves the access rate and communication efficiency for the enterprise.

In summary, Enterprise Caller ID provides a way for enterprises to identify themselves when calling users, in order to improve the effectiveness of those calls. An example screen shot is shown in Image 5.

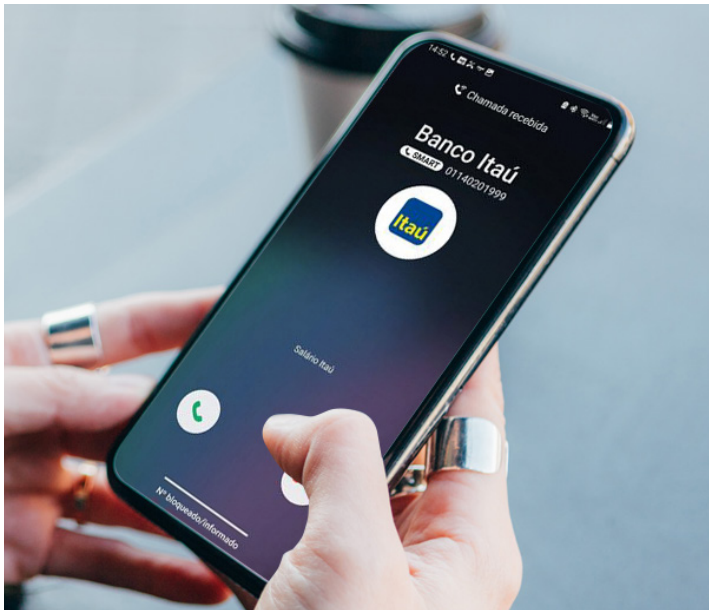
Caller ID in action (banking Mini-App)

Banks plan to use Enterprise Caller ID to realise the following benefits:

- Easier debt renegotiation by increasing the number of calls answered. For example, Itaú, a bank in Brazil, has found more than 80% of its calls are classified as spam on calling apps provided by third parties.
- Improved security. The practice of spoofing has negatively impacted attempts to contact customers.

Image 5

Example of Enterprise Caller ID



3.2.2 Smart customer service

Smart customer service is an upgrade of traditional telephone-based customer service. When a consumer dials a specific customer service number on their IMS DC device, they will automatically enter the smart customer service Mini-App corresponding to this customer service number. Rather than relying on traditional voice and keypad inputs, smart customer service provides a new interactive interface combined with human customer service. Users can choose different services within the customised menu, or they can connect to human customer service and perform corresponding operations under the guidance of a member of staff.

Smart customer service can be highly customised, enabling the creation of dedicated customer service for different enterprise users. Mobile operators, for example, could use it to provide bills and other information. For home appliance makers, it can be used to provide bidirectional video marking functions, so that customer service staff can observe the user's on-site scene in real time (with the user's authorisation), and guide them on how to use the functions of home appliances or eliminate simple errors. For insurers or banks, smart customer service can be used for face verification and real-time digital signatures, making life easier for customers and improving enterprise work efficiency.

For enterprise users, smart customer service could increase user reach rates, enhance user stickiness and bring extra income, as well as improving business processing efficiency.

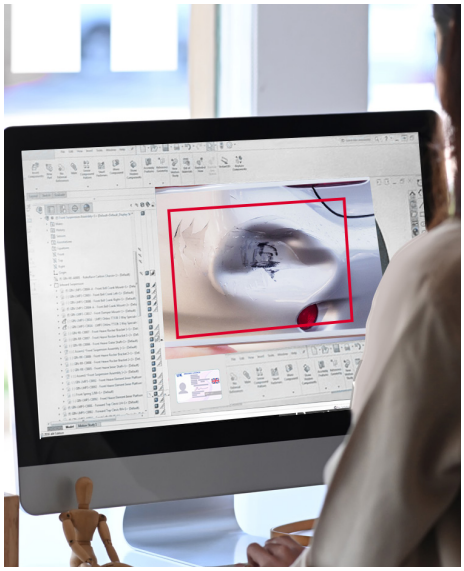
Example: Following an accident, a customer contacts their insurance company for remote damage assessment using the 5GNC Mini-App and shares images of the damage in real-time from within the Mini-App (see Image 6).

Advanced interactive smart customer service

By presenting an interactive menu to the customer during the call, it is possible to transform a voice communication into a fully-fledged digital service. Customers can access self-service journeys through the Mini-App that is loaded automatically in the background at the start of the call providing a more user-friendly experience than traditional Interactive Voice Response (IVR). With visual New Calling the 5GNC will allow enterprises, such as a bank, to send messages to customers about security instructions for financial markets or to showcase the banks new products.

Image 6

Damage assessment using the 5G New Calling Mini-App



3.3 Advanced use cases

3.3.1 Social Gaming

New Calling functionality can enable people to play games together during a call. If both parties' devices support IMS DC, users can play social games during two-person calls or multiplayer calls. They can send each other game invitations and play together during video calls. There are a wide range of potential games, including puzzle games, parlour games and competitions.

When a parent is away with work, they may want to be able to interact and play with their children. 5GNC makes that straightforward. During a call, a parent and child, for example, can click on the game function and choose a dodge ball game. Two tracks will appear: the parent controls a track and the child controls the other track, and both sides dodge the flying ball by turning their heads to see who holds out longer.

The game functions require devices that support IMS DC, which are enabled by a New Calling Mini-App that is provided by the network to both devices before the call starts.

3.3.2 Mixed Reality (MR) -based Immersive New Calling

MR headsets are becoming more and more popular. They offer an immersive experience and spatial human-computer interaction that opens up new possibilities for remote communication in both an office and home setting.

New Calling enables users to create their own digital-twin or avatar in a mixed reality space, where multiple users can communicate and interact. Rather than simply seeing each other in 2D in video windows, this functionality enables callers to experience 3D face-to-face interaction. 5G and gigabyte fibre networks can support the high quality cloud rendering and low latency connectivity required.

During an MR -based immersive call, facial movement and body gestures can be tracked and portrayed digitally, synchronised with voices. Within the mixed reality space, 2D presentations can be shared in a virtual screen or 3D models can be discussed and manipulated. Six Degrees-of-Freedom (6DoF) interaction allows users to move around and operate 3D objects in the virtual space. In this way, New Calling can generate a spatial virtual reality that improves communication.

MR -based Immersive New Calling requires MR headsets to support Simultaneous Localisation and Mapping (SLAM), 6DoF interaction, voice recording and be able to run the necessary app.

4 Standardisation progress

4.1 Overview of standardisation activities

Standardisation has been instrumental to the success of 5G, as well as previous mobile telecommunication technologies. The cooperation between all the stakeholders in international standards bodies fosters interoperability, widens the supply chain and creates economies of scale, resulting in robust, secure and high performance products. Therefore, it is critical to deeply root 5GNC in 3GPP specifications, GSMA profiles and other relevant standards to leverage such benefits.

In the initial phase, 5GNC will be based on 3GPP IMS technical specifications and rely on the GSMA profiles for VoLTE (PRD IR.92[1]), ViLTE (PRD IR.94[2]) and VoNR (PRD NG.114[3]) all of which enjoy a high level of stability and proven track record. Moving forward, when the full functionality of the IMS DC is introduced, 5GNC will continue to comply to 3GPP specifications and GSMA profiles, such as NG.134[4].

By adopting international standards, 5GNC will fit seamlessly into mobile operators' systems, will facilitate adoption in devices and will fulfil operator requirements, including charging and security.

4.2 3GPP

Established in 1998, 3GPP is responsible for creating the technical specifications on which 3G, 4G and 5G are based. The work in 3GPP flows from service requirements (stage 1), to the design of the architecture (stage 2) and the definition of the protocols (stage 3). 3GPP issues fully self-contained sets of technical specifications called "Releases". As of 2023, 3GPP is working on Release 18, which is scheduled for completion in early 2024, with related products available some months later.

3GPP SA1, responsible for the stage 1, has finished its Rel-18 study and normative work on the evolution of IMS MMTEL service, i.e. FS_MMTELin5G and eMMTel. It has identified and documented new use cases, such as real-time screen sharing, real-time visual interactive menu, multimedia Calling Line Identity Presentation (CLIP) and Connected Line Identity Presentation (COLP), and potential service requirements in 3GPP TR 22.873[5] and 3GPP TS 22.261[6].

In December 2021, 3GPP SA2, the working group that defines the system architecture, initiated its Rel-18 study on the network architecture evolution for real-time communication services based on the IMS enhancement requirements from stage 1. In May 2023, SA2 finished the study and normative work, and it concluded on the following three key issues in 3GPP TR 23.700-87[7] and TS 23.228[8]:

1/ GSMA PRD IR.92 "IMS Profile for Voice and SMS", GSMA

2/ GSMA PRD IR.94 "IR.94 IMS Profile for Conversational Video Service", GSMA

3/ GSMA PRD NG.114 "IMS Profile for Voice, Video and Messaging over 5GS", GSMA

4/ GSMA PRD NG.134 "IMS DC"

5/ 3GPP TR 22.873 " Study on evolution of the IP Multimedia Subsystem (IMS) multimedia voice call service", 3GPP

6/ 3GPP TS 22.261 "Service requirements for the 5G system", 3GPP

7/ 3GPP TR 23.700-87 "Study on system architecture enhancement for next generation real time communication", 3GPP

8/ 3GPP TS 23.228 "IP Multimedia Subsystem (IMS); Stage 2"

- Enhancement to support the DC in the IMS network.
- IMS-based AR communication.
- Study the applicability of service-based principles to IMS media control interfaces. 5G and gigabyte fibre networks can support the high quality cloud rendering and low latency connectivity required.

In the meantime, both 3GPP SA3 (security) and SA5 (charging) working groups have started their Rel-18 normative work. SA3 is progressing on IMS DC security and SA5 is focusing on duration-based charging and volume-based charging for the IMS DC.

Furthermore, 3GPP SA4 (codecs), which introduced the DC concept into IMS in Rel-16, is collaborating with SA2 to align with the concluded specifications on the IMS DC.

Based on the requirements from SA1, 3GPP is also working on making the eMMTel capabilities available to application providers, as well as vertical service providers, through standardised APIs in Rel-19. This work is led by the SA6 group, and the study will align with the 3GPP SA2 specification TS23.228[8] on the enhanced IMS architecture/ procedures.

Based on the conclusions of stage 2, 3GPP CT1 and CT4 have started the corresponding normative work for IMS DC interfaces and protocols, and are scheduled to complete it around March 2024.

8/ 3GPP TS 23.228 “IP Multimedia Subsystem (IMS); Stage 2”

4.3 The GSMA

The GSMA is supporting the development of the 5GNC industry chain through a series of activities in both its Networks Group (NG) and its Terminal Steering Group (TSG):

- GSMA NG released NG.129[9] in December 2021. This white paper describes the IMS DC technology and the related industry vision, and proposes requirements on IMS DC-based C2C, B2C, and C2B communication services on operators, vendors, and device manufacturers.
- In May 2023, GSMA NG released PRD NG.134[4]. The PRD details a IMS Profile for IMS DC, which defines a minimum mandatory set of features that user equipment (UE) and networks are required to implement to guarantee interoperable, high quality end-to-end IMS-based communication services for IMS DC over LTE radio access to EPC and NR access connected to 5GC.
- The GSMA TSG has initiated the IMSDCAS work item in April 2023 to specify an open and standardised IMS DC API specification for application developers. Immediately after that, GSMA TSG also initiated the UEIMSDC work item in May 2023 to define DCMTSI-specific functional and non-functional test cases for voice-centric UE with DCMTSI client, including test features and procedures, covering field testing, lab testing, performance testing and any other test cases that might be required.
- The GSMA TG (Technology Group) has released a Business Voice Calling White Paper (TGY.02[10]) in December 2021 that covers aspects that are relevant for 5GNC.

4/ GSMA PRD NG.134 “IMS DC”

9/ GSMA PRD NG.129 “IMS DC White Paper”

10/ GSMA TGY.02 “Business Voice Calling”

4.4 Further standardisation

Work in standardisation organisations will continue to evolve the IMS DC and add new features in the coming years. Further standardisation work is likely to focus on the following aspects:

- Enable interworking and roaming of New Calling services.
- Expose IMS real-time communication capabilities, such as audio, video, text and data, to enterprises/verticals to empower B2C/C2B service innovation.
- Support standalone DC - a DC Mini-App that does not require accompanying audio/video media in an IMS session. This will open up further opportunities for the development of innovative services and for fulfilling the needs of some enterprises/verticals.
- Enhance the IMS media plane to support more immersive and interactive IMS services, including the extended reality (XR) services specified in Rel-19 by 3GPP SA1.

5 5G New Calling readiness

Case study: China Mobile

China Mobile is well into the phase 1 of the deployment of 5GNC services. The operator is piloting and verifying “smart translation” and “AR calling”, based on the phase 1 of audio and video capabilities, in several provinces of China. At the same time, a number of friendly users have been invited to experience 5GNC functions in advance.

China Mobile hopes to complete the verification work in the pilot provinces during 2023 and make every effort to promote the service rollout on the entire network. At the same time, the research and development (R&D) and verification of the phase 2 of 5GNC are also under way. China Mobile has successfully tested the IMS DC-based 5GNC “Smart Translation” Mini-App, indicating that the phase 2 - IMS DC-based 5GNC in China - is ready to operate in the live network environment.

5.1 Phased approach to 5G New Calling

A successful 5GNC service depends on the full ecosystem, including chips, devices, networks, and software developers working in tandem. The development model and experience of traditional call services will be different to 5GNC.

The launch of 5GNC will take place in two phases. In phase 1, based on the video call capability provided by existing devices in the market, only the core network is enhanced to improve the media processing capability. In this way, users can enjoy a set of enhanced capabilities and innovative services that can be natively supported in the device calling interface (the dialler) without the need to download and install a separate client.

In phase 2, the network will be upgraded in parallel with the terminal upgrade to support IMS DC capability, real-time data interaction between the cloud and user and between the two users. In addition, the voice and video calls, the 5GNC services will integrate other media types and data transfer capabilities.

5.2 Network evolution

While phase 1 of 5GNC can be deployed with minimal changes to the current infrastructure, operators around the world and especially in China are already working with industry partners to upgrade their networks to support the required capabilities for advanced 5GNC services, based on the GSMA guidelines, as well as the most recent 3GPP technical specifications.

The main enhancement to the operator core network will be in the IMS. The IMS has remained fundamentally unchanged in the past 10 years, as it was already able to support multimedia voice services, such as VoLTE and ViLTE, as well as their evolution to 5G (VoNR and ViNR). The introduction of IMS -DC support, the alignment of the IMS architecture to the same service-based architecture used in the 5G core network and the need for more sophisticated control of media will require operators wishing to support 5GNC to upgrade.

5.3 Mobile chipsets

Mobile chipsets are the foundation of the industry ecosystem. The chip industry in China now has a complete IMS DC-based phase 2 New Calling device solution, which will provide various chip capabilities required to meet the requirements of 5GNC services. With the emergence of more product forms or application scenarios in the future, the chip solution will evolve to meet the cross-platform compatibility requirements of 5GNC and adapt to new application scenarios.

5.4 Devices

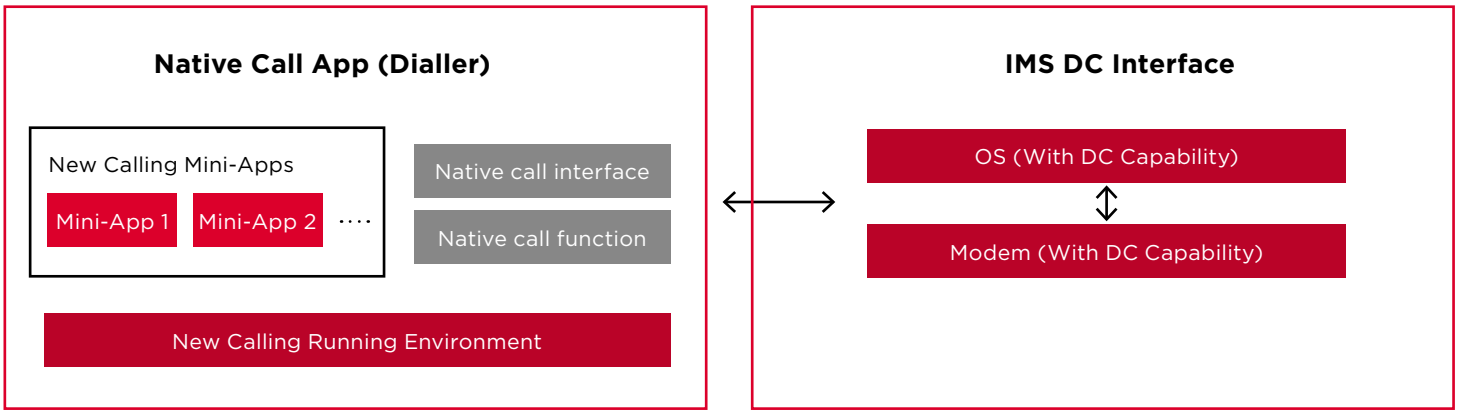
The progress of upgrading devices to support IMS DC capabilities will be key to large-scale adoption of 5GNC services. Existing 5G devices in the market can meet the service requirement of phase 1 of 5GNC without the need for hardware or software modifications. However, devices supporting the IMS DC capabilities for phase 2 have not yet been released and are still under development.

Support for the IMS DC in the device would probably be the most radical innovation since the launch of 5G and represents a vital opportunity to entice users to upgrade their device: in other words, 5GNC could be the first operator service suite specifically designed to take advantage of cloud-native 5G networks' capabilities. The architecture of a 5GNC Terminal is shown in Image 7.

The market promotion of 5GNC devices will take time and the penetration of such devices will be gradual. The first devices supporting the IMS DC capability are set to be released in China before the end of 2023 and after in the rest of the world.

Image 7

5G New Calling enabled device architecture



5.5 Application developers

A thriving and high-quality developer community will be an important part of the 5GNC industry ecosystem. In China, the industry is in the "introduction period" to attract more developers to participate in the development of 5GNC services. China Mobile has innovated and incubated multiple demonstration applications, built benchmark cases, and explored 5GNC application possibilities.

5GNC capabilities are being exposed to developers through documents, Mini-App development suites service quality test tools, and open-source 5GNC devices development kit (SDK) code, helping developers quickly interconnect with each other and lowering the barriers to entry. In future, more partners will participate in the development of the 5GNC application ecosystem. Operators will work with ecosystem partners to continuously improve network AI capabilities, build more 5G applications, and build innovative platform products based on New Calling services.

> China Mobile has innovated and incubated multiple demonstration applications, built benchmark cases, and explored 5GNC application possibilities.

6 Proofs of concept and trials

6.1 Introduction

5GNC has been demonstrated by consortia of mostly China-based companies at global events, such as the GSMA MWC 2023.

However, 5GNC is far from being a regional initiative. Several operators in various regions of the world have either conducted or are close to implementing a proof of concept (PoC) and trial. Some of the considerations and, where available, results are documented in this section.

6.2 Zain Kuwait

As a leading operator in the Middle East and a driving force of 5GNC, Zain Kuwait is focused on innovative communication product development. In 2023, Zain Kuwait proposed a 5GNC PoC plan and aims to be first operator to offer the following services in the Middle East:

6.2.1 Smart translation

Kuwait is a popular destination for tourists from all over the world. With a population of about 4.5 million, Kuwait welcomed 8.5 million tourists in 2019, speaking 20 or more different languages. In line with "New Kuwait 2035" (a Kuwait National Development Plan), Kuwait aims to repurpose, modernise and redevelop the existing tourism facilities in order to provide new world-class experiences for visitors. A smart translation service for tourists visiting Kuwait could represent a major step towards achieving this goal. When a visitor calls the local service departments for help, smart translation functionality would remove any language barriers. Zain Kuwait plans to start the PoC of smart translation in 2023.

6.2.2 Smart menu

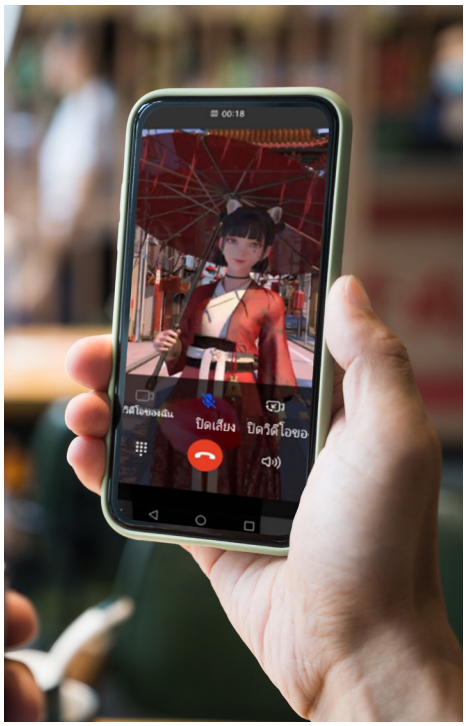
A smart menu function could significantly improve service efficiency for businesses, such as banks, utilities and travel agencies, running call centres in Kuwait. Today, after a call is answered, the customer has to listen to a voice menu in different languages, which is very inconvenient. With a smart menu, all the service options can be presented visually on the screen, and customers can access the services, via a simple touch. Zain Kuwait plans to start a trial of smart menu functionality in 2023.

6.2.3 Lighting up the screen

Kuwait's population is youthful. As of June 2022, more than half the population (51.8%) was under 25 years old. A lighting up the screen feature enables young people to show their personalities during a call. They can configure personal avatars for themselves, or even provide personalised animations. Meanwhile, companies can display adverts during service calls to showcase their business. Zain Kuwait plans to start a trial of lighting up the screen features in 2023.

6.3 AIS Thailand

AIS values the innovative use cases enabled by New Calling. A PoC is being developed, and a first New Calling call is expected in 2023Q3.



6.3.1 Massive consumer and business services

Considering the maturity of the network and the terminal, it is feasible to initiate consumer services like Intelligent Translation and Visualized Voice Calling in the initial phase. In Thailand, there are 2 million tourists each month, as well as about 10,000 global companies. Intelligent translation is expected to be a powerful tool to break the language barriers between tourists and tourism practitioners, and between people working with different home languages.

Visualized Voice Calling will be an interested feature for tourists as well, especially the young people. During the call, people would select the background of famous scenes, or select their personalized avatars in front of the scenes.

6.3.2 Interactive business services

As for the next phase, when DC is available on the terminals, more interactive use cases would be available for interactive business services. In Thailand, there are many popular APPs that can be integrated with New Calling. For example, AIS can collaborate with Taxi APPs to provide ride hailing services. Finding the right pick-up location is usually a problem, especially for travellers (or even locals). With 5GNC, both traveller and driver's locations can be shared in real-time upon request during a call. Furthermore, they can mark the pick-up location on the screen directly, helping the driver to pick up the traveller efficiently. Collaboration between operator and restaurants is also possible via 5GNC. When the customer calls the restaurant's receptionist, no waiting time is needed, as the customer can use the screen to fill in a request form directly. This would also improve the efficiency of the restaurant reservation. In short, with 5GNC, more opportunities can be explored between operators and a variety of business users. It is expected that the integrated voice-video-data calls provided by operators would greatly improve the efficiency of business users.

7 Industry collaboration

The success of 5GNC hinges on all stakeholders playing their part. To facilitate this collaboration an initiative was launched during the MWC Barcelona 2023 with a view to create a space where global operators, network vendors, terminal vendors, and industry partners can proactively participate in the expansion of the New Calling ecosystem.

The first step of industrial cooperation has been taken. It is hoped that this white paper will be taken as an opportunity for all parties in the industry to exchange ideas, explore the related business models, network interconnection, and global standards for terminals and applications, jointly participate in the construction of 5GNC ecosystem, in order to achieve the goal of enriching communication and life at an early date.

Image 8

Companies participating in the launch of the 5G New Calling Industry Cooperation Initiative during MWC Barcelona 2023, Spain

Source: *GTI summit at MWC Barcelona 2023*

8 Glossary

Term	Description
2D	Two Dimensional
2G	2nd Generation (of mobile technology)
3D	Three Dimensional
3G	3rd Generation (of mobile technology)
3GPP	Third Generation Partnership Project
4G	4th Generation (of mobile technology)
5G	5th Generation (of mobile technology)
5GC	5G Core (Network)
5GNC	5G New Calling
6DoF	6 Degrees of Freedom
6G	6th Generation (of mobile technology)
AI	Artificial Intelligence
API	Application Programming Interface
APP	Application
AR	Augmented Reality
B2C	Business to Consumer
C2B	Consumer to Business
C2C	Consumer to Consumer
CCSA	China Communications Standards Association
CLIP	Calling Line Identification Presentation
CN	Core Network
COLP	Connected Line Identity Presentation
eMMTEL	(3GPP) Stage 1 of Evolution of IMS Multimedia Telephony Service
EPC	Evolved Packet Core (i.e. 4G Core Network)

Term	Description
FS_MMTELin5G	(3GPP) Study on evolution of IMS multimedia telephony service
GSM	Global System for Mobile (Communication)
GSMA	GSM Association
ID	Identity
IETF	Internet Engineering Task Force
IP	Internet Protocol
IMS	IP Multimedia Subsystem
IMS DC	IMS Data Channel
IMSDCAS	IMS DC API Specification
IVR	Interactive Voice Response
KPI	Key Performance Indicators
5GC	5G Core (Network)
LTE	Long Term Evolution
MMTEL	Multimedia Telephony
MoU	Minutes-of-Use
MR	Mixed Reality
MTSI	Multimedia Telephony Service for IMS
MWC	Mobile World Congress
NG	(GSMA) Networks Group
NR	New Radio
OS	Operating System
OTT	over-the-top (player)
PoC	Proof of Concept
PRD	Permanent Reference Document
QoE	Quality of Experience
QoS	Quality of Service
RBT	Ring Back Tone
SDK	Software Development Kit
SLAM	Simultaneous Localisation and Mapping

Term	Description
TG	(GSMA) Technology Group
TSG	(GSMA) Terminal Steering Group
UE	User Equipment
UEIMSDC	UE IMS DC (device testing)
ViLTE	Video over LTE
Vo5GS	Voice over 5G System
VoLTE	Voice over LTE
VoNR	Voice over NR
VR	Virtual Reality
W3C	World Wide Web Consortium
XR	Extended Reality

About this whitepaper

About the GSMA Foundry

The GSMA is a global mobile industry association that represents the interests of mobile operators worldwide, uniting more than 750 operators with almost 300 companies in the broader mobile ecosystem, including handset and device makers, and software companies. The GSMA also holds the industry-leading events such as MWC (in Barcelona, Shanghai and Los Angeles) and the Mobile 360 Series.

GSMA Foundry is the go-to place for cross-industry collaboration and business development, where GSMA members and industry players come together to rapidly develop real-world solutions to industry challenges, nurture new ideas through initial commercial trials and scale proven solutions at a regional and global level to forge our digital future.

For more information, please visit https://www.gsma.com/foundry/projects/5g-new-calling/.

GSMA Terminal Steering Group (TSG)

Work on 5G NC is continuing within the GSMA Terminal Steering Group (TSG) if you would like to be involved contact Paul Gosden GSMA Terminal Director.

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