2G/3G Switch-Off & 4G VoLTE Calling Device Information

https://youtu.be/Q6qb9dml6So - *Additional Sources & Documentation Linked Below*

Background

While some people may be aware that 3G (and/or GSM) services will be gradually shut down in many regions, the vast majority will be unaware that this may affect their ability to make or receive calls on their existing and in some cases brand new 4G/5G devices.

4G/LTE and 5G technologies **do not** natively have voice calling functionality like 3G & GSM (2G) Services (Circuit Switched Calling). 4G and 5G are Data only and Calling is enabled through the use of VoLTE (Voice over LTE or VoNR [New Radio] for 5G SA), which is a software/firmware VOIP (Voice over Internet Protocol) solution for mobile phones (IMS services).

The issue is that a significant portion of 4G devices sold in previous years in various markets either Do NOT support 4G VoLTE Calling or ONLY support it with the Telcos/Carriers they were purchased with, regardless of whether the device is network unlocked. (*Also affects new imports).*

This issue primarily impacts Android phones and non-Apple devices.

With 3G (or GSM) still being in service customers don't experience any loss in device functionality by switching to a competing provider. However, without the 3G (or 2G/GSM) services people will no longer be able to make or receive standard phone calls on their existing 4G device with their preferred provider.

Apple Devices

Apple iPhone 6 (2014) and newer devices support VoLTE across the globe as Apple has complete control of the device software. iPhone 5, 5s and 5C though 4G Phones Do **Not** Support VoLTE.

Android Devices

Android is very fragmented from a software support side, however it's fair to say that a majority of Android devices released around or before 2018 are likely to have either no VoLTE calling support or only limited VoLTE support on Australian Networks (Depending on brand, firmware, region etc.)

Devices from Android 4 to Android 9 (2018) equates to approximately 27% of the Android Device Market as per Google's stats from April 2023. It's almost a certainty that anything Android 6/7 and older likely doesn't have any support or at best, only support with one Telco.

Further to that, the Optus (AU telco) website says VoLTE and VoLTE (International) Roaming should work on all Samsung Phones with Android 12 and above.

Android 12 was only released in late 2021 so people who have Android phones older than 2020/2021 are likely to encounter issues with either switching AU Providers or when overseas.

Devices from **Android 4 to 11 make up 69% of the Android Device Market** as of April 2023.

Google made major changes to the base Android Operating system for Version 12. Those changes improved how IMS (IP Multimedia Subsystem) Services are activated and by extension VoLTE Calling and RCS Messaging etc. This is the likely reason why Optus can say Samsungs on Android 12 and above are supported.

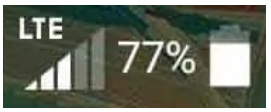
How to Check if 4G VoLTE Calling is Enabled (IMS Status)

***Note:** The below instructions **do not** test for **4G Emergency Calling** Support.* 🚨🚓🚑🚒
For **(112/000/911)** Emergency Calling testing instructions **Click Here** (Very Advanced) 🚨🚓🚑🚒

Method 1: Phone Call Test (Easy)

1. On your 4G Device Pay attention to the Signal Indicator at the top of the screen, if it says **4G** or **LTE** it means the device is connected to a 4G(LTE) Network for Data Services.
2. Make a regular call via the Dialer (to another phone or voicemail) and watch the signal icon. If it changes from **4G (or LTE)** to a **3G**, **H+** (or another non 4G/LTE symbol) then the device is likely using legacy (Circuit Switched) Fallback calling (CSFB) and **not** making a 4G call using VoLTE.

   If the icon stays on 4G (or LTE) throughout the call then the device is likely using 4G(LTE) for calling and is VoLTE Compatible with your carrier network.

Legacy 3G Call (CSFB) ❌	4G/VoLTE Call ✅
Sony  	**Sony**   
Samsung  	**Samsung**  
Google Pixel 	**Google Pixel**  

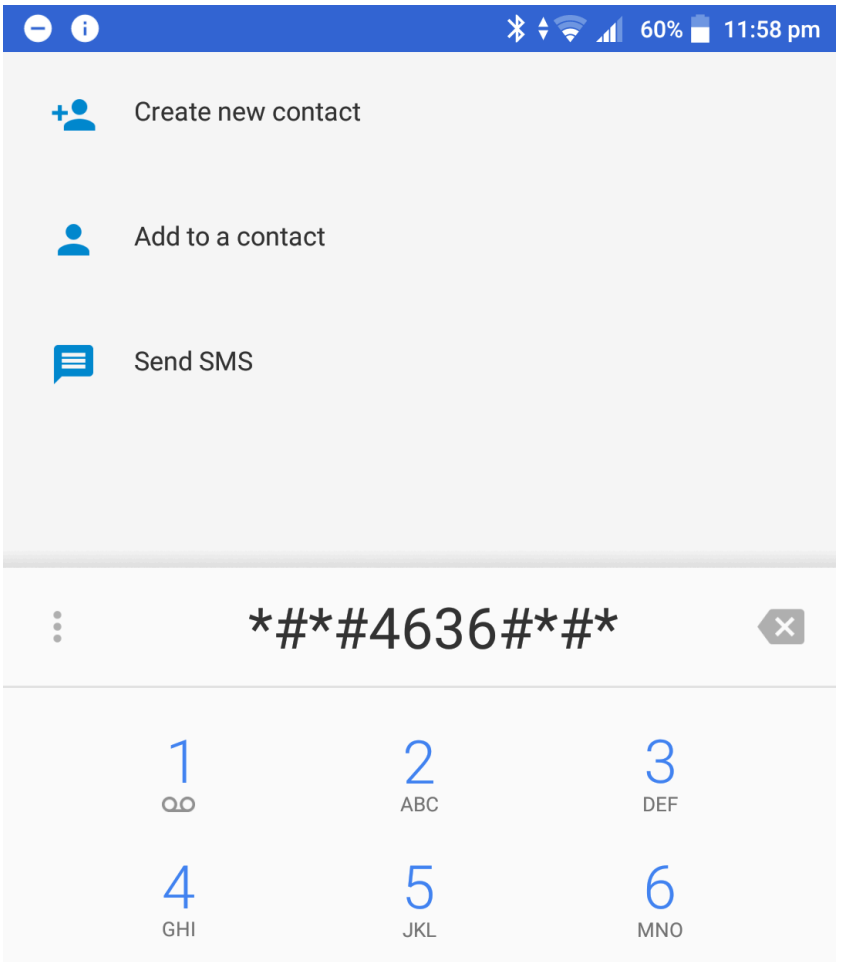
Note: When using legacy fallback calling the mobile connection to the whole device is downgraded to 3G (or 2G/GSM) in order to make that call. This also means your internet connection is slowed down dramatically as well during the call. Once the call ends the connection is upgraded again. Do note that the lack of a VoLTE icon whilst on '4G/LTE' doesn't mean VoLTE isn't enabled. (See below)

Method 2: IMS Status Check (Intermediate)

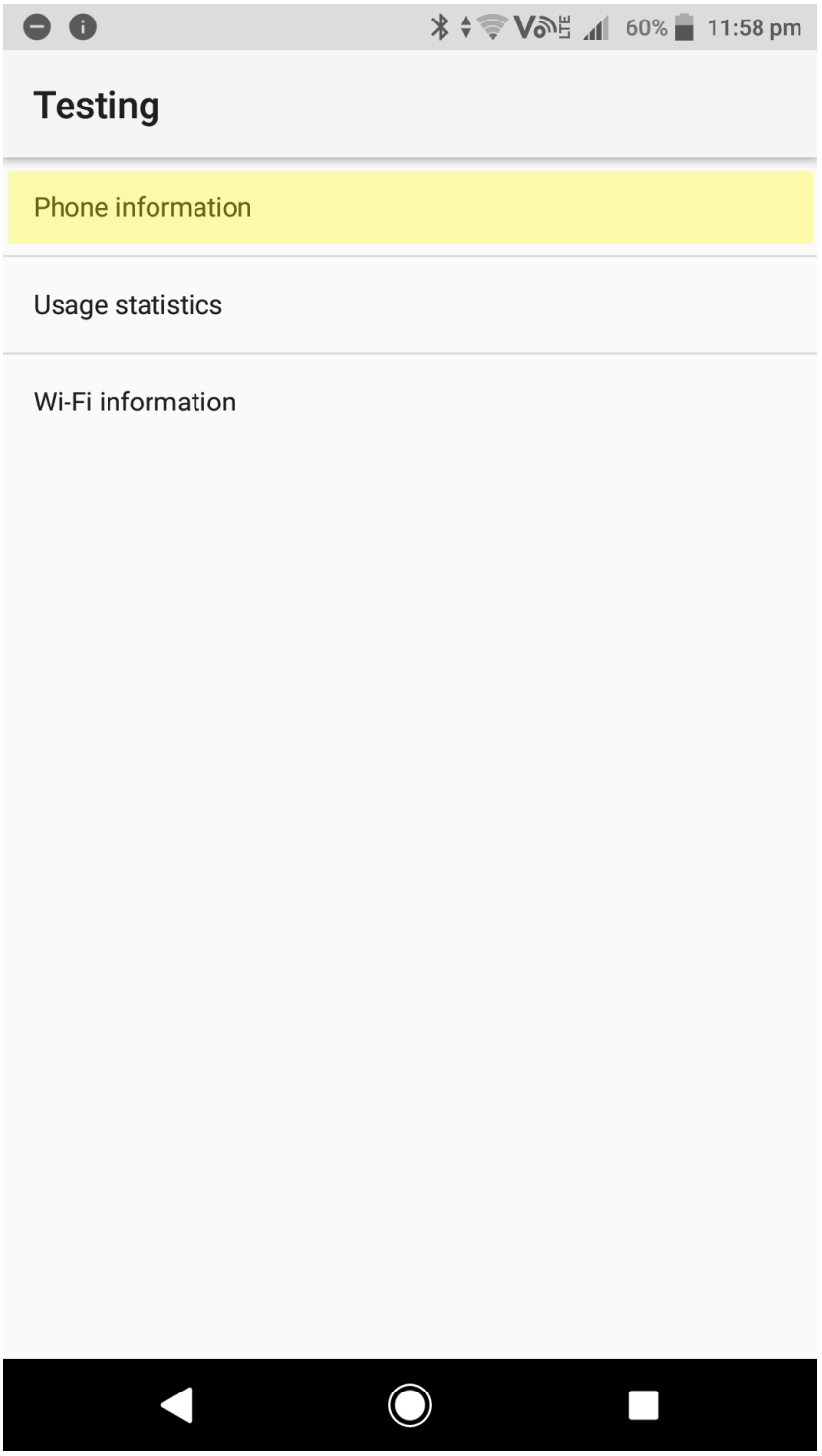
This Status Check method will vary depending on device model and firmware. (Android 7+)
Most 'stock-like' Android ROMs like those used by Sony, Pixels, OnePlus, LineageOS *should* work.

There may be alternative approaches for other brands not listed in this document.
For Samsung the IMS Status should be visible within the About Phone area of the settings. (See below)

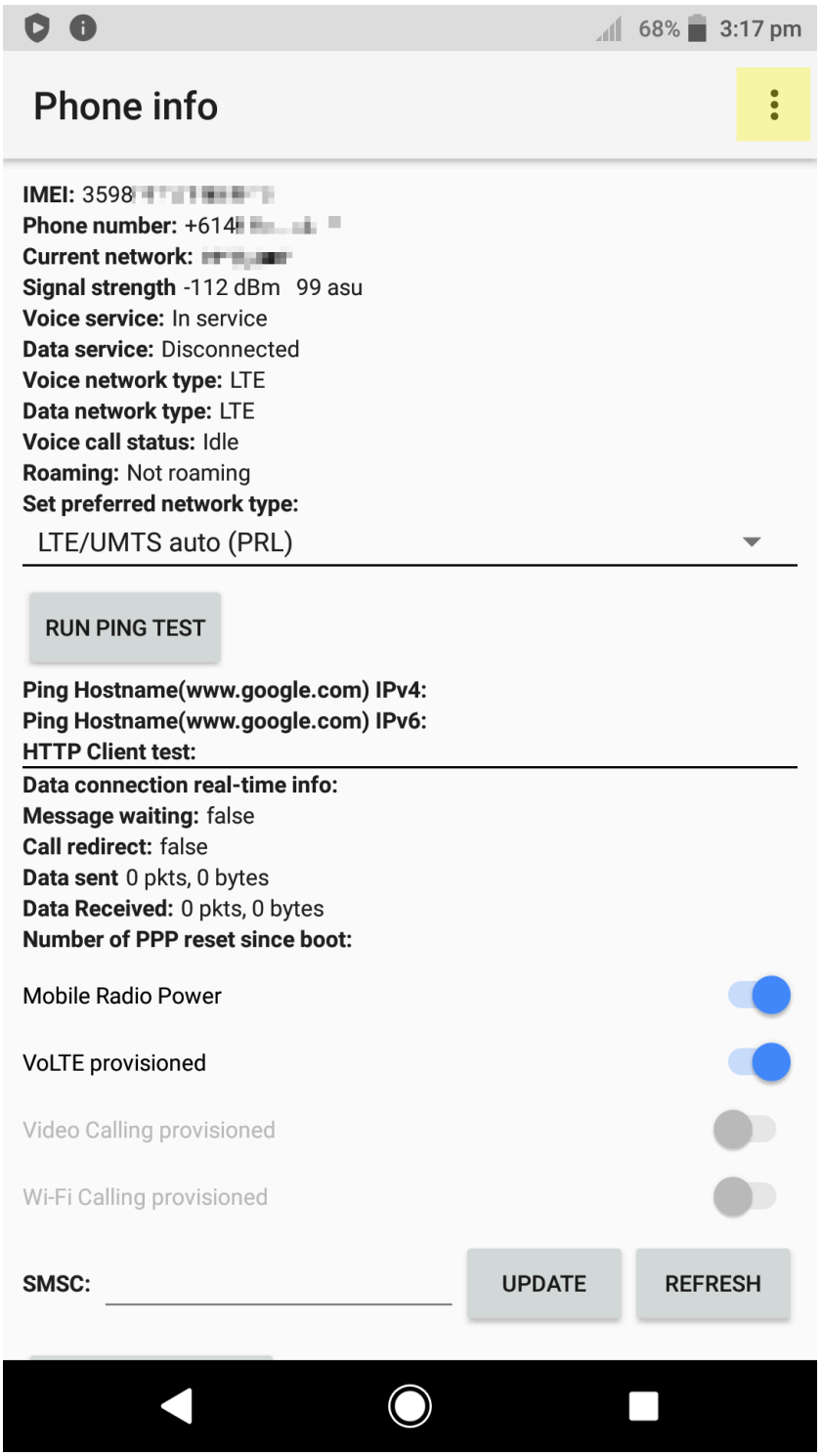
1. **Open the Dialer and type the code *#*#4636#*#* to load the Phone Testing Menu**



2. **Wait for the Menu to load then Press ‘Phone Information’**

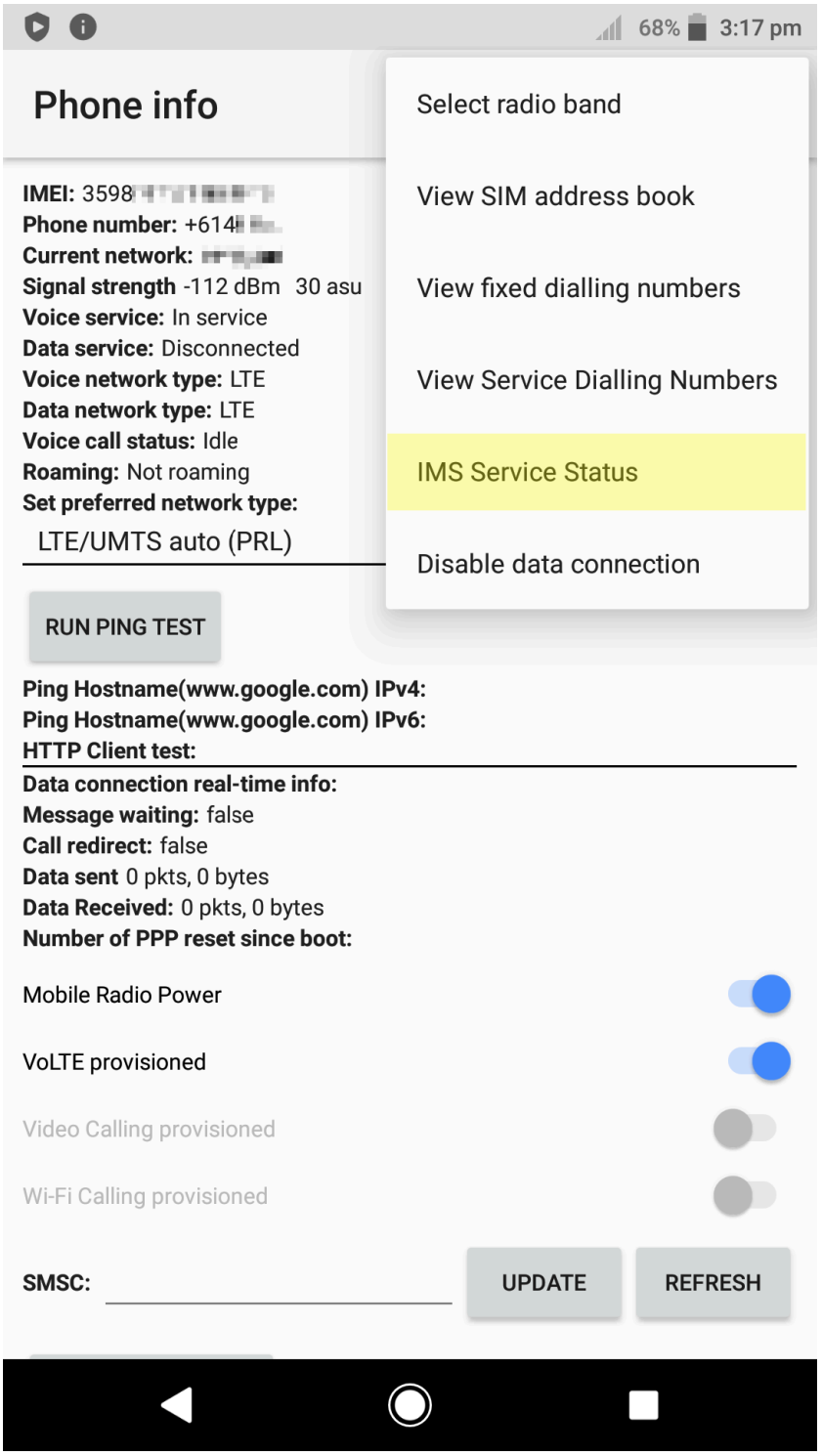


3. **On the Phone Testing Screen press the three dots located in the top right corner [⋮]**
   On this screen you can also see if VoLTE, Video Calling and Wi-Fi Calling are 'provisioned' (enabled) within the Firmware (build.prop) settings. VoLTE will not work if not provisioned.
   A Carrier compatible modem firmware configuration is also required for VoLTE to work.

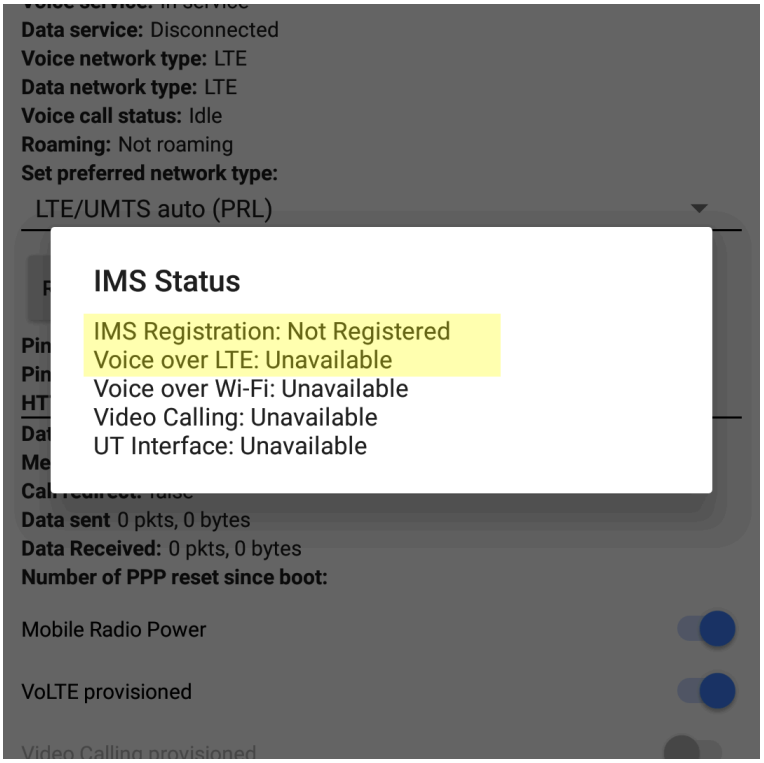


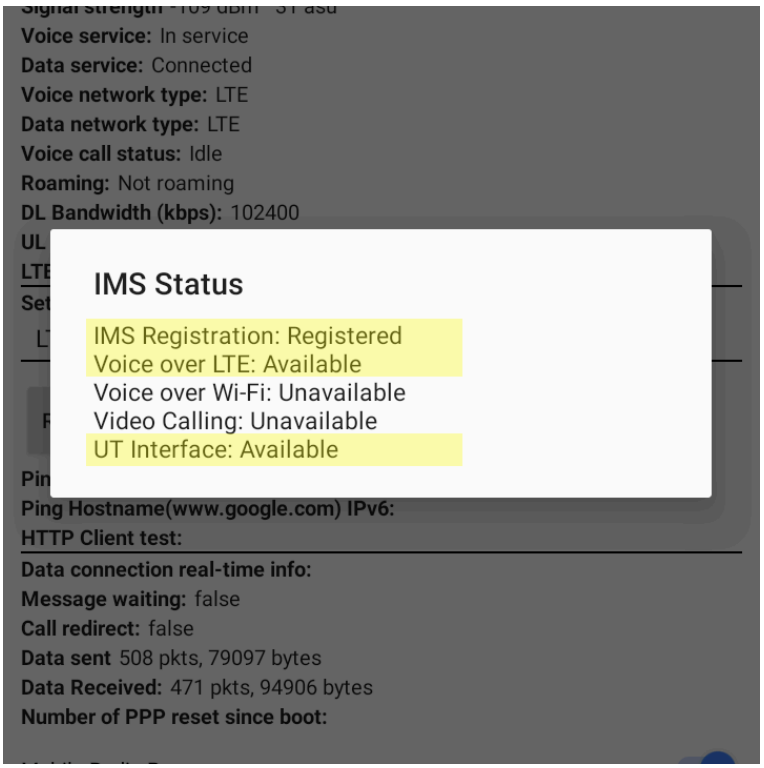
Per the screenshot above only VoLTE Calling is provisioned in the Firmware, both Video Calling and WiFi Calling are disabled in the firmware/build.prop.

4. **Select IMS Service Status**



5. If it says **"IMS Registration: Not Registered"** then VoLTE is **not** enabled or working with either the current phone firmware or that carrier network.
   If it says **"IMS Registration: Registered"** and **"Voice Over LTE: Available"** then **VoLTE is enabled and working.** ***(Note:** Does **Not** confirm working **Emergency Calling** - **See Here**)*





The other values are for WiFi-Calling (VoWiFi), Video Calling and UT Interface.
If these say **Unavailable** then the feature **is not working**.
***Note:** to have WiFi Calling say 'Available' you need to be connected to a suitable WiFi Network.*

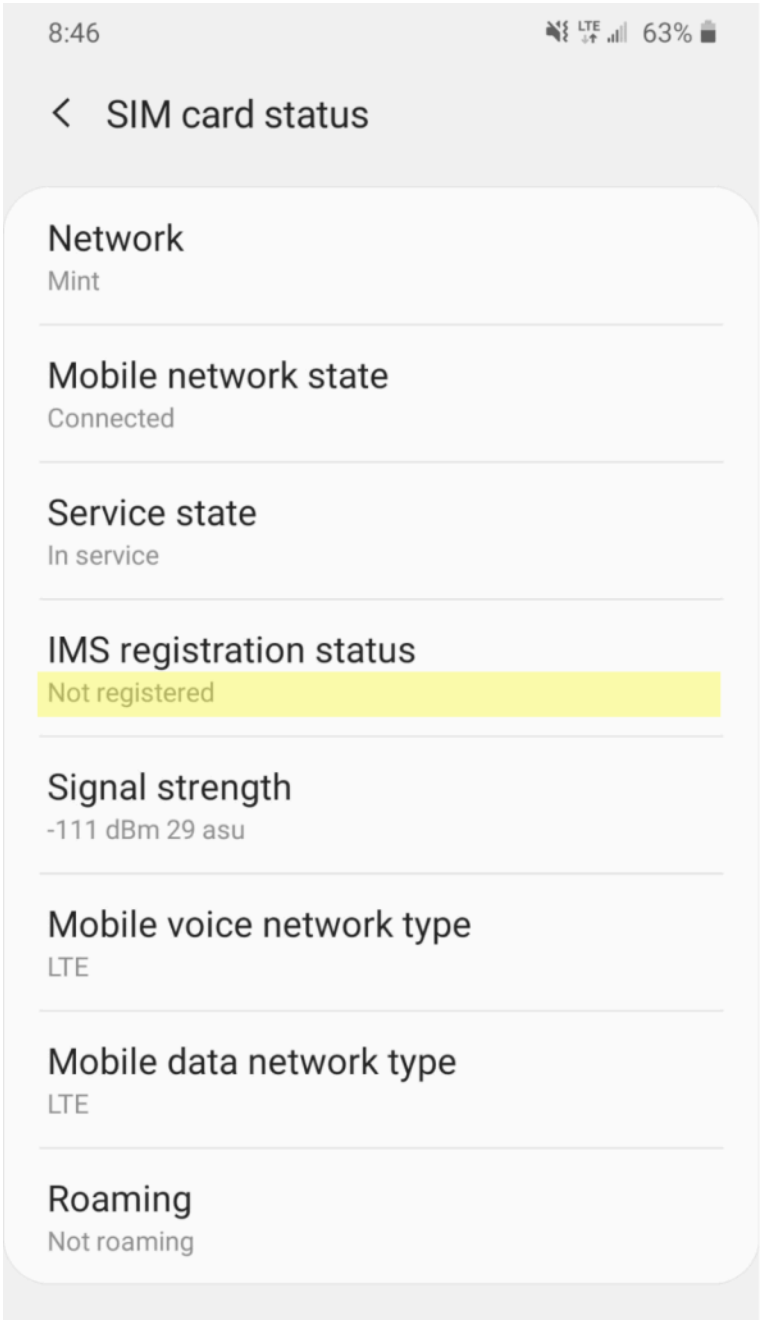
If UT Interface is **Unavailable** then you won't be able to use the Phone Dialer settings to change carrier Call Forwarding or Call Busy Settings. UT Interface isn't required for VoLTE Calling.
UT Interface is only required to change supplementary service (i.e forwarding) settings on a 4G only network.

Blackberry
Follow the steps above but instead use the code *#*#46368676#*#*

Samsung (& Others)
Samsung Devices don't support the *#*#4636#*#* (*INFO*) Debug code with OneUI 3.0 and newer, however IMS Registration Status should be visible within the System 'About Phone' settings area.

Note: *Based on a reddit thread it appears you can still launch the 'Phone Info' Screen on Samsung devices if you manually create an activity shortcut with something like Nova Launcher, Activity Launcher or similar. This may also work with other device brands that don't support the native debug code. (See below)*
https://reddit.com/r/samsunggalaxy/comments/13nj6b3/why_is_nobody_using_this_hidden_menu_to_set_their/
https://xdaforums.com/t/oneui-3-0-removed-the-radio-info-activity-so-now-i-cant-force-lte-only-anymore-please-help.4206821/
*Alternatively the code of *#77467# may display IMS Status on some older Samsung Devices (e.g S8,Note 9)*

As an Alternative to the above, the App 'NetMonster' has a built-in shortcut for the 'Phone Info' Screen.



Note: An 'IMS Registration Status' of "Registered" doesn't necessarily mean VoLTE is enabled. IMS registration may indicate other services are active like WiFi Calling (VoWiFi) etc. Use Method 1 to confirm.

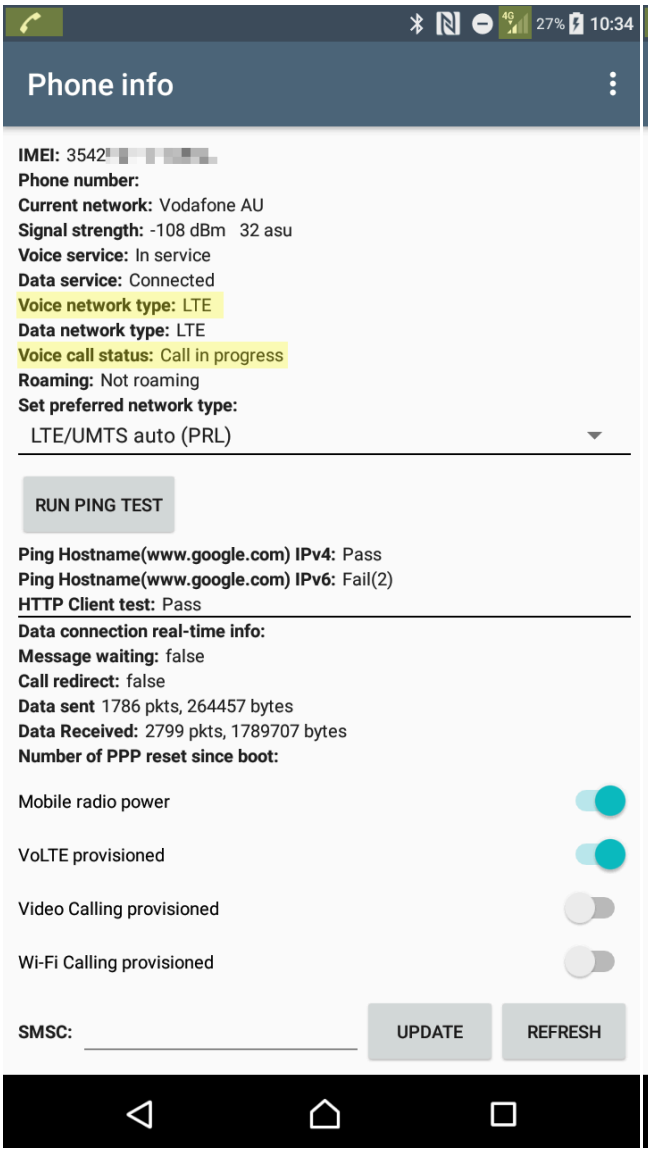
Method 3: Phone Info - Call Type/Voice Network Type (Advanced)

An alternative approach to the previous 'IMS Status' method is to check the Type of Call Connection within the Phone Info Screen during a call.

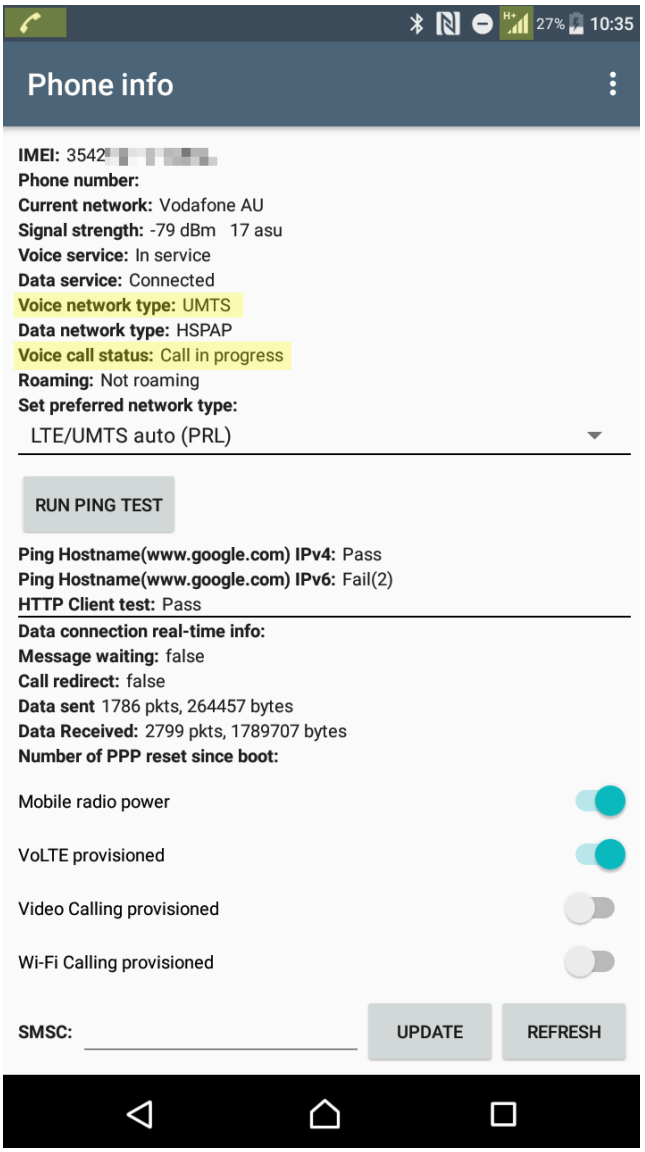
This requires opening up the *#*#4636#*#* Menu first (as above), making a call, then switching back to the Phone Info App via the App Switcher (with an active call) and checking the results. This approach can be used on devices that lack 'IMS Status' such as Xperia's with Android 6 or 7 etc.

If the "**Voice network Type**" says **'LTE'** whilst on a working call then VoLTE **is** working
If the "**Voice network Type**" says **'UMTS'** or **'GSM'** then **Legacy** (non-VoLTE) **Calling** is in use

Voice Type During Call - 4G LTE



Voice Type During Call - 3G UMTS



Xperia Z5 Compact - Vodafone AU with 3UK Modem/OEM

Force 'LTE Only' Mode

As an optional (Advanced) step with this method you can set the preferred network type to 'LTE Only' instead of 'LTE/UMTS auto (PRL)'. By changing this setting it forces the phone to only connect over LTE. If calls don't work on 'LTE Only' Mode then VoLTE isn't working. Before doing this please take note of the default preferred type and make sure to restore the setting after testing. Internet or Phone calls may not work properly if set to the wrong value. Device may need a restart.

VoLTE Icons

If VoLTE is currently active, many devices will show a “VoLTE” (Voice over LTE/4G) icon at the top of the screen (near the signal indicator). On some devices and in certain regions (e.g EU) you may see an “LTE” signal bar icon but this **is NOT the same** as “**Vo**LTE”. LTE is an alternative technical name for ‘4G’ Data, **Vo**LTE is a VoIP (Voice over IP) software feature/technology to enable calls.

Note: On many newer versions of Android device makers have removed a specific VoLTE icon being shown when VoLTE is enabled. Users may also see an ‘HD’ or ‘HD Voice’ during calls to indicate VoLTE, though HD Voice can operate without VoLTE so this isn’t a definitive indicator. You will need to have a “5G”, “4G” or “LTE” icon showing during calls to have working VoLTE.

Samsung

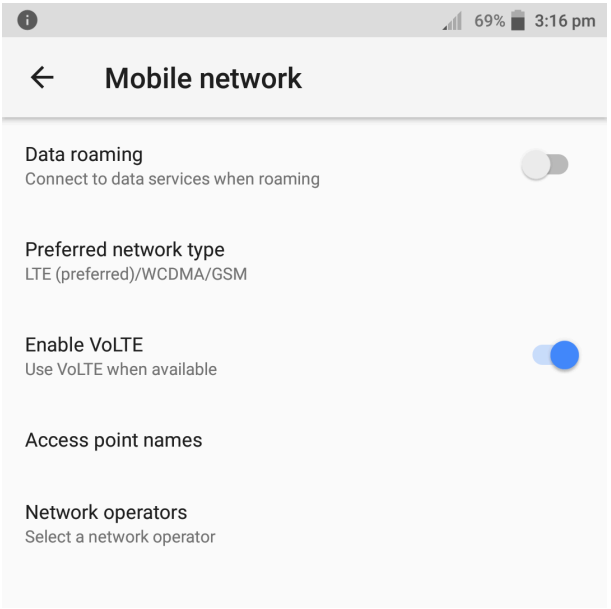
Sony

OnePlus

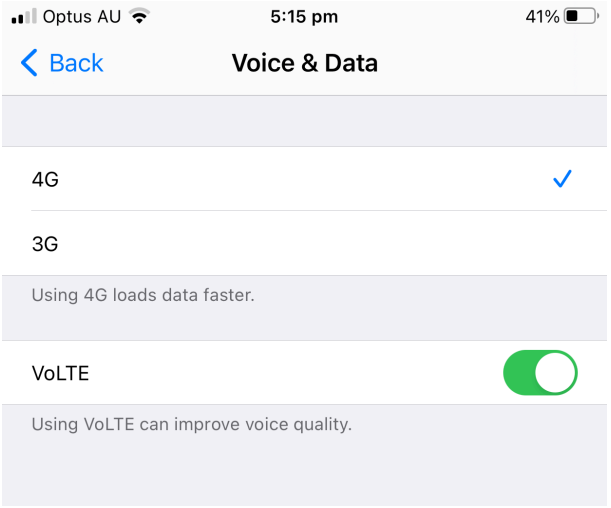
Xiaomi

LineageOS/AOSP

Sony ‘Enable VoLTE’ System Setting



iPhone VoLTE Setting



Note: Not all devices have a VoLTE Network setting, on some devices it is forced on or off by the firmware.

Device Firmware

The supported device information that is available from the various network providers is in many cases incorrect or misleading, the communication to the public about this issue is in serious need of improvement.

For example earlier this year (2023) Vodafone AU had the Sony Xperia XZ Premium, Xperia X, Z3 and Z5 on their VoLTE Support list. All of those devices were sold by Vodafone at the time with Vodafone software, however they have since removed those devices from their website. I have those devices and they do very much work with Vodafone VoLTE. (Minus the Z3 as I switched it to Retail Firmware many years ago and I can't download the Vodafone build anymore because it's been deleted for download).
Update 2024: Those devices can have issues with 4G Emergency Calling when running a vha modem config.
However when they were on their list it failed to mention that it will ONLY work if it has the Vodafone Firmware on the phone, this is the case with many other brands and telcos etc (see sources). In many instances your device will need to have the specific carrier version of the firmware installed in order to have access to VoLTE Calling (or have the carrier modem firmware configuration active/installed). Some OEMs allow you to re-flash the phone with carrier firmware or other alternate versions.

Interestingly the Z5 Compact doesn't work with Vodafone AU (or any other AU telco) as it was not sold with Vodafone software, just AU Retail. VoLTE is hard disabled with the AU Retail Firmware. However if you load (cross-flash) the 3UK Firmware on the phone VoLTE Calling will work with Vodafone but not Optus or Telstra.

In Sep 2023 I bought Telstra and Vodafone prepaid sims and have been testing different firmware builds etc.

For a number of Sony phones (and a few other brands) it is possible to root the phone or modify the firmware to get VoLTE to work on different providers. Though Sony has DRM keys that get wiped if you unlock the bootloader which affects things like the Camera etc. There are some root exploits that exist that can get around needing to unlock the bootloader. There is a temp root exploit approach for those with the XZ1 Series of Phones to enable VoLTE for example. Alternatively on some Xperia devices you can backup the DRM keys prior to bootloader unlocking (see sources). ***Note:*** *on newer (Xperia 1 and above*) models of Xperia's Sony has removed/changed the bootloader unlocking penalties found on older devices, refer to XDA & Sony.*

Based on my research older Nexus and Pixel Models look to be much more difficult to get working VoLTE if there isn't factory support for the networks. (See sources below)

In the US many providers actually whitelist devices (IMEI TAC Detection) so even if you have the right software and hardware because it's not an 'approved' device it's banned from connecting. Fortunately it doesn't appear that the AU telcos are doing that here (for now at least).

VoLTE support is also an existential problem for Custom ROMS and Open Source Phone Software as most Lineage builds can't enable VoLTE unless it was already working with stock software. VoLTE is also often implemented in a proprietary way that can't be reversed engineered to enable support on custom Roms or Software, this is common on (Exynos) Samsungs. Just take a look at XDA Developers, Reddit and the E Foundation discussions etc. (sources below)

Below is a small list of the countries slated to switch off either 2G and/or 3G by the end of 2025.

- Canada - 3G - 2025 (2G Shutdown finished)
- New Zealand - 3G & 2G - 2025
- Norway - 2G - 2025 (3G Shutdown finished)
- Singapore - 3G - 2024 (2G Shutdown finished)
- South Africa - 3G & 2G - 2025
- Sweden - 2G & 3G - 2025
- Switzerland - 3G - 2025 (2G Shutdown finished)
- Taiwan - 3G - 2024 (2G Shutdown finished)
  (Based on data from Kore Wireless)

JamesDwho - Medium Version: *https://medium.com/@jamesdwho/how-to-check-for-working-volte-calling-on-android-8c343362ecfe*

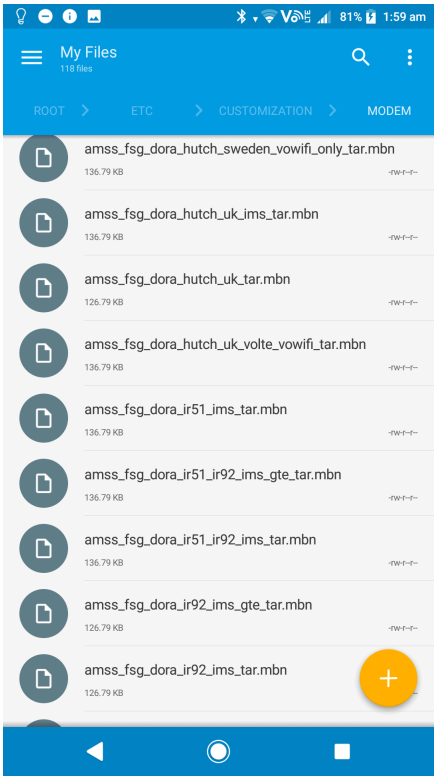
Carrier Modem Support/Cross-Compatibility
Below is a spreadsheet where I have been testing all the different Modem Configs that are on the Rooted Sony Xperia X Performance F8131 (Android 8.0) I bought (SD820 SoC). (Originally Telstra Sold/Branded)

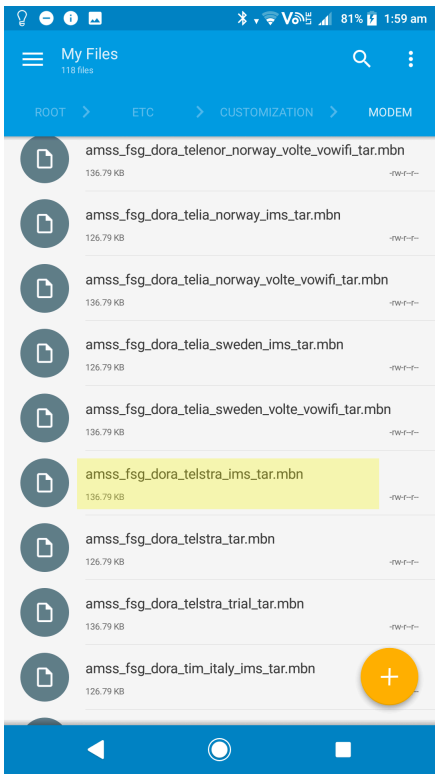
Xperia X Performance Modem MBN Testing:
https://docs.google.com/spreadsheets/d/1VoFf3HuHHwwyz3eWAgsdxP2Qif30_mwbCbtmzCt1Azw/view?usp=sharing

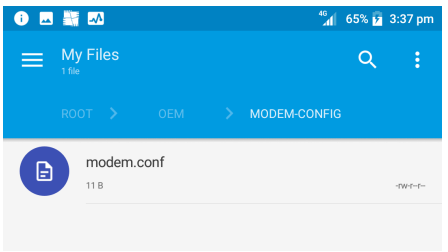
Spreadsheet Extract

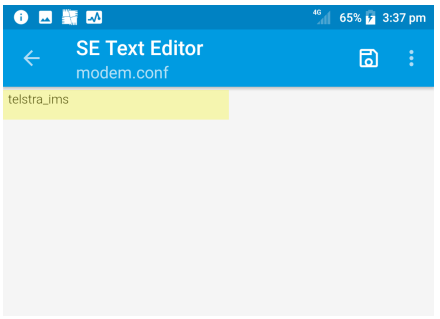
Qualcomm Modem - MBN File	Network Name	Country	Optus VoLTE	Vodafone VoLTE	Telstra VoLTE
amss_fsg_dora_optus_ims_tar.mbn	Optus	Australia	Yes	**No**	No
amss_fsg_dora_telstra_ims_tar.mbn	Telstra	Australia	No	No	Yes
amss_fsg_dora_vha_ims_tar.mbn	Vodafone AU	Australia	Yes	Yes	No
amss_fsg_dora_ir51_ir92_ims_tar.mbn	VoLTE + WiFi Call	GSMA Dev	Yes	Yes	No
amss_fsg_dora_singtel_ims_tar.mbn	Singtel SG	Singapore	No	No	No

The phone has all of the listed Qualcomm modem config files in the system partition however the OEM partition is responsible for telling the phone what one it should load. As per the table above a Telstra modem config is required to have working Telstra VoLTE. Optus and Vodafone seem to support the GSMA IR92 spec however Optus Firmware won't work with Vodafone AU Sim Cards. (Vodafone AU MBN will work with Optus)









On Sony (Android 7.0+) Devices the OEM partition is what is customised by the Telcos etc and in many instances only one modem config is specified per customisation.

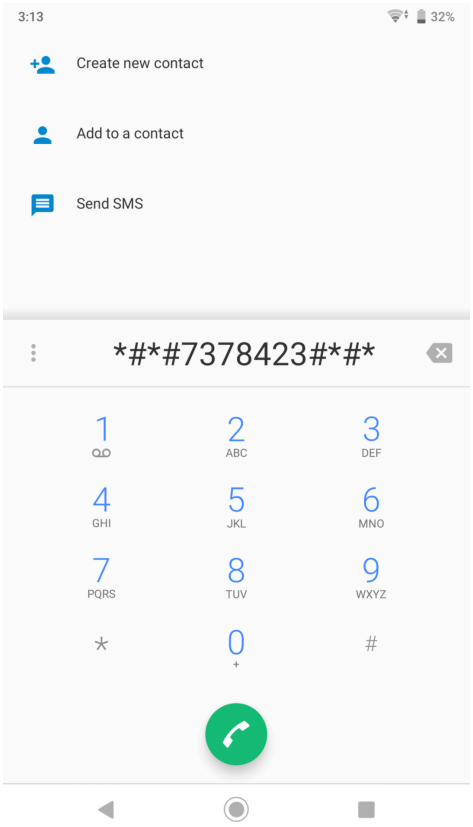
Samsung has/had a similar thing with different Region CSCs etc (see sources). Newer AU Model Samsungs on the latest firmware *should in theory* now have unified firmware instead of separate Telstra, Optus and Vodafone AU builds with working VoLTE on all AU networks (TBC). The OEM partition also often contains things like pre-install apps, telco wallpapers, ringtones and boot-up animations etc.

Note: On newer Sony phones (sold with Android 10+?) the mbn file system has been changed and should be the same across AOSP/OEMs (e.g mcfg_sw.mbn). The modem configs are instead stored within the modem firmware/partition in separate carrier folders. Features are indicated by name (non_ims, vl, vlvw, vlvtvw etc) **vl** = VoLTE, **vw** = VoWiFi (WiFi Calling), **vt** = Video Telephony/Calling.

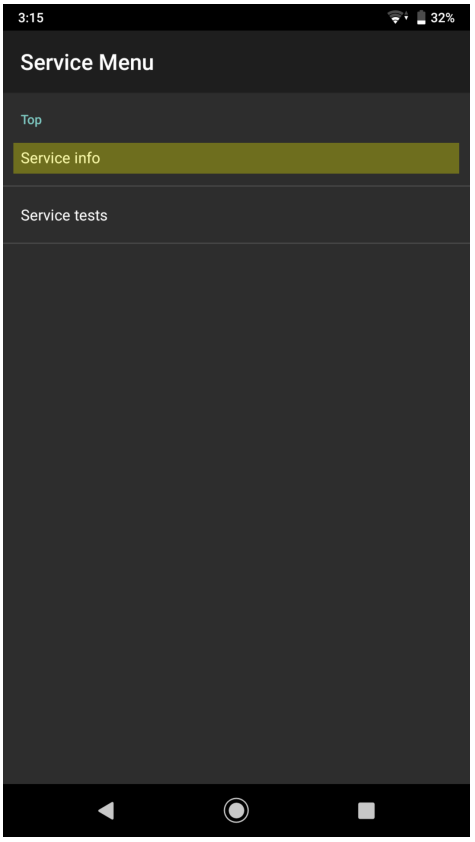
Sony Devices - Current Modem Config Check

On Sony Devices you can check what modem config is currently loaded by using the dialer code to load the phone service menu. Type ***#*#7378423#*#*** then wait for the *SERVICE* Menu. Once loaded select **"Service Info"** then **"Software Info"** and at the bottom it will display the current Modem Config. (Android 9 example)

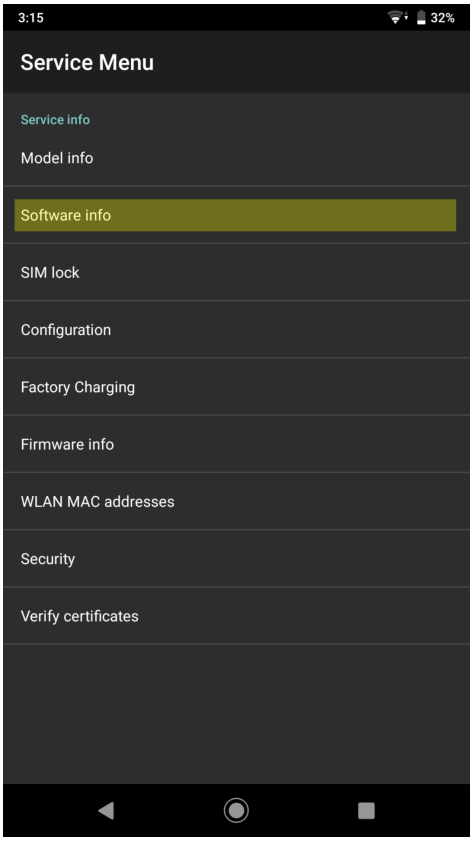
1. Dialer Code



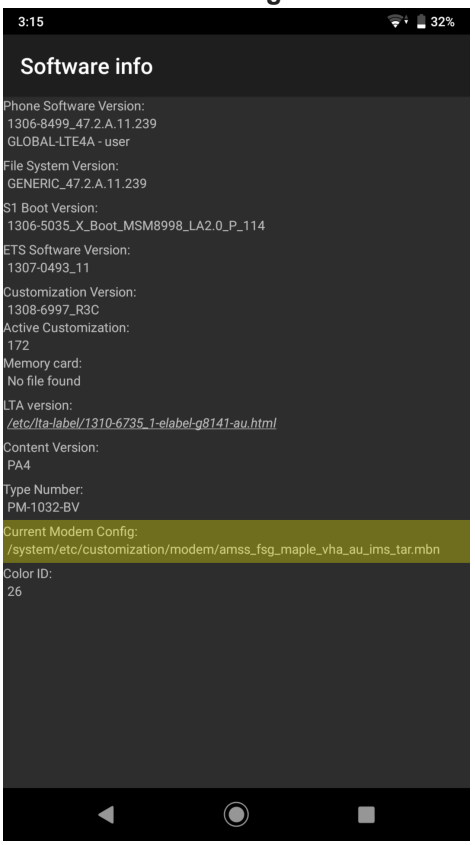
2. Service Info



3. Software Info



4. View Modem Config



vha_au_ims = Vodafone Australia IMS Modem

Xperia X Performance Firmware List: https://xpericheck.com/F8131

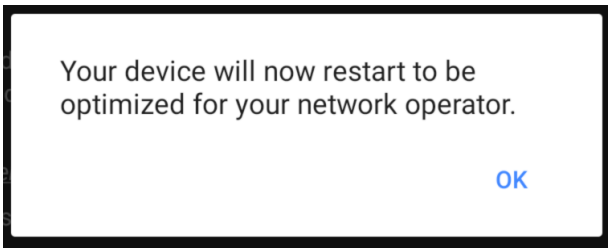
By modifying the modem.conf text file in the OEM partition on the Xperia XP and flashing only a Cust-Reset (exclude all other partitions) with XperiFirm & Flashtool you can make the phone load any of the configs for testing etc. *(The cust-reset is required to get the phone to reload the config from the modem.conf file)*

The OEM partition also contains a config.prop file which enables additional build.prop values. VoLTE (IMS) needs to be enabled at a device build.prop level for VoLTE to work, even if the correct Modem File is already loaded.

On some Official Sony ROMs the phone has VoLTE off by default in the build.prop and is only enabled via the customised OEM config.prop *(and/or CarrierConfig apk or CustomizationSelector apk)* when a supported Sim Card is installed. (ie. Vodafone UK Firmware (ROM) requires Vodafone UK Sim Card to activate vodafone_uk_ims_tar.mbn and VoLTE build.prop value).

If any “Anysim” or other non-supported sim card is installed in the phone the device will revert back to the default Non-VoLTE enabled Modem and build.prop. *This behaviour has changed with Android 12 and newer devices due to Google’s IMS changes to Android. The OEM partition and modem configuration is not present on current Sony (Android 13) models and the modem config process has changed. The native CarrierConfig API (6.0+) is generally used to enable the correct carrier settings on pre Android 12 devices (varies by oem), Android 12 supports the GSMA TS.43 Service Entitlement Configuration for carriers which ‘should’ facilitate easier activation of VoLTE services on (Android 12) devices without pre-configured support (see sources).*

When a supported (carrier network) Sim Card is inserted into the phone the device will display a message that a restart is required to optimise for your network operator. The device will then restart and load the specific modem (RIL) config, config.prop and other customisations for that carrier network.



If you enable VoLTE on Xperia Devices when it's on stock software you can install a Custom ROM and have working VoLTE, though this isn't possible with all brands (see sources - backup any data before modifying firmware and you can risk bricking your device if done improperly).

Based on my sheet and testing it appears that Optus and Vodafone AU both support the Generic (Global/‘Open Market’) GSMA IR92 VoLTE Specification; some other providers internationally seem to have implemented/support VoLTE in a similar way. Though if the phone is running Optus Modem/Firmware it won't have working VoLTE with Vodafone or Telstra even if it's Network Unlocked (Same behaviour occurs on a Sony XZ Premium G8141).

At this stage Telstra hasn't started supporting the ‘Open’ GSMA IR92 Spec version and their VoLTE is still non-standard (which is permitted under the spec but obviously prevents people from using BYO Devices etc)

Even if Telstra does end up supporting the Generic GSMA IR92 VoLTE Spec then any devices with the Telstra Firmware/Modem Configs will still be unable to switch to alternative providers and have VoLTE Calling even if they are Network Unlocked.

Email to Hugh

From: **JamesDwho**
Date: Sun, 5 Nov 2023 at 16:20
Subject: Video Suggestion - AU 3G Network 2023-24 Switch-Off - Loss of Calling for older 4G Devices that lack VoLTE - Device eWaste & Repair Issue - Hugh Jeffreys
To: hughjeffreys

Hi Hugh,

I've been watching your channel for a while and have dabbled in repairing phones myself including iPhones and some Sony Phones.
The contact form on your website is disabled so I'm trying to see if I can email you directly as I think this information is very relevant to you and your audience.

I also live in Australia (Brisbane) and was wondering if you were aware of the implications for mobile phones when it comes to the 3G switch off in Late 2023/2024?

When 3G services are switched off completely in 2024 **many 4G devices will no longer be able to make and receive calls anymore**, as to make calls over 4G your phone needs to have specific firmware loaded to support 4G VoLTE calling on each network.

This issue affects a lot of older 4G Phones and a significant number of new imported international phones including devices such as the Sony Xperia 1 Mk V (a $2,000 5G phone).
(The Xperia 10 Mk III you fixed recently likely also has similar issues depending on the telco.)

For example I purchased a used Sony Xperia X Performance off eBay a few months ago and it was shipped with Telstra Firmware; this means 4G VoLTE Calling will only work on with providers that use the Telstra network, Optus and Vodafone 4G VoLTE does **not** work.

The device is completely network unlocked so 3G Calling works across all networks but with 3G switched off it will **only have working 4G Calling on Telstra**.

If you have the regular Xperia X (non Performance) with the Vodafone AU firmware then VoLTE calling will work with Vodafone and Optus but not Telstra.
This sort of issue also affects various models of Samsung Phones and a number of early generation Pixel Devices such as the Pixel 1 and Pixel 2 etc.

Android is very fragmented from a software support side, however it's fair to say that a majority of Android devices released around or before 2018 are likely to have either no VoLTE calling support or only limited VoLTE support on Australian Networks.

Devices from Android 4 to Android 9 (2018) equates to approximately 27% of the Android Device Market as per Google's stats from April 2023.
It's almost a certainty that anything Android 6/7 and older likely doesn't have any support or at best, only support with one Telco.

Further to that, the Optus website says VoLTE and VoLTE (International) Roaming should work on all Samsung Phones with Android 12 and above.
As you know Android 12 was only released in late 2021 so people who have Android phones older than 2020/2021 are likely to encounter issues with either switching AU Providers or when travelling overseas.

Devices from Android 4 to 11 make up 69% of the Android Device Market as of April 2023.

I can envision that many Australians with tight budgets and limited incomes may purchase used 4G Phones from Cash Converters, eBay, Gumtree or Facebook Marketplace and think they are "3G switch-off ready", when in fact many will have wasted their money on devices that don't support 4G VoLTE Calling with all AU providers or don't support the feature at all.

Starting in June I raised this issue from both a consumer competition and e-waste point of view with my local Federal Politicians.
I received a response from the Communications Minister 4 months later and their response indicates a lack of oversight from the Government about this issue.

It's also worth noting that in 2019 Optus said the following to the ACCC in their MTAS FAD discussion paper:

*"30. Optus' 3G mobile network covers 98.5% of the population. The **3G network** **is the network over which voice services are provided for the majority** **of Optus' 10 million mobile customers**. While voice services can be provided over LTE through Voice over LTE (VOLTE) technologies, **VOLTE cannot be the sole technology** **relied upon to provide voice services**. There are several reasons for this including:*
*(a) **Low VOLTE handset penetration**, **especially in regional areas**. As a result, **even if VOLTE were available over the whole network, end-users would be unable to use the technology due to incompatible handsets.***
[....]"

I also contacted various news outlets about this issue but they haven't published anything to date.

7 News did interview me about this on Camera at the beginning of September but they have not aired the interview to date despite previously committing to do so.
It's worth noting their original coverage failed to mention this issue at all, as did Nine's.

Just figured I would try and send you a message about this as it could be an interesting video and there isn't really much if any coverage about this.

There are millions of otherwise perfectly functional 4G phones that will be essentially turned into e-waste once 3G is switched off unless something is done by the telcos and device manufacturers.
This is also a growing global issue as 3G is switched off elsewhere in the world.

In some cases people can flash different firmware on their devices to enable VoLTE Calling however this is model and brand dependent etc.

I've been successful in finding ways to do this on some of my Sony Devices and there are methods for some other brands/models but not all.

Also in many cases this **can't** be fixed with flashing a Custom Rom either, as VoLTE is not implemented in an open way on most devices.

Hopefully this email got through.
If you'd like more background and technical information including what I wrote to my local politicians and media about the issue let me know, happy to discuss further.

Regards

JamesDwho

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Additional Sources, Comments and Suggestions Welcome (Use Google Docs Edit/Suggestion Feature - Ask for Access etc)