



An Coimisiún um
Rialáil Cumarsáide
Commission for
Communications Regulation

2G/3G Switch off

Guidance for Mobile Network Operators

Information Notice

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1 Legal Disclaimer

1.1 The Guidance intends to set out ComReg’s expectations with regard to the reasonable endeavours mobile network operators should take to minimise the adverse effects of any cessation of use of a terrestrial system, and it does not limit ComReg’s discretion in carrying out its statutory functions and powers. ComReg will apply the Guidance as appropriate when exercising its functions and powers, but it does not necessarily set out ComReg’s final or definitive position on particular matters i.e. it is not an exhaustive list of all reasonable endeavours which mobile network operators may be expected to take in all circumstances. The Guidance can be considered as setting out general principles to guide mobile network operators in seeking to meet their obligation to take “all reasonable endeavours”. ComReg may decide, as circumstances dictate, to depart from the Guidance where justified. The Guidance does not replace any regulations or laws and does not amount to legal advice. Whilst the Guidance endeavours to set out ComReg’s general approach within the areas referred to in this Guidance, ComReg’s powers and responsibilities are often subject to changes and are likely to evolve over time.

2 Glossary of terms

- 2.1 Unless the context otherwise suggests, definitions in the European Electronic Communications Code¹ (“the Code”) apply in this Guidance.
- 2.2 ComReg sets out below a glossary of further terms that are used in this document.

Term	Definition
BEREC	Body of European Regulators for Electronic Communications
CSFB	Circuit switched fall back
EDGE	Enhanced Data rates for GSM Evolution
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
GSMA	GSM Association
FCS	Fixed Cellular Solution
HSPA	High Speed (Downlink/Uplink) Packet Access
IAS	Internet Access Service
IMEI	International Mobile Equipment Identity number
LSS	Limited Service State
LTE	Long Term Evolution
MBSA(2)	Multi Band Spectrum Award (2)
MNO(s)	Mobile Network Operator(s)
MVNE(s)	Mobile Virtual Network Enabler(s)
MVNO(s)	Mobile Virtual Network Operator(s)
NG-eCall	Next Generation eCall
NR	New Radio
OEM	Original Equipment Manufacturer
RSPG	Radio Spectrum Policy Group
UMTS	Universal Mobile Telecommunications System
VoLTE	Voice over LTE
VoNR	Voice over New Radio

¹ Directive (EU) 2018/1972, S.I 444/2021

3 Executive Summary

- 3.1 As a result of network modernisation activities, which will bring many efficiencies and benefits,² the rollout of Long Term Evolution (“LTE” or “4G”) and New Radio (“NR” or “5G”) networks in recent years MNOs in Ireland, Europe and worldwide have commenced or are considering plans to retire their GSM (“2G”) and/or UMTS (“3G”) networks.
- 3.2 The licence conditions in Regulation 6(1)(k) of S.I.264/2021³ (“Condition 6(1)(k)”) ⁴ require that licensees (the MNOs) must:
- (i) Notify ComReg at least 6 months prior to the cessation of any terrestrial system to which the licence relates; and
 - (ii) Use all reasonable endeavours to ensure that any adverse effects on users caused by the cessation of use of a terrestrial system are minimised.
- 3.3 The Guidance sets out ComReg’s expectations for MNOs, as to what reasonable endeavours they should take in seeking to meet the requirement to take “all reasonable endeavours”, per the licence condition. The purpose of the Guidance is to provide practical guidance for MNOs to follow in taking all reasonable endeavours (“Reasonable Endeavours”) in the context of minimising any adverse effects on users. The term “network” is used to refer to the terrestrial system subject to cessation.
- 3.4 For the purposes of the Guidance, the users referred to in Condition 6(1)(k)(ii) of S.I. No. 264/2021 are customers of the MNO concerned, any MVNOs hosted on that MNO’s network as well as that MVNO’s customers (collectively referred to herein as “Users”). As such, MNOs are responsible for facilitating any MVNOs hosted on their network, in making Reasonable Endeavours, to ensure that any adverse effects on Users caused by the cessation of use of a terrestrial system are minimised.
- 3.5 Obligations in respect of end-user rights (such as those relating to contract change notifications, switching and porting) may also be engaged on switch off. ComReg has published detailed regulatory guidance for Service Providers entitled *Information Notice - Regulatory Guidance on Title III: End-User Rights of the European Electronic Communications Code*, Reference Number ComReg 20/111R2 (Title III Regulatory Guidance”) and service providers can refer to same for guidance in relation to

² See 4.3 to 4.5

³ Wireless Telegraphy (Liberalised Use and Related Licences in the 700 MHz Duplex, 2.1 GHz, 2.3 GHz and 2.6 GHz Bands) Regulations 2021 (S.I. No. 264 of 2021).

⁴ The same condition is also set out in Regulation 6(12)(a) and (b) of the Wireless Telegraphy (Liberalised Use and Preparatory Licences in the 800 MHz, 900 MHz and 1800 MHz bands) Regulations, 2012 (S.I. 251 of 2012).

meeting their obligations under the Code⁵. ComReg also published Regulatory Guidance for providers of Internet Access Services (“IAS”) to the Irish market.⁶ The Guidance does not replace any regulations or laws which apply. Service providers should also be cognisant of their obligations under the General Authorisation⁷. Furthermore, it is noted that the General Authorisation (“the GA”) and conditions giving effect to it, together being rights of use, which are also relevant. In particular, the Consumer Protection provisions, set out in Condition 18.5 of the GA, which apply to Cessation of a Service, may apply in this context.

- 3.6 The effects of cessation on MNO services such as Voice and SMS, on Data Services such as IAS, on Emergency Communications, as well as on general service availability, coverage and wider user issues, are outlined and considered below.
- 3.7 ComReg’s analysis takes utmost account of prior work by BEREC⁸ and the RSPG⁹, as well as having regard to experiences in other territories, in particular the United States of America.
- 3.8 ComReg provides in the table below a high-level summary of the Reasonable Endeavours that MNOs might take before any network cessation is commenced. The table is broken into four general headings.
- 3.9 A list of Reasonable Endeavours is contained in section 6, with supporting background information included in section 5.

Heading for Reasonable Endeavours	Guidance on Reasonable Endeavours to minimise adverse effects	Relevant Section(s)
Notification and Preparation	<ul style="list-style-type: none"> The 6-month period to notify ComReg of a network cessation, as specified in the spectrum license conditions should be treated as a minimum. The notification should be provided sooner where possible to ensure that adverse effects on Users are minimised. 	6.1

⁵ Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code (Recast)

⁶ <https://www.comreg.ie/publication/regulatory-guidance-on-title-iii-end-user-rights-of-the-european-electronic-communications-code>

⁷ General Authorisation Response to Consultation Document Number 08/27 and Decision setting out new General Authorisation Conditions in relation to Electronic Communications, Document No: 08/8.

⁸ BEREC’s “Report on practices and challenges of the phasing out of 2G and 3G”, document BoR (23) 204

⁹ “Mobile technology evolution – experiences and strategies (February 2023)” Available at https://rspg-spectrum.eu/wp-content/uploads/2021/06/RSPG21-033final-RSPG_Opinion_on_RSPP.pdf. Or from https://radio-spectrum-policy-group.ec.europa.eu/opinions-and-reports_en

	<ul style="list-style-type: none"> • It is essential for MNOs to share their cessation plans with any hosted MVNOs as early as is practical and support any resulting planning activities with those MVNOs. • A gradual, step-by-step cessation process should be pursued, with careful analysis of customer feedback/experience and network impacts at each step. 	
<p>Communication</p>	<ul style="list-style-type: none"> • Timely publication of actual/specific cessation plans should be issued via appropriate media (both national and local) as well as online and via targeted communications channels. • A blend of public communications channels and direct contact should be used by the MNO concerned to reach affected Users. • MNOs should proactively contact their customers who may be impacted by switch off. • Users that will be affected by slowed data rates as a result of cessation should be informed. • MNOs should make particular efforts to ascertain which subscriptions are used for M2M communications where the device will no longer function after cessation and inform affected owners. • MNOs should engage with ComReg at an early stage, and throughout the process, to provide details on progress and planning. • MNOs should inform inbound roamers of any service limitations. 	<p>6.2</p>
<p>Network, Coverage and Service Principles</p>	<ul style="list-style-type: none"> • The VoLTE/VoNR¹⁰ service should be enabled for customers with supporting 4G/5G devices. • 4G/5G coverage should be available in a given area before or immediately following the cessation of a 2G/3G network, with minimal delay in equivalence being reached where the new coverage relies on newly released spectrum. • Adequate network capacity should be made available or retained on the remaining 2G (or 	<p>6.3</p>

¹⁰ Voice over LTE (VoLTE) and Voice over New Radio (VoNR) are the voice calling services which run over modern packet switched 4G & 5G networks

	<p>3G) network to cater for users of devices only able to access the remaining 2G/3G network.</p> <ul style="list-style-type: none"> • Continuation of the SMS service via any supported network should be ensured. • For Emergency Communications, Implementation of VoLTE/VoNR interconnection to ECAS should be implemented as part of the cessation. • Particular attention should be paid to devices which cannot make an emergency call as a result of the switch off of both 2G and 3G. These devices should be detected, and the User concerned individually contacted by the MNO. • Coverage maps provided by MNOs should make it clear that coverage is diminishing on the network which is subject to cessation. 	
<p>End-User Rights</p>	<ul style="list-style-type: none"> • New customers of the MNO (or existing customers renewing contracts) should be informed of the planned switch off and any adverse impacts of same in advance of concluding a new contract. • Users that experience a degradation in overall service as a result of a network cessation cannot be held to any minimum contract period and must be afforded a right of exit. 	<p>6.4</p>

Table 1: Summary of Guidance on Reasonable Endeavours to minimise adverse effects before network switch off

4 Introduction

4.1 Background

- 4.1 With the rollout of mobile networks based on 4G and 5G technologies in recent years, MNOs worldwide have commenced, or are planning to commence, the decommissioning of older 'legacy' 2G and/or 3G networks.
- 4.2 A brief overview of the evolution of mobile network generations from 2G to 5G is provided later in this document starting from paragraph 5.39
- 4.3 4G/5G networks provide far greater capacity and a better quality of service at the frequencies previously used by 2G/3G networks and are more energy efficient than legacy networks.
- 4.4 The end-user benefits of 4G/5G (in comparison with 2G/3G) include much faster data connections, higher video streaming quality, increased reliability and fewer dropped calls, reduced network transfer delay and potentially higher voice quality on the 4G voice service (VoLTE).⁷
- 4.5 Additionally, given the late stage in the lifecycle of 2G/3G networks and the focus of the industry supply chain on more modern networks, it can be expected that decreasing maintenance capabilities and increasing maintenance costs for legacy networks will reach a point where no vendor support is available.
- 4.6 The Guidance focuses on the Reasonable Endeavours to be taken to minimise adverse impacts on Users where only one of either the 2G or the 3G network is ceased and as such the adverse impacts are somewhat mitigated by the continued operation of the remaining (2G or 3G) network. In the coming years, when the adverse impacts of a cessation of the remaining (2G or 3G) network are more fully known or anticipated, ComReg may update the Guidance on Reasonable Endeavours to be taken.

4.2 Licence conditions

- 4.7 The terms of the MBSA1 licences issued in 2013¹¹, and the MBSA2 licences, issued in 2023¹², are technology and service neutral, so spectrum licensees are free to operate any mobile network technology generation (i.e. terrestrial system) on the

¹¹ Information on the long-term licences issued for mobile & wireless broadband, mobile voice and text services in Ireland is available at: <https://www.comreg.ie/industry/radio-spectrum/licensing/search-licence-type/mobile-licences-3/>

¹² <https://www.comreg.ie/industry/radio-spectrum/spectrum-awards/proposed-multi-band-spectrum-award/>

spectrum they have licenced, where technically compatible.¹³

- 4.8 Licensees must notify ComReg not less than 6 months prior to the proposed cessation of any terrestrial system to which the licence relates and must use all reasonable endeavours to ensure that any adverse effects caused by the cessation of use of a terrestrial system are minimised.
- 4.9 The 6-month period to notify ComReg of a network cessation, as specified in the license Conditions 6(1)(k) of the Licence should be treated as a minimum period (the requirement being “at least 6 months’ notice” given to ComReg). ComReg considers a longer period of notice should be given, where possible, to ensure that adverse effects on Users are minimised.

4.3 Progress to date

- 4.10 In Ireland, Vodafone has provided this notification and commenced the withdrawal of its 3G service. At the time of writing this cessation has been completed in Limerick, Cork, Galway and Dublin and will continue in other cities and regions over the coming months.
- 4.11 No mobile network has yet notified ComReg of plans to withdraw a 2G service.
- 4.12 Withdrawal of service in other European countries follows a broadly similar pattern, more detail on which can be found in Annex 2.
- 4.13 ComReg expects that MNOs will advise ComReg of their intended Reasonable Endeavours when notifying ComReg at least 6 months prior to the cessation of any terrestrial system and that they will continue to keep ComReg updated as their cessation progresses.

4.4 Purpose and BEREC Report

- 4.14 The purpose of this Guidance is to outline ComReg’s expectations regarding the Reasonable Endeavours that MNOs might reasonably take in seeking to meet their obligations when switching off 2G and/or 3G networks.
- 4.15 In providing this Guidance, ComReg has taken utmost account of the BEREC report on 2G/3G phaseout practices and challenges¹⁴, BoR (23) 204 (“the BEREC report”).

¹³ In addition, Eir has a 3G Licence and a 2.1 GHz Band Liberalised Use Licence which run until 11 March 2027. The 3G Licence is a service and technology specific licence for the provision of 3G services, while the 2.1 GHz Band Liberalised Use Licence is a service and technology neutral licence.

¹⁴ <https://www.berec.europa.eu/en/document-categories/berec/reports/berec-report-on-2g3g-phaseout-practices-and-challenges>

5 Potential Impacts

- 5.1 This section assesses the potential impacts of 2G and/or 3G cessation on the services offered by MNOs, starting with overall coverage and then assessing the potential impact on Voice, SMS and Data services. These are then considered against the impacts identified in the BEREC report where relevant.

5.1 Service availability/coverage

5.1.1 Potential Adverse Effects

- 5.2 The cessation of a 2G/3G network will result in a loss of service for devices that relied solely on that network.
- 5.3 In general, existing 2G/3G networks occupy the most desirable part of the radio spectrum, as they can cover a wide distance and penetrate buildings satisfactorily.
- 5.4 In the main, 4G and 5G networks operate at higher frequencies¹⁵ which means that the signals do not propagate over distances or through building materials quite as well. However, these higher frequencies are capable of delivering superior data rates.
- 5.5 A key driver for an MNO in discontinuing its 2G/3G network is to be able to reuse the spectrum thus made available for the more efficient 4G and 5G networks.
- 5.6 Such reuse inevitably requires significant updates to the 4G/5G access network, likely including the deployment of new hardware.
- 5.7 Where 4G/5G updates are not timed to coincide with the discontinuation of the 2G/3G network in a given area, there could be a reduction in coverage available to Users for a period of time, which should be minimised.

5.1.2 Reasonable Endeavours

- 5.8 Section 6.3 describes ComReg's expectations of Reasonable Endeavours that MNOs should take in seeking to ensure that adverse effects on Users caused by the cessation of use of a terrestrial system are minimised. These include expectations that 4G/5G coverage should be available without unnecessary delay, that any remaining 2G/3G network will have adequate capacity to serve its remaining Users, and that any coverage maps provided by the MNO clearly state that the 2G or 3G coverage is diminishing, and that the coverage information displayed might be subject to change.

¹⁵ With the exception of the LTE and NR 700MHz & 800MHz bands

5.2 Voice, SMS and Emergency Communications services

5.2.1 Potential Adverse Effects

Voice Calling

- 5.9 In general, a modern smartphone purchased in the last 5-10 years will provide its user with access to 4G (and more recently 5G) networks for use with data services such as the IAS. Devices less than approximately 5 years old will support the VoLTE service too, which is the packet switched voice calling service used in 4G. The 5G voice service is known as VoNR.
- 5.10 ComReg understands that all MNOs, and most MVNOs, now offer VoLTE calling by default for devices that support it. VoLTE offers a number of benefits to the User such as quicker call setup time and potentially improved voice quality during the call.
- 5.11 4G devices that do not support VoLTE will instead ‘fall back’ to a 2G/3G network when making or receiving a voice call. This is known as circuit switched fallback (“CSFB”).
- 5.12 At the time of writing, almost all emergency calls made on any mobile network utilise the CSFB service. However, planning and implementation of VoLTE interconnection to the ECAS is in progress by the MNOs/MVNOs.
- 5.13 A recent ComReg decision D06/24¹⁶ mandates the inclusion of caller location information, including in the form of PIDF-LO where technically feasible, for emergency calls made with VoLTE.
- 5.14 A device which does not support VoLTE, either because it relies on 2G/3G only, or because it is a 4G device that relies on CSFB, will require adequate coverage on either a 2G or 3G network to make a voice call.
- 5.15 In the case where one of those networks (e.g. the 3G network) is switched off, the reliance on the other (e.g. the 2G network) increases for devices that do not support VoLTE.
- 5.16 In such cases, the greater proportion of the user base that relies on older handsets, the greater the possibility of capacity issues on the remaining (2G or 3G) network.
- 5.17 Not all Users upgrade their devices regularly, with some Users thought to be likely to use the same device for several years.
- 5.18 Another category of older devices which could remain in the market is the unknown quantity of older feature phones (i.e. non-smartphones) which (anecdotal evidence

¹⁶ ComReg Doc 24/17 - Emergency Caller Location Information - Response to Consultation and Decision

suggests) are kept in reserve by the public, either at home or in the car, for use in emergency situations.

- 5.19 Similarly, there may exist a number of installations of fixed line emulation services based on 2G/3G mobile access.
- 5.20 Such devices have a higher likelihood of supporting only 2G and 3G (or perhaps only 2G for very old devices) and not 4G/5G network access, and in the event that either 2G or 3G, or both are turned off there is a possibility of loss of service to that device.
- 5.21 The BEREC report describes a number of potential VoLTE compatibility issues that can arise with certain 4G/5G devices and notes that the mobile industry globally, including the GSMA, is aware of these issues and is working to address them.
- 5.22 This situation may be compounded by the use of devices that were not provided, approved or tested for VoLTE by the host network operator, and the fact that visitors to Ireland temporarily roaming on an Irish network could be using devices which have VoLTE compatibility issues.
- 5.23 Where either 2G or 3G remains available from such providers, then even if VoLTE does not work properly on a given device, that device is expected to simply continue using the available circuit switched calling service of the remaining (2G or 3G) network, based on CSFB.
- 5.24 If both 2G and 3G are switched off however, VoLTE incompatible devices will be unable to use the voice calling service of the provider in question. This problem is already experienced by some EU originating visitors to the US.

SMS

- 5.25 The SMS standards¹⁷ envisage that a given device might be connected to a network of any generation at any time and the ability to transparently send or receive an SMS over all access network types is preserved.
- 5.26 It is because of this that little impact on SMS services is likely to arise as a result of the shutdown of either the 2G or 3G network for a given provider.
- 5.27 However, there is a low risk that older devices relying exclusively on 2G/3G access may experience some delay in receiving SMS messages if the required signalling channels used to deliver SMS are congested. This could happen in the event of capacity issues such as those referred to in paragraph 5.15
- 5.28 While the SMS service is somewhat more resilient to the cessation of 2G/3G than the voice calling service, a 2G/3G only device will not be able to send or receive SMS

¹⁷ Describing the operation of the SMS service and published by ETSI, the European Telecommunications Standards Institute.

in the absence of either a 2G or 3G network. However, 4G devices that do not support VoLTE should not be affected as the SMS service does not require VoLTE compatibility.

- 5.29 One consequence, as outlined in the BEREC report, is that services that require SMS access for the purposes of 2-factor authentication will not be supported by devices that no longer support the SMS service.

Emergency communications and eCall

- 5.30 The risks described above also apply to emergency communications¹⁸, with the possibility of some devices being unable to make an emergency call in the event of both 2G and 3G being switched off.
- 5.31 Normally, in Ireland, a device with no available home network will attempt to route an emergency call via another available network, registering on that network in a limited service state (“LSS”) for the duration of that call. This option will not work for 2G or 3G devices if and when all providers have retired their 2G and 3G services. However, ComReg considers that LSS will continue to be supported as appropriate on 4G/5G networks.
- 5.32 A further complication arises where a User with a 4G device on which VoLTE calling is not supported might continue to use a network for data services only, potentially unaware of the lack of an operational voice service from their carrier. Moreover, it is not a certainty that such a device would de-register from the normal network to place an emergency call on another network in LSS mode. This behaviour is likely to be handset dependent, and given the existence of imported devices, it cannot be fully known.
- 5.33 As outlined in the BEREC report, eCall is a service that in the event of a collision, or when an User manually activates the service by pressing a button in the car, initiates a call to emergency services with certain location data transferred at the start of the call.
- 5.34 Given that the current eCall service is based on circuit switched¹⁹ calling technology, access to a 2G or 3G network is required and the service will not work when both 2G and 3G are unavailable.
- 5.35 The standardisation of a replacement service, known as Next Generation eCall (“NG-eCall”) which will operate on packet switched technology, specifically VoLTE, is well underway with the publication of Commission Delegated Regulation (EU) 2024/1180

¹⁸ [GSMA | How we're addressing VoLTE emergency call issues - Industry Services](#)

¹⁹ Circuit switching is a method of implementing a telecommunications network in which two network nodes establish a dedicated communications channel (circuit) through the network before the nodes may communicate. The circuit guarantees the full bandwidth of the channel and remains connected for the duration of the communication session

of 14 February 2024,²⁰ requiring NG-eCall to be available in new cars approved after 1 January 2026. A corresponding enactment, Commission Delegated Regulation (EU) 2024/1084 of 6 February 2024,²¹ requires PSAP infrastructures to be able to accept these calls from the same date.

- 5.36 However, no solution has been arrived at so far for the millions of cars already fitted with (what is now called) 'legacy' eCall, and these cars are expected to remain in service for some years to come. As things stand, where both 2G & 3G are switched off, such calls will not be connected.
- 5.37 Failure of legacy eCall is not anticipated to arise in Ireland as yet, with Irish MNOs expected to maintain a 2G network for some years to come. ComReg expects that MNOs will pay attention to developments on this front and react swiftly to any policy or legislative direction from Europe. ComReg will continue to monitor the situation and engage with industry on this topic and may issue updated guidance or decisions as required for example in response to developments at European level.

5.2.2 Reasonable Endeavours

- 5.38 Section 6.3 of the Guidance describes ComReg's expectation of the Reasonable Endeavours that MNOs should take in seeking to ensure that any adverse effects on Users caused by the cessation of use of a terrestrial system are minimised. Reasonable Endeavours which ComReg expects MNOs to take, include the putting in place of a smooth migration to the 4G VoLTE/5G VoNR services for supported devices, and informing owners of unsupported devices of upcoming service limitations, in particular where the end user may not be able to make an emergency call and is not aware of this. Implementation of VoLTE emergency calling will also be required to ensure service quality.

5.3 Data services

5.3.1 Potential Adverse Effects

- 5.39 Each successive mobile generation has brought about a relative improvement in data speed and quality, both because of the increase in available spectrum and because the underlying technology uses that spectrum more efficiently.
- 5.40 This trend started with the introduction of the GPRS which was added to the Voice and SMS only 2G mobile service, becoming known as 2.5G. The GPRS service was

²⁰ Available here: [Commission Delegated Regulation \(EU\) 2024/1180 of 14 February 2024 amending Regulation \(EU\) 2015/758 of the European Parliament and of the Council as regards the standards relating to eCall \(europa.eu\)](#)

²¹ Available here: [Commission Delegated Regulation \(EU\) 2024/1084 of 6 February 2024 amending Delegated Regulation \(EU\) No 305/2013 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the harmonised provision for an interoperable EU-wide eCall \(europa.eu\)](#)

improved further with the introduction of EDGE, known as 2.75G

- 5.41 The data rates typically offered by 2.5G/2.75G are considered very low by modern standards and were typically in the region of 20Kbps – 200Kbps, several orders of magnitude below the data rates available in 4G/5G networks.
- 5.42 An additional hindrance for 2.5G/2.75G is that the mechanism for sharing the available capacity within a relevant cell restricts the number of possible active devices sending or receiving data simultaneously.
- 5.43 With the introduction of UMTS or “3G”, subsequently improved by HSPA, MNOs could deliver higher speeds in the region of 300Kbps – 5Mbps.
- 5.44 4G and 5G networks today mean that Users can experience speeds between 20Mbps and 500Mbps, or even beyond, with good radio conditions.
- 5.45 It should be noted that the speed ranges quoted above are approximate and depend on factors such as the quality of the radio signal as received between the device and the mobile network antenna and on how busy a given cell is. The theoretical maximum speeds possible for each technology have not been quoted as these speeds are rarely, if ever, reached in practice.
- 5.46 According to ComReg’s understanding from discussions with MNOs, a wide range of IoT²²/M2M devices have been deployed in Ireland, many of which do not support 4G/5G network access.
- 5.47 These devices, some of which may be safety critical, could include smart electricity meters or other utility applications, telecare applications and user-installed applications such as home alarm systems or remotely operated gates.
- 5.48 No clear picture exists of all of these applications and in many cases such devices are connected to the serving mobile network as IoT/M2M devices without the knowledge or involvement of the MNO concerned.
- 5.49 Nevertheless, MNOs have a business relationship with the owners or operators of many IoT/M2M devices in the form of a subscription, albeit one that might not be immediately distinguishable from a human user in all cases.
- 5.50 In addition to this business relationship, the MNO network has visibility of the unique device serial number in the form of the IMEI. The first 8 digits of the IMEI (the type approval code – or “TAC”) indicate the manufacturer of that equipment. Careful analysis of the IMEI numbers associated with subscription and other usage data should be used to ascertain which subscriptions on a network are being used for

²² The Internet of things (IoT) describes devices with sensors, processing ability, software and other technologies that connect and exchange data with other devices and systems over the Internet or other communications networks

M2M purposes.

- 5.51 It should be noted that some IoT/M2M devices operate on a roaming basis, where the manufacturer of the device provides a built-in sim card which is associated with a home network outside of Ireland. In such cases the phone number associated with the subscription may be more difficult to obtain, and in any case there may be little point in contacting that phone number, for example by SMS message. The resolution of such cases is likely to go beyond the remit of an individual mobile operator and should be handled on a case-by-case basis.

5.3.2 Reasonable Endeavours

- 5.52 Reasonable Endeavours that MNOs should take in seeking to ensure that any adverse effects on Users caused by the cessation of use of a terrestrial system are minimised include comprehensive and suitably tailored communications being sent by the MNO to relevant Users in the case of data services. Older devices that are likely to experience a degradation in the quality of their service should be detected by the MNO concerned, and the users of these devices should be individually informed of this fact. Details of this are included in section 6.2.

6 ComReg's Guidance

- 6.1 The following sections address the impacts described in Section 5 and describe ComReg's expectations of the Reasonable Endeavours that MNOs should take in seeking to ensure that any adverse effects on Users caused by the cessation of use of a terrestrial system are minimised.

6.1 Notification and Preparation

- 6.2 While Licence Condition 6(1)(k) requires a minimum cessation of network notification to ComReg not less than 6 months prior to the proposed cessation, it is likely that MNOs would plan a network cessation further in advance than this. As such, ComReg expects that it be given notice as soon as possible of any planned cessation, which may be well in advance of the 6-month minimum period.
- 6.3 MNOs should have regard to MVNOs that provide service on a network which is subject to cessation and any impacts that cessation of the network can have for their Users. Careful consideration of the impact of the cessation upon the MVNO service and its customers should be included in the planning from the outset.
- 6.4 As an overarching principle, ComReg expects that MNOs switching off either their 2G or 3G network plan the process carefully, monitor progress at each step and carefully examine User experience and feedback.
- 6.5 This is likely to necessitate that a cessation is done in multiple steps on a gradual area-by-area basis and not in a single step.

6.2 Communication

- 6.6 The plans for cessation should be publicised via appropriate media both nationally before commencement of the cessation, and locally via targeted channels in advance of a given area being switched off.
- 6.7 Such communications should allow Users an appropriate notice period between publication of the notice and switch off; to establish if they need to act, and to follow through (e.g. by upgrading their handset or moving to another provider) if required. ComReg considers that a 3-month notice period is likely to suffice for this purpose.
- 6.8 A dedicated page on the provider's website, kept up to date with publicly available information on the progress of the cessation, should be used to enable Users to engage with the process at any point.
- 6.9 In addition to the statutory requirement for notification to ComReg, ComReg expects there to be ongoing communication to ComReg of the planning and progress of the cessation, and information sharing regarding any issues that are anticipated or arise

during the process of the cessation.

- 6.10 Users in the form of inbound roamers (visitors to Ireland temporarily using an Irish mobile network) should be warned of any potential service limitations they might experience as a result of a network cessation. This is particularly relevant where both 2G and 3G have been switched off and the VoLTE compatibility issues referred to above could apply.
- 6.11 MNOs should ascertain which devices connected to their network will be affected by the upcoming cessation and individually inform the users of such older devices which will experience a reduction in service quality (e.g. service unavailability, slower data speeds etc.) in advance of any network cessation. Upgrade incentives could be offered in the form of attractive handset deals.
- 6.12 MNOs should ascertain which of the subscriptions to their network relate to M2M devices which will no longer function after the network cessation. They should contact those subscribers to inform them of the upcoming cessation.
- 6.13 The operator/owner of the M2M equipment in question may not be aware that they need to act and may lack the expertise themselves to replace or upgrade the equipment. In such cases, ComReg considers that a 6-month notice period is likely to suffice for this purpose.

6.3 Network, Coverage and Service Principles

- 6.14 4G/5G coverage should be available before or immediately following the cessation of a 2G/3G network.
- 6.15 Where spectrum which had been used for the 2G/3G network is to be reused in the 4G/5G networks, and the use of this spectrum is required to deliver coverage, there should be no unnecessary delay in enabling its use.
- 6.16 An example of a necessary delay could be temporary network reconfiguration activities aimed at avoiding interference, whereas commissioning activities on new equipment, commenced after the network cessation takes place in an area, are likely to result in an unnecessary delay.
- 6.17 MNOs should ensure that the remaining 2G (or 3G) network has adequate capacity to support a potential increase in utilisation from devices which cannot use the 4G/5G network.
- 6.18 MNOs that offer their own coverage maps on their websites should make it clear that the 2G or 3G coverage is diminishing due to a network cessation, and that the information provided might be subject to change.

Voice, SMS and Emergency Communications services

- 6.19 MNOs must ensure that there are no barriers to Users with compatible devices from using the VoLTE/VoNR service, so that the reliance on 2G/3G circuit switched calling is removed in advance of any 2G/3G cessation.
- 6.20 MNOs must ensure that the SMS service remains available to devices capable of connecting to any remaining network.²³
- 6.21 VoLTE emergency calling must be implemented as part of any network cessation.
- 6.22 In the event of a cessation of both 2G and 3G, where no circuit switched voice calling service remains, particular attention should be given to devices which may support 4G, but not VoLTE, as these might not support emergency calling and this may not be known to the User until a critical moment. Such devices should be detected, and the User concerned individually contacted by the MNO.

6.4 End-User Rights

- 6.23 Users that experience a degradation in overall service as a result of a network cessation cannot be held to any minimum contract period and must be afforded a right of exit.
- 6.24 Information on any upcoming network cessation should be provided in advance of the commencement of a new contract period, where such a cessation is planned to occur during that contract period.

²³ e.g. SMS service still works for 2G for devices connected to 2G while 4G devices which do not support SMS delivery over IMS are still supported

Annex 1: Other matters from BEREC report

Competition issues for small MNOs and MVNOs

A 1.1 MVNOs that use the network resources of a provider switching off their 2G and/or 3G networks may need to plan their own customer engagement and other activities. Such MVNOs need to be included in the planning of the switch off to avoid their being discriminated against.

A 1.2 Host network VoLTE provisioning and service enablement, in particular, may be required in the event that this service is provided by the host operator.

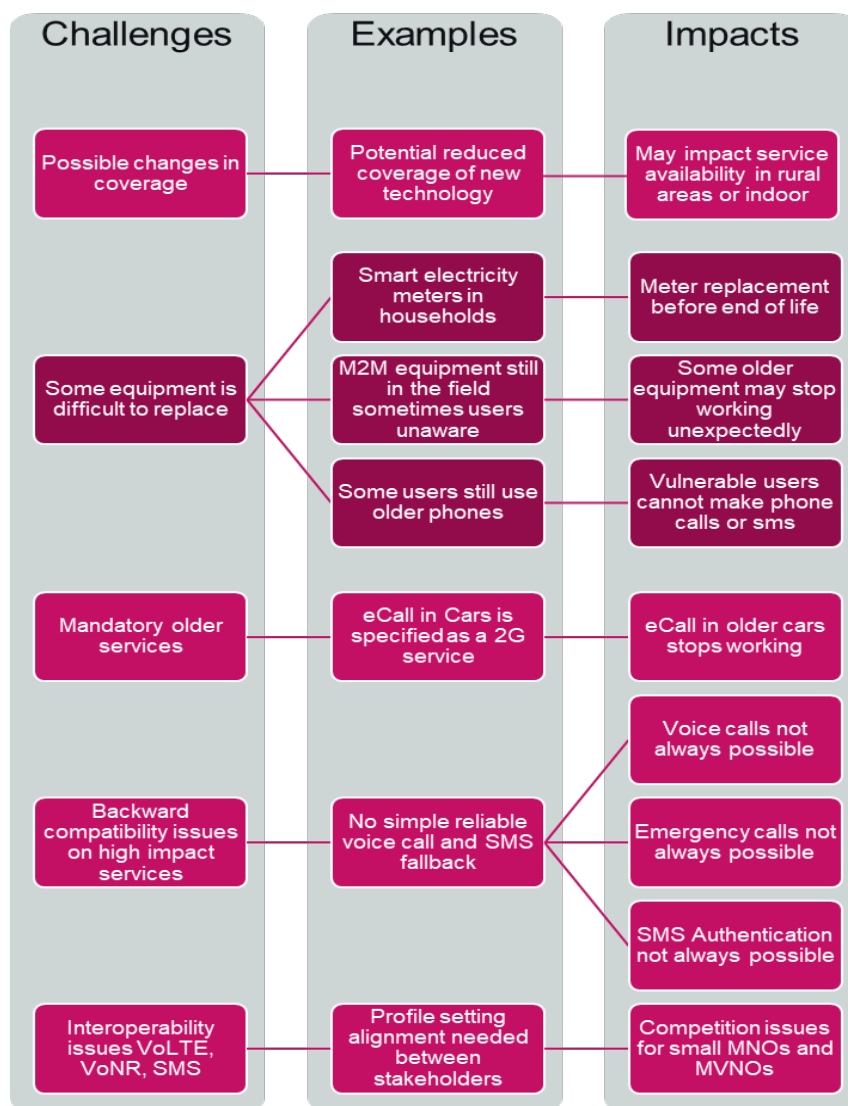


Figure 1: Summary of some of the impacts from 2G/3G phaseout (Source: BEREC report).

A 1.3 The BEREC report provides an overview of the practices and challenges associated with phasing out 2G and 3G networks, focusing on the wider European context. It examines the roles and perspectives of key stakeholders such as regulators, policymakers, network operators, service providers, equipment vendors, and consumers in this transition. The report analyses the motivations, strategies, and obstacles faced by each stakeholder group, as well as the implications for the telecommunications industry and end-users. Additionally, it highlights best practices and recommendations for managing the transition effectively while ensuring continued service quality and innovation.

Stakeholders

A 1.4 The following diagram outlines BERECs view of the various stakeholders.

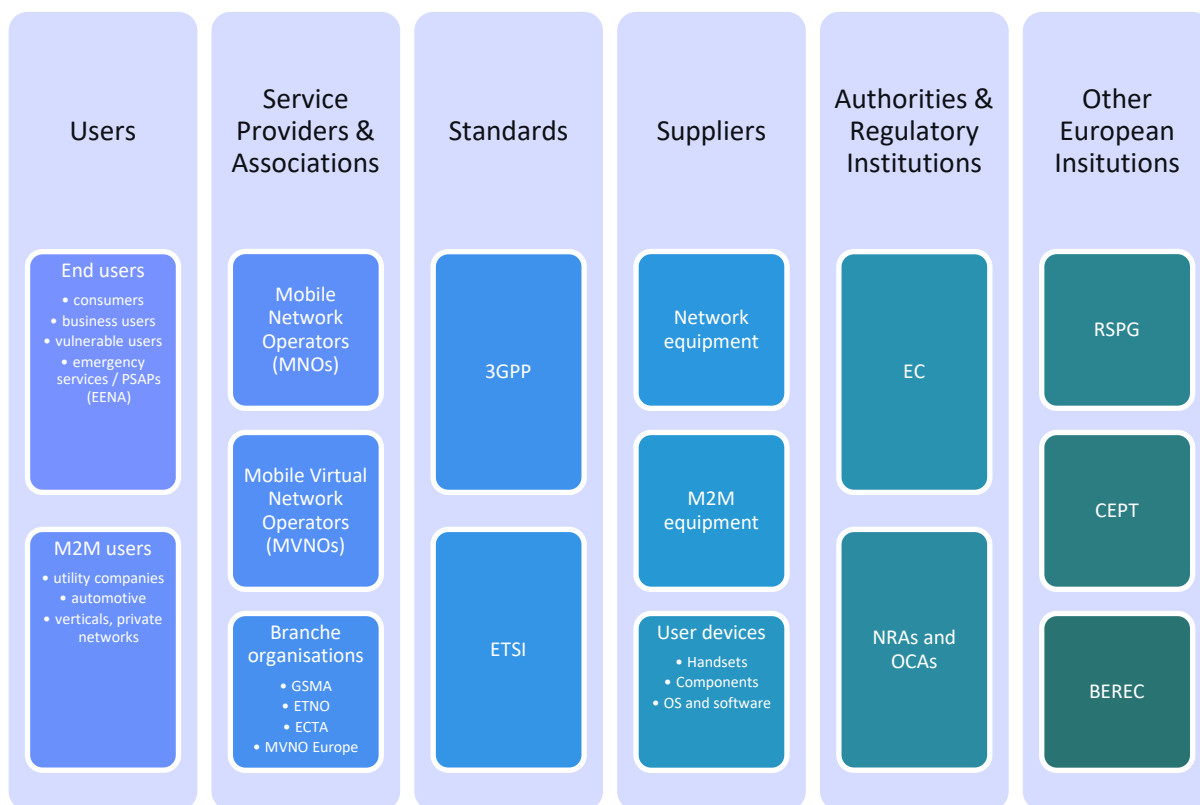


Figure 2: Stakeholders in relation to 2G/3G phaseout issues.

A 1.5 Of particular relevance in the above stakeholder list are the Users and the MNOs/MVNOs.

A 1.6 A point made in the BEREC report is the possibility of indirect impacts to the services offered in an end-user contract, for example in a case of bundles. BEREC noted that “it is important that a necessary conversion of the contracts is carried out in consideration of Art 105 EECC and the corresponding national regulations; especially the compliance with user protection rules is important in this context.”

- A 1.7 BEREC also notes the possibility of international roamers arriving in a country where no 2G/3G network is operating. Such users, on unsupported devices may not be able to make a voice call, or indeed an emergency call. This latter issue was specifically raised by EENA, who encouraged stakeholder mobilisation and transparency.
- A 1.8 In relation to the MNO stakeholder cohort, the responses to BEREC's consultation in producing its report are worthy of note.
- A 1.9 The organisation of European Telecommunication Network Operators (ETNO) stated in a reaction to the published BEREC work program which referred to the upcoming report that *"Regarding the Report on practices and challenges of the phasing out of 2G and 3G it is important to acknowledge that decisions to sunset 2G and 3G networks are in the remit of operators and are based on a wide range of considerations, aiming at improving and optimizing networks, services, spectrum efficiency, etc. In drawing conclusions from its analysis of potential consequences of 2G/3G shutdown, as listed in the WP (e.g. environmental impact of replacement of the equipment), it is important that BEREC carefully weights any possible negative impact against the numerous benefits of transition to new technologies, which are most likely to offset the former"*.
- A 1.10 The European Competitive Telecommunications Association, ECTA, is an organisation sharing concerns and practices of its members. In a reaction to the published BEREC work program which referred to the upcoming report that *"ECTA is aware that concerns have emerged, notably relating to VoLTE-based emergency calling while roaming and eCall, in the context of planned shut-downs of 2G and 3G networks. BEREC's attention to the topic is welcome [...] However, ECTA wishes to emphasise that the answer to certain challenges is not to delay shutdowns. The answer is to decisively ensure:*
- *VoLTE interoperability, and notably to require all handset manufacturers to support VoLTE-based emergency calling by default;*
 - *That companies that embed mobile connectivity in hardware (e.g. in the connected mobility sector) include forward-looking technology in their products and carry out the upgrades to 4G/5G that have been known to be necessary for a decade (eCall, M2M/IoT).*
 - *That mobile network operators, customers, and society at large are not held back from reaping the benefits from a long-planned transition to more efficient technologies, including in terms of improvements to environmental sustainability"*.
- A 1.11 MVNO Europe set out that the wholesale roaming dimension of 2G/3G shutdown needs to be addressed as a matter of priority, given that it can potentially lead to lack of availability of emergency calling. MVNO Europe wished to emphasise that

the potential lack of availability of emergency calling is a symptom of deeper problems, at the network/service level, and at the OEM and handset level.

A 1.12 The RSPG, the advisory body to the European Commission, adopted a Report on: "Mobile technology evolution – experiences and strategies (February 2023)"²⁴ ("RSPG report") as a contribution from a strategic spectrum management perspective to the process of switching off 2G and 3G, which will affect legacy systems, equipment and services such as eCall, emergency calls and smart meters.

A 1.13 The general benefits highlighted in the report include:

- Improvement of spectrum and energy efficiency
- Improvement of communication security
- Achievement of savings in network and maintenance complexity
- Reduction of reserves of spare equipment parts deployed on the network
- Upgrade incentives for customers, as some customers also actively seek the latest technology
- Uphold the principle of technology and service neutrality
- Migrating from 4G to 5G is more flexible compared to migration from previous generations because of dynamic spectrum sharing (DSS); DSS allows supporting both 4G and 5G in same band based on real-time demand

A 1.14 The main obstacles, according to the RSPG report, are that current emergency call and eCall are still mainly routed through circuit-switched mobile technologies (2G/3G) and not packet switched 4G/5G networks, as outlined in Section 5.2 .

A 1.15 The RSPG concluded that:

- From a spectrum regulatory perspective, no need has been identified for regulatory intervention to extend the lifespan of 2G/3G.
- A switch-off of both 2G and 3G networks will disable the use of eCall under the current regulation. Any update of eCall framework should assess impacts on current licenses in force
- Operators will switch off 3G before 2G, mainly due to lower volume of 3G traffic registered in their networks.
- RSPG observes that prior to phasing out of 2G/3G, MNOs tend to repurpose high frequency bands first: 2.1 GHz band from 3G to 4G/5G and 1800 MHz band from 2G to 4G/5G. Repurpose 2G and/or 3G spectrum for more efficient 4G and 5G technologies, in terms of energy, and capacity MNOs

²⁴ Available in https://rspg-spectrum.eu/wp-content/uploads/2021/06/RSPG21-033final-RSPG_Opinion_on_RSPP.pdf. Or from https://radio-spectrum-policy-group.ec.europa.eu/opinions-and-reports_en

tend to prefer retaining 2G and/or 3G in the 900 MHz band during the coming years, but the situation differs among countries.

A 1.16 RSPG also highlighted that the transition from circuit switched telephony over 2G and 3G networks to IP based (packet switched) telephony over 4G (VoLTE) and future generations (5G, 6G) is an essential condition for successful 2G/3G phasing out.

Annex 2: Status in other countries

A 1.17 According to Cullen International, the 2G/3G switch off process is well underway in Europe.

A 1.18 The following pair of diagrams show the countries where at least one operator has switched off 2G and 3G.

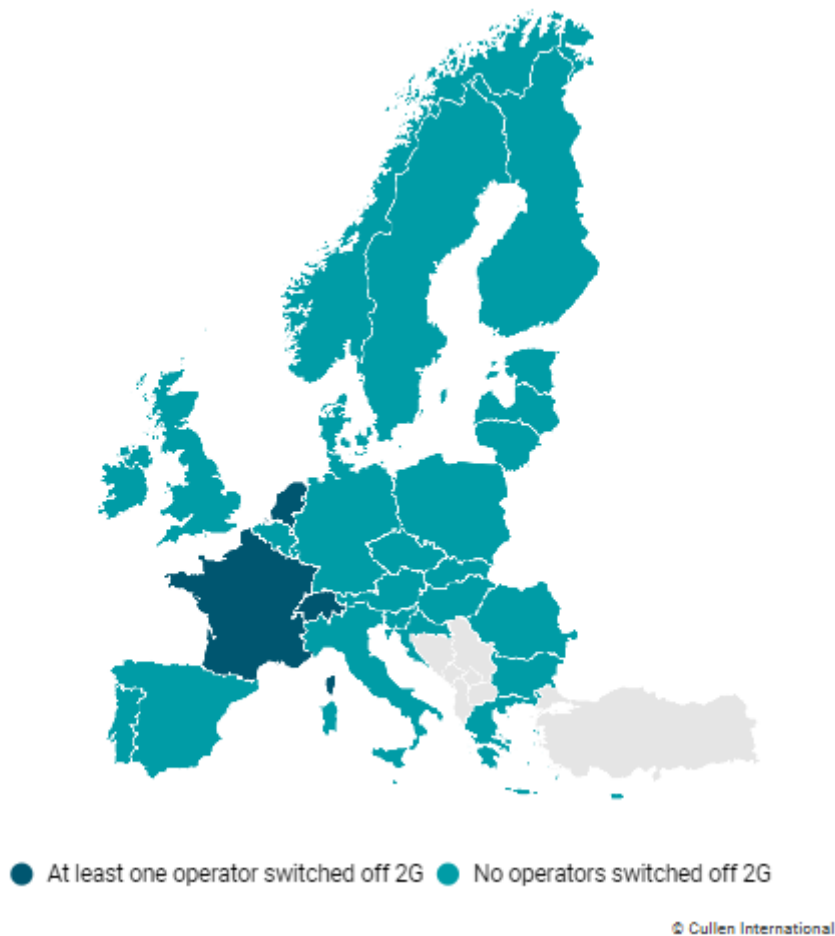


Figure 3: In three countries at least one MNO has switched off its 2G network (cullen international)

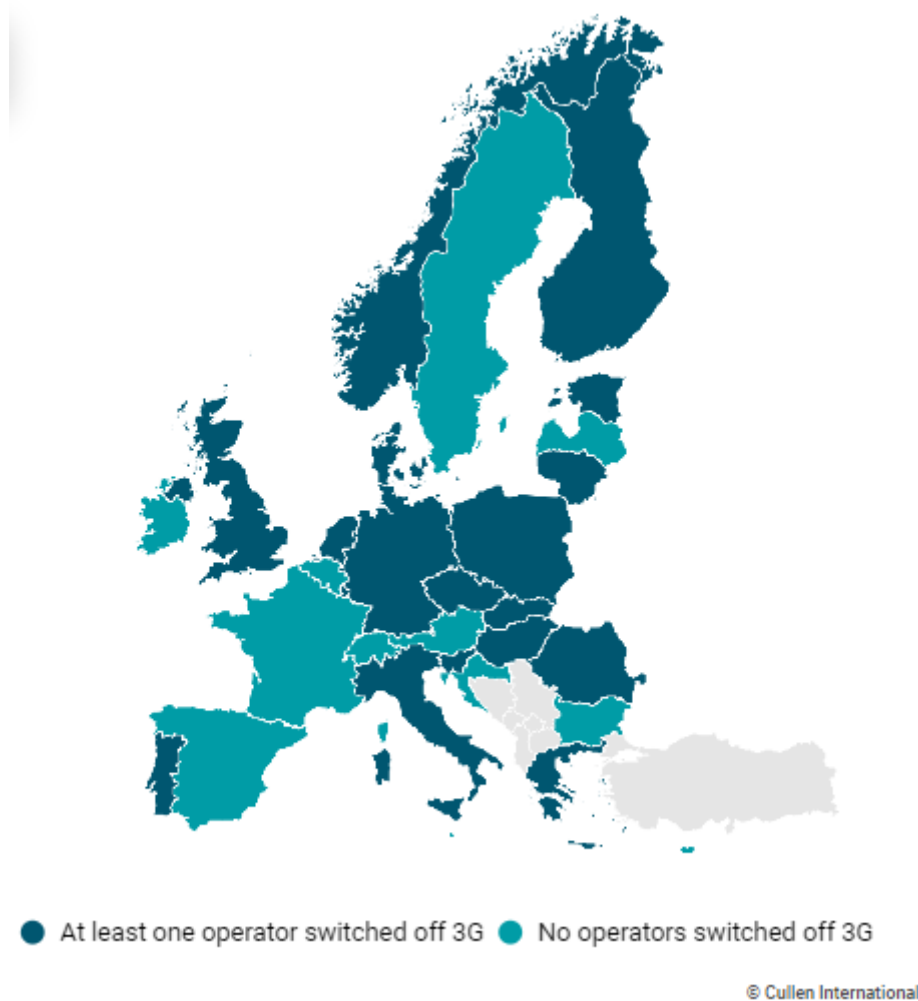


Figure 4: In 19 countries at least one MNO has switched off its 3G network (Cullen International)

- A 1.19 In most cases, the spectrum licenses issued to MNOs are technology neutral as they are in Ireland, meaning that MNOs are free to operate any technology generation (2G/3G/4G/5G) on any spectrum that supports it.
- A 1.20 The exceptions to this technology neutral aspect are Czech Republic (2G required until mid-2028), Finland (2G until end of 2029) and Malta (details are under consultation)
- A 1.21 All 3G networks have been switched off in the Czech Republic, Germany, Greece, Hungary and Norway, with a total of 16 countries with at least one 3G network fully switched off.
- A 1.22 No country has yet switched off all 2G networks, although Switzerland is expected to be the first, with the last remaining 2G network expected to be shut off by the end of 2025.

- A 1.23 In the UK, MNOs have confirmed to the government that they do not intend to offer 2G and 3G mobile networks past 2033 at the latest, with each mobile network setting their own timetable for switch-off.
- A 1.24 Each UK MNO confirmed that its 3G network will be switched off first, starting from early 2023:
- Vodafone (UK) is starting its switch-off in early 2023
 - EE plans to start Three expects to switch off by the end of 2024
 - Three (UK) expects to switch off by the end of 2024
 - Virgin Media-O2 (UK) has not yet announced its planned 3G switch-off date
- A 1.25 Ofcom has published its own guidance²⁵ entitled "[3G and 2G switch-off: Our expectations of mobile providers](#)"
- A 1.26 In addition, Ofcom has addressed other stakeholders with "[Our advice for mobile customers](#)"²⁶ and "[Our advice for IoT and third-party device suppliers](#)"²⁷

²⁵ https://www.ofcom.org.uk/__data/assets/pdf_file/0025/252592/3G-and-2G-switch-off.pdf

²⁶ <https://www.ofcom.org.uk/phones-telecoms-and-internet/advice-for-consumers/advice/3g-switch-off>

²⁷ <https://www.ofcom.org.uk/phones-telecoms-and-internet/information-for-industry/policy/2g-and-3g-switch-off/advice-for-iot-and-third-party-device-suppliers>