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PUBLIC VERSION

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Glattpark (Opfikon), 5 December 2025

Consultation responses on the draft tender documents for the allocation of mobile radio frequencies

Mr. President,
Dear Sir or Madam,

We refer to the documents published in draft form on October 14, 2025, for consultation regarding the tender for mobile radio frequencies intended for the allocation of mobile radio frequencies (draft tender documents) and would like to thank you for the opportunity to comment on the draft tender documents.

The upcoming award is of crucial importance for the future of the Swiss telecommunications market and for ensuring competition, innovation and consumer welfare. It includes:

- more than 55% of all spectrum resources used for mobile services in Switzerland;
- two-thirds (800 MHz & 900 MHz) of all low-band spectrum, which is crucial for maintaining legacy 4G and extending the most modern 5G wide area coverage and coverage within buildings; and
- the entire lower mid-band spectrum (1800 MHz & 2100 MHz), which provides essential capacity for 4G and 5G networks.

Crucially, the upcoming award should but does not take into account the existing asymmetric holdings by MNOs of 700 MHz. The combined holdings of 700, 800 and 900 MHz are crucial to continuing 4G services and to the on-going roll-out of 5G services, which will dominate by mid-license period.

If one of the three MNOs fails to secure sufficient spectrum in this auction – be it in general or specifically in the low-band or lower mid-band – this could mean the failure of this provider and could result in the end of the 3-player market, on which competition in the Swiss market is based.

For Sunrise, compared to our competitors, a larger proportion of low band frequencies is at stake. This leaves us at a strategic disadvantage; we are uniquely exposed to a bad allocation outcome as our low band frequencies have an essential role in providing high quality services to our customers. No consideration appears to have been given to this significant asymmetry between us and our rivals, in particular Swisscom, which (if all bidders take up the proposed portfolios) would enter the additional spectrum stage with a two-lot advantage in low-band spectrum over Sunrise.

Regrettably, the concerns voiced by Sunrise during the first consultation and ahead of the publishing of the draft tender rules during several occasions, along with our request for an extension of the current spectrum holdings, were not addressed.

Below, we outline ComCom's expected role in frequency allocation, highlight our main concerns with the award design and present our proposals to adapt the rules in the interest of promoting downstream competition. We elaborate on each of these points in our consultation response.

1. ComCom's Obligations for this award – Deliver on regulatory goals and promote consumer welfare

Swiss telecommunications legislation obliges ComCom to ensure a broad supply of high-quality, affordable services and to promote effective competition by fostering the economically and technically efficient and uninterrupted use of the spectrum, and to ensure equal access to the limited frequency resources. We refer to these obligations as the "principles" of ComCom. Based on the available draft tender documents, our impression is that ComCom is not applying these principles, or at least not applying them with the necessary diligence.

In particular, the proposals are inadequate in three respects:

a. **Lack of market analysis**: Frequency allocation is the most important tool at the regulator's disposal for ensuring effective competition in the mobile communications market. However, there is a complete absence of analysis of the effects of frequency allocation on the downstream market and consumer welfare. Not only does ComCom refrain from conducting a thorough market analysis, it also fails to explain what objectives it intends to achieve in the mobile communications market with the proposed allocation procedure. The proposed allocation mechanism seems to be primarily aimed at securing government revenues (via high reserve prices and lax caps that may tempt Swisscom to challenge for an excessive share of spectrum) and not at providing the Swiss population and economy with optimal supply of mobile services (that ComCom is mandated to ensure through measures that the resulting allocation has three operators with competitive spectrum propositions).

b. **Failure to consider market asymmetry**: Swisscom possesses structural advantages primarily owing to its history as a former monopolist and early entrant into the market. These advantages include factors such as number of sites, a legacy advantage in emission rights (non-ionising radiation budget allocation), financial strength, state guarantee, etc., all of which have contributed to it securing an outsize share of spectrum in past auctions and maintaining a high market share, which in turn confers economies of scale advantages. Reflecting this asymmetry, the average Sunrise mobile site handles much more customer traffic than a Swisscom site. The often-used argument by

Swisscom that they need more spectrum because they have a larger customer base is simply untrue: we are already forced to use our limited spectrum and network resources much more efficiently than Swisscom.

Academic studies indicate that having more equal spectrum allocation can address past market distortions. More spectrum means more network capacity, enabling smaller operators to challenge for higher market share, which in turn encourages price competition and service innovation to the benefit of consumers. Access to spectrum for Sunrise and Salt is disproportionately important relative to other small and mid-size MNOs elsewhere in Europe owing to the particular difficulties of building new sites in Switzerland. ComCom's draft neglects this competition dynamic and does not create a level playing field for all participants. To the contrary, ComCom's proposals create the conditions for Swisscom to at least maintain and potentially extend its exceptionally large spectrum holdings. Switzerland already has the most asymmetric distribution of spectrum of any European three-player market and the proposed auction rules could allow Swisscom to extend their spectrum holdings to more than 50% of all mobile frequencies and over 75% of the lower mid-band. Such an outcome would cause long-term damage to the downstream market and would be very harmful to the consumers that ComCom is mandated to protect.

c. **Failure to weigh the case for full or partial prolongation versus re-auction**: The three MNOs have expressed their interest in extending the current licenses. Absent participation of a fourth party, there is plenty of spectrum to support three operators. From a competition perspective, renewal is an adequate solution and certainly better than outcomes where Swisscom warehouses even more spectrum at the expense of its smaller rivals. An auction in these circumstances artificially creates scarcity, by tempting bidders to bid based on strategic rather than purely technical value and will divert precious industry funds from network expansion. ComCom has not yet sufficiently examined whether an auction can really deliver an outcome better than renewal, for all or some of the spectrum, and it does not appear to have meaningfully explored whether there are any additional parties interested in the spectrum. As a result, the auction design does not reflect the main principles of ComCom and jeopardizes effective competition and the reliable, affordable supply of mobile telecommunication services.

2. Critical weaknesses in proposed auction design

Notwithstanding our preference for renewal of all spectrum, an auction could still deliver an acceptable outcome if designed with a focus on promoting downstream competition and investment. Our analysis of the draft tender documents has identified the following major deficiencies that must be corrected to guarantee future competition in the Swiss mobile market:

a. **Small portfolios and lax spectrum caps**: If there must be an auction, we support the use of portfolios and caps as tools to safeguard downstream competition based on three MNOs, each with adequate capacity to expand. However, the proposed portfolios are too small and the caps are too lax and too unbalanced (because they ignore Swisscom's lead in substitutable spectrum not in this auction) to reliably deliver this. Without reform, they simply do not provide sufficient protection for smaller operators,

leaving open a significant risk that this award intensifies spectrum asymmetry to the detriment of downstream competition.

b. **High reserve prices**: The reserve prices proposed are significantly higher than European benchmarks for reserve prices and the equivalent values set for the 2019 Swiss 5G auction. Such high prices put a disproportionately high strain on smaller providers and may raise our cost of capital and squeeze the residual funds we have available to invest in our networks and services.

3. Recommended improvements and calls to action

We propose the following key changes to ensure consumer and national welfare guarantee fair competition in the downstream market for the upcoming years:

a. **Synchronization of license terms**: The terms of the 800 and 900 MHz licenses should be extended and aligned with the expiry of substitutable 700 MHz licenses in 2034 to allow for fair and much more efficient re-allocation that is essential for the 5G and 5.5G era which will dominate during the new license period.

b. **Portfolio adjustment**: The portfolios should be enlarged and must take into account the providers' spectrum holdings outside the auction. The portfolios must be designed in such a way that all three MNOs remain competitive after the auction, rather than leaving this to the additional spectrum phase when strategic play linked to market asymmetries could distort bidding.

c. **Reduction of reserve prices**: The reserve prices should be reduced to a level in line with the 2019 Swiss auction and fair European benchmarks. We propose a set of prices that would still ensure substantial revenues for the State but also allow room for price discovery in an auction.

d. **Flexible payment conditions**: The option of staggered payment over the license term should be introduced.

e. **Stricter spectrum caps**: We propose a series of caps that consider existing spectrum holdings and would prevent any single provider from achieving a dominant position through spectrum accumulation.

f. **Longer license periods**: The license period for any spectrum not extended to 2034 should be increased to at least 20 years to create investment security.

In conclusion, the current tender documentation is a missed opportunity by ComCom to level the playing field for all market participants. It does nothing to fulfill ComCom's mandated objectives to ensure the wellbeing of Swiss Consumers. This is a failure we anticipated, based on precedent, and a key motivation for Sunrise preferring renewal over re-auction even though this would lock in existing asymmetries through to at least the early 2030s when more spectrum may come available.

Given that the most relevant levers influencing market dynamics remain static and outside of the regulator’s control, spectrum allocation stands as the primary instrument to enhance market equality and correct historical inefficiencies.

We are convinced that our concerns and the resulting proposals for the adaptation to the auction format will significantly improve the upcoming spectrum allocation. ComCom can deliver on its principles, fulfill its legal obligations and ensure fair competition only through these (or similar) adaptations, thereby upholding the principles of objectivity, transparency, and non-discrimination. Should these obligations remain unmet, Sunrise reserves the right to pursue legal action.

Given the great importance of this award, we would welcome individual expert hearings of the MNOs with ComCom, BAKOM and the involved advisors at the beginning of 2026, and subsequent consultation on any adaptations to the tender documents before ComCom progresses to the final publication of the auction rules.

We kindly ask you, Mr. President, dear Sir or Madam, to take into account the concerns and objections presented in this consultation response and to adopt the proposed amendments. We are at your disposal for questions or clarifications and thank you for the opportunity to outline our position and to present our suggestions for improvement.

Yours faithfully,

André Krause
CEO

Marcel Huber
General Counsel & Chief Corporate Affairs Officer

Annex:

Consultation responses on the draft tender documents for the allocation of mobile radio frequencies, incl. NERA report on re-award of expiring spectrum licences

Sunrise

Consultation responses on the draft tender documents for the allocation of mobile radio frequencies

1 Introduction

Sunrise welcomes the opportunity to respond to this consultation and appreciates the chance to contribute to the ongoing discussion regarding the future structure and rules of the upcoming spectrum auction. Our response reflects a careful analysis of the proposed framework and draws upon both our practical experience in the market and independent expert advice. We aim to ensure that the award structure and auction design not only support fair competition but also deliver lasting benefits to Swiss consumers, in line with the principles set out in the Telecommunications Law.

Our analysis is set out over five further sections:

- **Section 2** sets out our main concern with the proposed award design. The design prioritizes in-auction competition and auction revenues over downstream competition and post-auction welfare of Swiss consumers. It must be modified to ensure that only allocation outcomes that are efficient and pro-competitive are feasible.
- **Section 3** sets out our two major remedies:
    - **Alignment of 800 MHz and 900 MHz expiry with 700 MHz.** We propose a short extension of 800 MHz and 900 MHz licenses to 2034, to align with expiry of substitute spectrum at 700 MHz. This approach will provide network continuity and help safeguard downstream competition through 2034. It will then allow ComCom to revisit low-band holdings in the 2030s, constructing a process that offers a level playing field across MNOs. (Alternatively, this remedy may be achieved by including new 700 MHz licenses starting 2034 in this auction but with an expiry date that aligns with all low-band.)
    - **Adapting the spectrum portfolios to take account of existing spectrum holdings.** If ComCom does not implement our first remedy, it should level the starting position for the MNOs in the auction by creating individual portfolios that leave every bidder the same total low-band going into the Additional Spectrum Phase. Whether or not it implements our first remedy, downstream competition would also best be served by increasing the total spectrum included in the portfolios and giving bidders more flexibility over composition. This remedy would reduce the risk that one of three MNOs ends up with insufficient overall network capacity to compete credibly for customers in the downstream market.
- **Section 4** addresses rule changes that would make licenses more affordable, especially for smaller MNOs. The proposed reserve prices are too high. ComCom should adopt a much more conservative pricing strategy when setting reserve prices, as it did for the 2019 spectrum auction. It can also reduce the financing burden on MNOs and improve investment incentives by providing an option to pay license fees in annual instalments extending the duration of licenses from 15 years to 20 years or more.
- **Section 5** sets out our comments on the award structure, including available spectrum and the proposed bidding phases. Our requested changes include replacing the FDD cap with a series of caps, on overall spectrum holdings (including 700, 1400 and 3500 MHz), and on mid-band FDD spectrum in the auction, that collectively prevent any single operator from securing too large a share of spectrum. We also ask that the unsold 1400 MHz spectrum be included in the auction.

- **Section 6** sets out our comments on the auction rules for the three stages of the auction that may involve bidding. We support the use of clock auctions and a two-stage allocation structure, including the use of portfolios. Our suggestions include a minor amendment to the activity rules, a reduction in the maximum bid increment, clarification of the end-of-round information rules and, in the Assignment Phase, a provision for winning bidders to negotiate with each other regarding the placement of their frequencies.

Throughout the document, we refer to the NERA Report, dated 12 September 2025, attached as an Annex to this paper. We asked NERA to review the role that the available spectrum bands play in existing mobile networks, examine the impact that changes in holdings could have on downstream competition, and explore the case for renewal or re-auction. NERA finds that the three-MNO market structure is at risk if the reallocation weakens Salt or Sunrise spectrum holdings.

Like ComCom, NERA identifies a two-stage auction design, including a portfolio stage, as a possible way to mitigate this risk. However, relative to ComCom, NERA proposes:

- larger spectrum portfolios that consider each operator's existing frequency holdings;
- tighter spectrum caps that preclude extreme spectrum concentration scenarios where Swisscom acquires too large a share of spectrum at the expense of Salt and Sunrise; and
- lower reserve prices based on the opening bids that ComCom previously adopted for the 2019 5G auction.

We believe that NERA's proposals are compelling and well justified by the evidence presented.

2 Proposals are likely to harm downstream competition

A primary objective for adopting an auction for this award should be to explore if the market can identify new allocation outcomes that will promote greater downstream competition and enhance consumer welfare. Otherwise, it would be a better approach simply to renew all the spectrum as is. These proposals are unlikely to deliver this objective: they could generate outcomes that harm the ability of Sunrise and Salt to compete in the downstream market and are very unlikely to produce allocations in which we are strengthened.

We infer from the proposals for spectrum portfolios and spectrum caps that ComCom is aware that the outcome of this award is likely to have a profound impact on competition in the mobile sector. However, the portfolios are too small, and the overall cap is too lax to provide certainty that there will still be three viable mobile operators after this auction. The proposed reserve prices are also very high, implying that even if Sunrise and Salt succeed in winning adequate spectrum holdings, they are both likely to be burdened by high financing costs, constraining both companies' flexibility to invest in network and compete on price with our much larger rival, Swisscom. Significant changes are required to address competition concerns.

Swiss law requires fair and functioning competition in the downstream area, and mandates regulators, including ComCom and BAKOM, to facilitate this, applying regulatory intervention when necessary. Spectrum allocation is the regulator's most important lever for ensuring fair and functioning competition - or preventing it. The legal mandate of ComCom is to ensure fair and functioning competition by allocating frequencies and to protect the interests of Swiss consumers. **ComCom's mandate includes the following core principles,** all of which are aimed at either direct benefit to the end-user (coverage, most modern services, cheaper service) or indirectly through stronger competition between mobile network operators (MNOs). It is mainly defined in the Swiss Telecommunications Act (TCA):

1. Provision of a wide range of high-quality services (Art. 1 para. 1 TCA)
2. Ensuring the provision of affordable and reasonably priced telecommunications services (Art. 1 para. 1 and para. 2 lit. a TCA)
3. Granting of a license must not eliminate or constitute a serious obstacle to effective competition (Art. 23 para. 4 TCA)
4. Ensuring and promoting the economically and technically efficient and uninterrupted use of the spectrum (Art. 25 para. 1 TCA)
5. Ensuring equal access to the limited frequency resources (Art. 25 para. 1 TCA)

MNOs are highly motivated to meet these core principles as consumers base their choice of service provider on how well they provide these benefits – they determine market share. Hence MNOs and ComCom should equally drive their decisions based on these principles.

Availability of base-station sites and radio-emission limitations are the two most challenging factors, aside from spectrum allocations, that hinder the extent to which MNOs can fulfill these obligations. ComCom also has some level of responsibility for these two factors.

We urge opening the review of how best to take into account the combination of spectrum allocation, site-sharing and emissions to best fulfill the jointly held core principles.

Without ComCom taking into account in the spectrum award design the complete set of available frequencies (renewable, continuing and new) and site-sharing and emission standards, even the best efforts of all the MNOs will fall far short of the ultimate achievement of these

core principles. Below we illustrate some of the very beneficial scenarios that would then be available, such as reconfiguring all low-frequency spectrum (700, 800 & 900 MHz) to benefit from much higher performance and efficiency that recent technology provides. Out-dated emission standards overlook that consumers are much more exposed to uplink radio (emissions from their own and neighboring handsets) than from distant towers, and that denser networks of towers reduce consumers' exposure. Currently emissions standards are used to block site sharing and hence they prevent competitors from making efficient reuse of spectrum.

ComCom has not provided any explanation for its choice of rules nor linked its decision to its principles listed above. Our concern with the proposed award design is that it prioritizes revenues and the wrong kind of in-auction competition – namely competition for spectrum as a tool to limit downstream competition for market shares – over outcomes that are more likely to support downstream competition. Or stated in other words: competition in an auction does not translate into fair and functioning downstream competition.

The lax caps invite Swisscom to target as much as 50% of all mobile spectrum, and an even larger fraction of key bands such as 1800 MHz and 2100 MHz, knowing such an outcome would hugely constrain rivals. This may induce in-auction price competition for spectrum primarily on commercial value (i.e. expectations of market share gains because rival networks are constrained) rather than technical value (avoided cost of network investment) and could even lead to a bidding war with devastating impact on downstream competition, leaving smaller operators with either inadequate spectrum portfolios or huge debts. Even if there is little competition and the auction settles quickly, the high reserve prices will ensure that smaller operators are left with a financial burden that constrains their ability to invest. We perceive this approach as a serious mistake that ComCom should want to avoid. Changes to the award rules are needed to safeguard downstream competition and avoid the possibility of severe harm to Swiss consumers.

2.1 In-depth analysis of the situation and market dynamics is necessary

To understand why the proposals could be so harmful to competition it is necessary to analyze carefully the existing market dynamics, including existing spectrum and site holdings, how operators are using the spectrum that is expiring, network congestion and relative financial strength of the three MNOs. It is unclear to us whether ComCom or its advisors have performed any such analysis.

NERA analyzed the market situation in its white paper for Sunrise (cf. Annex). The following are the key factors of in-auction and downstream competition to consider when designing this award:

1. Swisscom enjoys significant structural advantages in the mobile market compared to Sunrise (and Salt), with the implication that operators do not enter the auction on a level playing field.
2. Access to sufficient spectrum is the only realistic way for Sunrise to close the gap to Swisscom with respect to network quality and capacity.
3. Switzerland has the highest level of asymmetry in spectrum holdings in Europe and market shares.

Under these conditions, without specific measures to promote competition, it is impossible for Sunrise (and Salt) to compete with Swisscom on equal terms. It is an unsafe assumption that an auction will deliver an allocation of spectrum that ensures the most efficient use of spectrum in an efficiently competitive downstream market.

2.1.1 Swisscom has significantly better basic conditions

Swisscom enjoys a series of structural advantages in the mobile market over its competitors, with respect to market share and revenues, financial strength, network size and radio emission rights. We describe these advantages as "structural" because, realistically, they are unlikely to change in the short-to-medium term. In the case of network size and emission rights, they are presently locked in by regulatory restrictions. Many of these competitive advantages were locked in during its privileged position as PTT Telecom during the monopoly regime. At liberalization, deregulation and privatization most of these privileges were retained and not available to the new entrants. It is time to review the sharing of these privileges across the MNOs. In the meantime, these advantages must be accounted for in the design of the auction, so we can compete for spectrum with Swisscom on a more level playing field.

Swisscom has the largest share of customers of the three MNOs and enjoys substantial economies of scale as explained in NERA's white paper: its enterprise value per 1% of market share is, by some margin, the highest among the three MNOs. This translates into a significant financial advantage when buying spectrum and investing in the network. Equivalent investments in the network represent a smaller proportion of turnover relative to rivals and are inherently less risky. Additionally, Swisscom can borrow money at a coupon rate close to zero and benefits from a de facto state guarantee.

[… ✂ …]

Yet, reflecting its historic customer base, Swisscom's traffic per consumer is much lower than Sunrise. Sunrise has to work very hard to meet its much more demanding consumers' needs despite less spectrum and fewer sites – it carries double the traffic per site as Swisscom. The multiple advantages that Swisscom enjoys are not used effectively or fully to meet the core principles for the best wellbeing of Swiss consumers.

Additionally, the restrictive non-ionized radiation (NIR) and building regulations in Switzerland make it very difficult for mobile network operators to build new antenna sites. Here, too, Swisscom, as a former monopolist, benefits from a first-mover advantage, enjoying grandfathered permissions unavailable to rival networks.

2.1.2 Access to sufficient spectrum is the only realistic way to close the gap to Swisscom

Given that Swisscom's network advantages are, in the medium term, locked in by structural advantages, spectrum is realistically the only tool presently available to Sunrise (and Salt) to expand significantly network capacity. Access to significant reserves of spectrum is essential to our ability to compete in the downstream market. The market is not standing still. We (and presumably Salt) need more spectrum simply to maintain the quality of service for our existing customer base, as traffic per user continues to expand. And we need further reserves of spectrum to create sufficient potential capacity to allow us to compete vigorously for new subscribers.

In Table 1, we compare the three MNOs in terms of level of data traffic, number of sites and total spectrum holdings. Observe that the average level of traffic on Swisscom's sites is similar to Salt and much less than Sunrise, despite the mismatch in market shares. Furthermore, each Sunrise site has less potential to expand capacity than a Swisscom site, owing to our much lower spectrum holdings. In short, as things stand, Sunrise's network is closer to maximum capacity, whereas Swisscom is swimming in a sea of spare capacity. (We understand, for example, that Swisscom has not meaningfully deployed its 2.6 GHz TDD spectrum despite having a 45 MHz holding since 2012).

Table 1: Swiss mobile traffic by operator

Operator	Total mobile traffic	Total number of sites	Traffic per site	Total spectrum holdings MHz	Total spectrum holdings %	Traffic per site/MHz	Traffic per site / MHz	Capacity per site / MHz	Handicap vs SC
	PB/ month		TB/ month/ site			TB/month/ site/MHz	Indexed	indexed	indexed
Swisscom	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Sunrise	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Salt	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: *Sunrise – values for Swisscom and Salt are estimates provided by Sunrise.*

Specifically, we calculate that Sunrise has [… ✂ …] times the traffic per site than Swisscom. And, making the reasonable assumption that (potential) capacity per site is proportional to the frequency holdings, Sunrise has [… ✂ …] times less capacity per site than Swisscom. Consequently, on a per site level, Sunrise is using spectrum up to [… ✂ …] more efficiently than Swisscom. Put differently, Sunrise has a handicap of [… ✂ …] vs. Swisscom if the combined effect of traffic, site and spectrum holdings is considered.

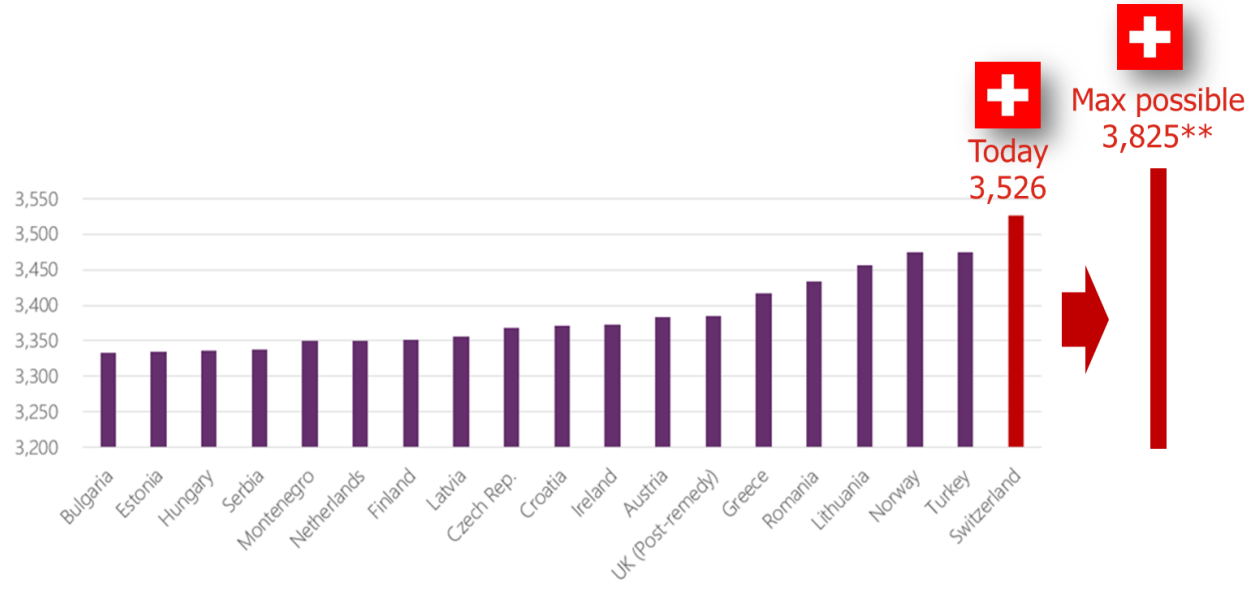
[… ✂ …]

Hitherto, Swisscom has put forward the argument that it requires a frequency allocation that corresponds to its market share. The data we present demonstrates that this is untrue. In fact, Swisscom needs much less spectrum relative to market share than Sunrise and Salt owing to its larger network and its relatively low average traffic per user (which is likely explained by its customer base skewing older than Sunrise and Salt). A much more even distribution of spectrum is required to put the networks on an equal footing in terms of their ability to expand capacity.

2.1.3 Switzerland has the highest level of asymmetry in spectrum holdings

As NERA pointed out in Section 3.1 of their White Paper, Switzerland already has the highest level of asymmetry in total spectrum holdings of any three-player market in Europe. We show in Figure 1 how much worse that asymmetry could get under the proposed auction rules, using HHI to illustrate concentration in spectrum shares. Observe that HHI could rise by almost 300 points if Swisscom bought up to the cap and Salt was reduced to the minimum under the auction rules. We struggle to understand how this could be an acceptable outcome, given the Government's commitment to promoting a competitive mobile marketplace.

***Figure 1**: Herfindahl-Hirschman Index (HHI) for spectrum holdings**



***Source:** NERA Gigabase*
*Notes: *Measures spectrum share concentration by summing the squares of MNO holdings of sub-4 GHz mobile spectrum for all firms in a given market; ** Max possible assumes that Swisscom buys to the cap; Salt buys only portfolio + 1 block at 900 MHz; and Sunrise buys portfolio and all remaining spectrum.*

For Switzerland to be at such an extreme should be a red flag for regulators, justifying detailed analysis. With so much spectrum expiring, this award is an opportunity to reduce asymmetry. But this will not happen under the current rules because the design includes no mechanisms to balance the operators. It is as if Switzerland is in a fairytale in which the auction design pretends that Salt, Sunrise and Swisscom are equivalent.

In this regard, we remind you of the significant financial advantage that Swisscom enjoys over Sunrise and Salt. As NERA point out in their report (Section 4.2), the current distribution of spectrum is a legacy of two auctions in which lax spectrum caps enabled Swisscom to compete for and win an outsize share of spectrum. ComCom should consider whether this is really evidence that such asymmetric distribution is efficient or rather, as we contend, a reflection of Swisscom's financial muscle and the prudent compromises that Sunrise and Salt have been obliged to make to manage our limited budgets.

ComCom's approach to allocating expiring licenses requires careful consideration of how different allocation methods impact its broader objectives. In forming its decisions, ComCom typically relies on both national and international experience, as well as relevant academic and industry research. Over the past thirty years, this body of knowledge has tracked the evolution of spectrum auctions, starting with the initial 3G and 4G auctions between 2005 and 2020 and continuing to present-day issues concerning 5G and expiring licenses.

While auction designs have evolved, the fundamental structure of spectrum auctions has remained largely unchanged. Early auctions limited each bidder to a single license. More recent auctions, however, have offered multiple spectrum blocks and incorporated mechanisms to prevent excessive market concentration following the auction. These mechanisms often take the form of limited "portfolios" available to a small number of bidders – typically three. This

structure implicitly recognizes the risk of adverse competitive effects after the auction and has the advantage of enabling new entrants to compete effectively with incumbent operators by securing a meaningful share of the market.

2.1.4 Critical Weaknesses in Portfolio Selection

Despite these safeguards, ComCom's method for selecting portfolios currently lacks thorough analysis of their potential impact on post-auction competition. A key weakness is the failure to account for bidders' existing spectrum holdings in similar bands when determining portfolio allocations. Specifically, blocks in the 700 MHz, 800 MHz, and 900 MHz bands function as close substitutes and are considered part of the same market under standard competition policy guidelines, such as the SNIP test. Presently, new entrants hold no 700 MHz blocks, Sunrise holds one, Salt has two, and Swisscom possesses three. The existing cap of five blocks in the 800 MHz and 900 MHz bands would allow Swisscom and Salt to acquire up to eight and seven low-frequency blocks, respectively, while Sunrise is exposed to ending up with only four. At this level, Sunrise would likely no longer be a viable concern. While we recognize this is not the most likely auction outcome, ComCom must consider whether it is reasonable to uniquely expose Sunrise to market failure, and by extension harm consumers and abandon ComCom's five principles owing to the resulting loss in downstream competition.

This disparity is significant because low-frequency spectrum is essential for coverage and in-building penetration. Operators with limited low-frequency spectrum must deploy substantially more cell sites to achieve comparable quality of service, resulting in higher costs per customer or per gigabyte. As a result, operators with greater spectrum holdings benefit from higher profit margins, particularly if they also hold larger market shares, which further exacerbates competitive imbalances.

Recent research – see, for example, Elliott et al. (Journal of Political Economy, 2025) and Peha (Telecommunications Policy, 2017) – suggests that the most pro-competitive distribution of low-frequency bands occurs when two bidders receive six blocks each and a third receives seven, in the absence of a new entrant. If a new entrant participates, a 5-5-5-4 allocation is considered optimal. ComCom's current decisions, however, appear to prioritize auction revenue over post-auction consumer welfare. Both recommended allocation scenarios maintain competition for surplus blocks among participants.

Academic research has less to say about the distribution of mid-band spectrum. In these bands, there is less scarcity, so there is a lower likelihood that one or two entities may monopolize the spectrum. Furthermore, in most countries, there is considerable scope for operators to address general capacity constraints by building new sites. However, in Switzerland, owing to building and emission restrictions, operators are necessarily more dependent on spectrum. This implies that ComCom should be more, not less, concerned about asymmetries in mid-band spectrum than other European regulators. This should prompt ComCom to consider larger portfolios and tighter spectrum caps.

2.1.5 Recommendations for Remedy and Portfolio Refinement

At a minimum, conventional competition practice should dictate that the portfolio offerings be based on each applicant's initial holdings of 0, 1, 2, or 3 blocks in the 700 MHz band. In our view, this would be best handled by taking the low-band out of this auction and addressing the

issue in the early 2030s when substitutable 700 MHz is also expiring. If it must be addressed now, then the portfolios must consider the asymmetry in operator starting positions.

Synchronizing the renewal of all low-band (700, 800 and 900, plus new spectrum such as 600) would enable a resorting of holdings into combinations per MNO that modern technology can use more efficiently, with higher performance and offering new services. Not doing this would lock-out any such modernization for not just the next 15 years, but also from subsequent renewals, which again would fail to deliver on ComCom's five principles.

In addition, the inclusion of other frequency bands within the portfolios should be expanded. This will create a more level playing field between the bidders, as larger portfolios advance smaller MNOs closer to the point of spectrum critical mass from a downstream competition perspective. This de-risks the additional spectrum stage, allowing all bidders to compete more vigorously with less exposure to excessive overall spend. Any deviations from an equitable split – such as four blocks each in the 1800, 2100, and 2600 MHz bands – should be carefully justified if the goal is to maximize post-auction welfare. Should ComCom's caps allow Swisscom to maintain and even increase its spectrum share on the basis of its larger share of customers (rather than its much more modest lead in mobile traffic share), experience and academic analysis both indicate that the net impact of this decision would be to allow Swisscom to strengthen its already dominant position in the Swiss market. Furthermore, the 270 MHz spectrum cap – which represents half the available spectrum in the auction – suggests that ComCom may consider a duopoly a good outcome in the post-auction landscape. This approach is substantially more permissive of consolidation than European or global standards. ComCom should clarify whether this reflects an explicit policy stance.

In conclusion, the primary recommendations are twofold: first, synchronize the expiration dates of low-band spectrum holdings by extending all 700 MHz, 800 MHz, and 900 MHz assets to ensure equitable treatment (see Section 3.1); and second, refine portfolio allocations to accurately account for existing holdings and promote market competition (refer to Section 3.2). There is no justification for prioritizing revenue maximization in the award design; revenue targets can be achieved through appropriately set reserve prices, as detailed in Section 4. Additional improvements are described in Sections 5 and 6, particularly the revision of spectrum caps to prevent anti-competitive outcomes. It is important to note, however, that such caps serve as constraints rather than direct solutions to the core issue of bidder asymmetry specific to Switzerland.

3 Major remedies: Low-band extension and portfolio adaptation

We set out here proposals for two major remedies to address our concerns about asymmetries between bidders and to create a more level playing field in the auction. Major remedy #1 addresses only the low-band spectrum: our preference is that the term of the current low-band licenses is extended to 2034 to align with substitutable 700 MHz spectrum. Major remedy #2 involves adapting the portfolios to account for existing spectrum holdings and expanding them to create a more level playing field between bidders. It could be adopted as an alternative to remedy #1 or as a complement focused only on mid-band spectrum.

3.1 Major remedy #1: Align 800 MHz and 900 MHz expiry with 700 MHz

We recommend extending all 800 MHz and 900 MHz low-band holdings as they currently exist through to 2034. This approach would align their expiry dates with the substitutable 700 MHz spectrum, allowing ComCom to reassess the efficient allocation of low-band spectrum in the 2030s, when all relevant frequencies may be considered collectively. By then, additional spectrum at 600 MHz may also become available. Such synchronization would also facilitate a reordering of holdings, which could then exploit the full advantages of latest technology. For example, each MNO having at least one set of four contiguous low-band blocks would enable new services, higher speeds and more efficient and effective use of the spectrum. Continuing with the current approach of every MNO having 1, 2 or 3 blocks in any band would shut out this modernization for at least 15 more years.

Proceeding with an auction limited to only 800 MHz and 900 MHz – without addressing the distribution of 700 MHz – is inadvisable and may risk market inefficiencies. [… ✂ …] Implicitly, the design assumes participants can simply resolve spectrum shortfalls through frequency acquisitions, neglecting the potential for strategic bidding by incumbents.

Earlier this year, alongside other MNOs, we appealed for a straightforward renewal of expiring spectrum rights. We continue to support such renewal as it provides predictability for investment planning and ensures ongoing competitiveness in downstream markets. For Sunrise, renewal would secure our current 800 MHz and 900 MHz spectrum holdings – essential for both 4G and 5G coverage and capacity. Unlike Salt and Swisscom, Sunrise possesses only 10 MHz at 700 MHz, [… ✂ …].

To clarify, we acknowledge that the existing spectrum distribution does not represent the most efficient or pro-competitive allocation possible. A more balanced reallocation would involve spectrum caps effectively transferring some of Swisscom's extensive spectrum assets to Salt and Sunrise, reducing asymmetry to levels typical of a European market. However, this is an outcome we cannot realistically aspire to in an auction without supporting pro-competitive rules, owing to the huge financial advantage that Swisscom enjoys over its competitors. Our current spectrum is sufficient for maintaining competitiveness until further spectrum becomes available in the mid-2030s. [… ✂ …].

Empirical and engineering evidence consistently demonstrates that all MNOs require significant low-band spectrum portfolios, and material asymmetries among operators harm competition. Notably, research by Elliott et al. (Journal of Political Economy, 2025) and Peha (Telecommunications Policy, 2017) finds optimal outcomes arise from equitable spectrum distribution, with disparities adversely impacting welfare. Elliott et al. provide a microeconometric analysis using French demand data, illustrating the tradeoff between competition and economies of scale, and

indicating that an optimal market should have no fewer than three operators, or more if consumer welfare is prioritized.

Furthermore, Rey and Salant argue that optimal auction designs allocate near-equal low-band spectrum shares to each participant, based on models where costs decrease with increased spectrum. This aligns with technical understanding and the findings of Peha and Elliott et al. Additionally, Ershov and Salant's empirical study of European 4G auctions shows that concentrated markets and certain low-band allocations can exacerbate market concentration and reduce investment and welfare.

Given the government's intent to proceed with an auction, we propose a temporary extension of low-band licenses as an intermediate measure to maintain competitive balance. The most straightforward implementation would be a short-term extension of existing rights, covering the six-year period to 2034. Alternatively, a de facto extension could be structured within the auction by allocating tailored spectrum portfolios to each bidder.

As discussed in the NERA paper, it may also be possible to address our concerns by integrating 700 MHz into this award, considering the rights that bidders have until 2034. We do not focus on this here as we think this would be harder to implement than our simple proposal for a short-term low-band extension.

3.2 Major remedy #2: Adapting portfolios to take account of spectrum holdings

We recommend enlarging and adapting portfolios to reflect each operator's existing low-band spectrum holdings. This modification is essential for safeguarding downstream competition and mitigating risk for smaller bidders. An additional benefit is that it should enhance affordability for Salt and Sunrise as they compete with Swisscom for additional spectrum in the upcoming auction.

Our suggested portfolios are as follows:

- 50 MHz (5 lots) of low-band spectrum, adjusted for current holdings at 700 MHz. Each bidder should have the option to prioritize access to up to two lots at 800 MHz, supporting 4G network continuity.
- 100 MHz of mid-band spectrum, comprising either:
    - 40 MHz at 1800 MHz, 20 MHz at 2100 MHz, and 40 MHz at 2600 MHz; or
    - 50 MHz at 1800 MHz and 50 MHz at 2600 MHz.
- Applicants could indicate their priority across these two options at application. If there is no conflicting applications, each would get their preference.

ComCom's proposed award structure utilizes a "two-stage auction" format: initial allocation through spectrum portfolios followed by competition for remaining lots. By adopting this approach, ComCom implicitly recognizes ex-post competition as a rationale. We concur that promoting downstream competition must be the primary objective of this award.

Therefore, ComCom should employ standard industry metrics when determining spectrum portfolio composition. A commonly used metric is market concentration, typically measured by the Herfindahl–Hirschman Index (HHI) within the relevant antitrust market.

In spectrum auctions, it is customary to identify at least two, potentially three, markets from an antitrust perspective:

1. **Low-band spectrum**: Comprising the 700, 800, and 900 MHz FDD bands, these frequencies offer distinctive advantages for signal propagation, including cell edge, uplink, and indoor coverage not easily replicated at higher frequencies. The 1400 MHz SDL band is marginally included for downlink only.
2. **All mobile spectrum below 4 GHz**: Includes low-band plus the 1400, 1800, 2100, 2600, and 3500 MHz bands, which benefit from mature ecosystems and cost-effective deployment over standard cell networks.
3. **Lower mid-band capacity**: Encompasses the 1800 MHz and 2100 MHz bands, crucial for wide-area capacity enhancement, particularly for uplink where higher frequencies face power constraints.

By proposing caps on low-band and FDD spectrum during the auction, ComCom acknowledges these distinct markets. However, there are two principal issues:

1. Market definitions are either incorrect or not properly applied, overlooking uneven distribution of relevant spectrum currently held by MNOs outside the auction process.
2. The importance of granting operators sufficient capacity spectrum to prevent future constraints and sustain cost-effective growth is underestimated.

Academic research indicates that downstream competition is most robust when MNOs possess relatively balanced portfolios across the 700, 800, and 900 MHz bands. In a typical three-player market, this equates to the largest operator holding no more than 7-8 lots and the smallest 5-6 lots. Swiss allocations are already within these bounds: Swisscom has 8, Sunrise 6, and Salt 5.

Optimally, auction design for low-band spectrum should:

- guarantee that each operator acquires at least 5 lots; and
- assess whether Salt and Sunrise can capitalize on acquiring 1-2 blocks from Swisscom.

The current proposal does not adequately meet these objectives. While securing 5 lots is feasible for Swisscom and Salt based on existing holdings, Sunrise remains below the viable threshold with just four guaranteed lots.

These disparities in pre-existing allocations create significant asymmetry among bidders seeking additional spectrum. Sunrise must pursue its 4th, 5th, and 6th lots; Swisscom bids for its 6th, 7th, and 8th; Salt occupies a middle position. [… ✂ …].

NERA's analysis, detailed in Section 5.2 and Annex I of its White Paper, recommends adjusting low-band packages according to existing holdings – specifically, allocating four blocks to Sunrise, three to Salt, and two to Swisscom. This ensures all participants enter the Additional Spectrum Phase with a minimum of five blocks, competing for subsequent lots. We strongly support this recommendation.

For all mobile spectrum, differentiation among operators based on existing holdings is less imperative, given Swisscom's substantial lead from combined holdings at 700, 1400, and 3500 MHz. While ample spectrum is available, the proposed portfolios do not sufficiently guarantee ongoing viability for any MNO. NERA estimates each operator requires approximately 240-260

MHz, including 50 MHz low-band. With current portfolio allocations and caps, Salt is assured only 190 MHz and Sunrise 205 MHz, compared to Swisscom's 280 MHz.

[… ✂ …]

To address this imbalance and risk, we propose expanding portfolios to include 100 MHz of mid-band spectrum, with at least 2x30 MHz allocated across the 1800 MHz/2100 MHz bands. Complementary band-specific caps (see Section 5) would further bolster this approach. This strategy would ensure the continued viability of three operators post-auction. […✂ …]

We also have a concern about the composition of mid band spectrum in the portfolios. The inclusion of only a small block of 2x5 MHz at 2100 MHz makes no sense. Perhaps this was added to safeguard 3G networks, but 3G is being discontinued, and the block is too small to support 5G. This approach encourages operators to buy in both the 1800 MHz and 2100 MHz bands when it may be more cost effective for an operator to focus on one or other. ComCom should either give bidders choice between bands or offer larger packages in both bands, not an "in between package" that pushes us towards two bands but does not give us certainty that we will secure a large enough spectrum block in both bands.

4 Making licenses more affordable

In this section, we make the case that:

- reserve prices are too high, allowing insufficient room for price discovery and threatening an unduly steep financial burden on the industry;
- ComCom should adopt a much more conservative pricing strategy when setting reserve prices, as it did for the 2019 spectrum auction;
- extended payment terms and longer licenses will provide stronger investment incentives; and
- for full term licenses, the duration should be extended from 15 years to 20 years or more.

A conservative pricing strategy involves adopting prices that are well below expected market prices but still substantive, thereby guaranteeing reasonable minimum levels for the State. Such an approach would create space for price discovery in the auction for additional spectrum and reduce the risk that the final prices will financially strain the mobile industry in a manner that may affect the ability to finance investment. It is consistent with the recommend approach for neighboring EU countries, as set out in the Letta Report on the future of the Single Market, which states that spectrum licenses should have "*low reserve prices (or annual fees)*".[1]

Simply put, the proposed reserve prices are much higher than we expected. They appear to have been set with reference to historic final prices in other countries, not reserve prices, and designed to prioritize revenue collection over efficiency and downstream competition. It is well understood that the current era has presented great financial challenges for the mobile industry worldwide, with revenues stagnating and costs increasing owing to 5G network rollout. High spectrum costs feed into challenging financial circumstances which in turn limit scope for innovation in price and service competition, constrain access to capital markets and limit flexibility to fund network investments. These constraints are especially felt by smaller operators, including Sunrise and Salt.

The Government can also help industry by extending payment terms and license duration. In past auctions, ComCom has required full payment upfront, requiring operators to draw heavily on external financing to pay for spectrum. The associated debts weigh on operator balance sheets, constraining our access to capital for other productive activities, including network roll out. Again, this burden falls disproportionately on smaller operators. Providing an option to pay for licenses in annual instalments could greatly improve industry economics. The proposed prices would also be more affordable if the licenses were longer. Other countries in Europe are moving to terms of 20 years or more. Switzerland should do the same for auctioned spectrum, providing operators with greater certainty to plan their 5G and future 6G networks.

4.1 Lower reserve prices

We propose a significant reduction in reserve prices, consistent with recent benchmarks for spectrum auctions and renewals in Europe. Specifically, we propose that portfolio reserve prices be set no higher than the level of Swiss 2019 reserve prices and/or UK lump sum

[1] Enrico Letta (2024), Much More than a Market. Speed, Security, Solidarity, p. 58.

renewal prices for the same or equivalent bands. We further propose that reserve prices for additional spectrum be set at a discount of up to 50% to this level to allow for price discovery.

The Swiss 2019 reserve prices are an obvious benchmark for this auction and applying similar reserve prices for this auction would promote regulatory consistency. The UK provides an excellent benchmark because the prices were updated in 2025 based on an analysis of recent price benchmarks in leading European countries. Moreover, these prices represent UK regulator Ofcom's best estimate of "*full market value*" for each spectrum band, so are a good benchmark for a ceiling on the value of Swiss portfolios.

If ComCom continues to propose higher prices for Switzerland, it needs to explain why it believes:

a. a departure from the 2019 precedent of setting conservative reserve prices is appropriate for this award; and

b. the market value of spectrum in Switzerland is higher than the United Kingdom, a larger and similarly developed market.

Our proposed prices are set out in Table 2.

***Table 2**: Sunrise proposal for reserve prices for 2027 spectrum award*

	Portfolio reserve prices			**Additional spectrum reserve prices**		
Band	CHF/MHz /Pop	Lot size	Price per lot	CHF/MHz /Pop	Lot size	Price per lot
800	0.22	20 MHz	39,221,600	0.20	10 MHz	17,828,000
900				0.20	10 MHz	17,828,000
1800	0.15	20 MHz	26,742,000	0.10	10 MHz	8,914,000
2100	0.15	10 MHz	13,371,000	0.10	10 MHz	8,914,000
2600 F	0.075	20 MHz	13,371,000	0.05	10 MHz	4,457,000
2600 T	NA	-	NA	0.05	20 MHz	8,914,000

Notes: *These prices are derived from our analysis of UK ALFs and Swiss 2019 reserve prices, as set out below.*

If these prices were adopted, the auction would still raise a minimum of CHF 616.8m (and likely higher given competition), which is a very significant sum to extract from the mobile industry.

In the following analysis, we explain why we believe the reserve prices proposed in the Consultation are too high, why ComCom should instead consider UK prices and past Swiss auction prices as references for revising them, and why the financial burden on the industry of ComCom's proposed prices is too high.

4.1.1 *The prices proposed in the Consultation appear to be benchmarked against final prices and not reserve prices*

We benchmarked the proposed reserve prices against prices paid for spectrum in Europe over the last 15 years (2011-25), the last 10 years (2016-2025) and the last 5 years (2021-25) for spectrum in the same and similar bands. Our results are shown in Table 3. We observe that ComCom's proposed prices are closest to the average of the last 5 years. While we agree this is the correct range of benchmarks to explore, we are concerned that the reserve prices appear to have been set at or above full market value. Notably, the proposed portfolio price for 800 MHz and 900 MHz spectrum is about the same as the average price paid for equivalent spectrum in Europe over the last five years.

***Table 3**: Consultation reserve prices compared to European benchmarks for market prices (CHF, Price/MHz/Pop)*

	CONSULTATION RESERVE PRICES		**FINAL PRICES* (EUROPEAN AWARDS**)**		
Band	Portfolio spectrum	Other spectrum	15-year average	10-year average	5-year average
800	0.31	0.26	0.51	0.34	0.28
900	0.31	0.26	0.51	0.34	0.28
1800	0.21	0.17	0.26	0.23	0.21
2100	0.21	0.17	0.26	0.23	0.21
2600 F	0.10	0.09	0.10	0.08	0.08
2600 T	NA	0.09	0.06	0.06	0.05

Notes: **All benchmarks shown are converted to CHF at exchange rate in year of award and are adjusted for a 15-year license and for inflation. For 800 and 900 MHz, we benchmarked all low-band FDD awards for 700, 800 and 900 MHz together. For 1800 and 2100 MHz, we benchmarked these two bands together. For 2600 FDD, we benchmarked 2600 MHz FDD awards only. For 2600 MHz TDD, we benchmarked 2600 TDD and 3500 MHz awards together.*
***We include all awards from 31 European countries, including all EU member states plus Iceland, Norway, Switzerland and United Kingdom. The sample size is as follows: 15-years: 183 awards; 10-years: 106 awards; and 5-years: 53 awards.*

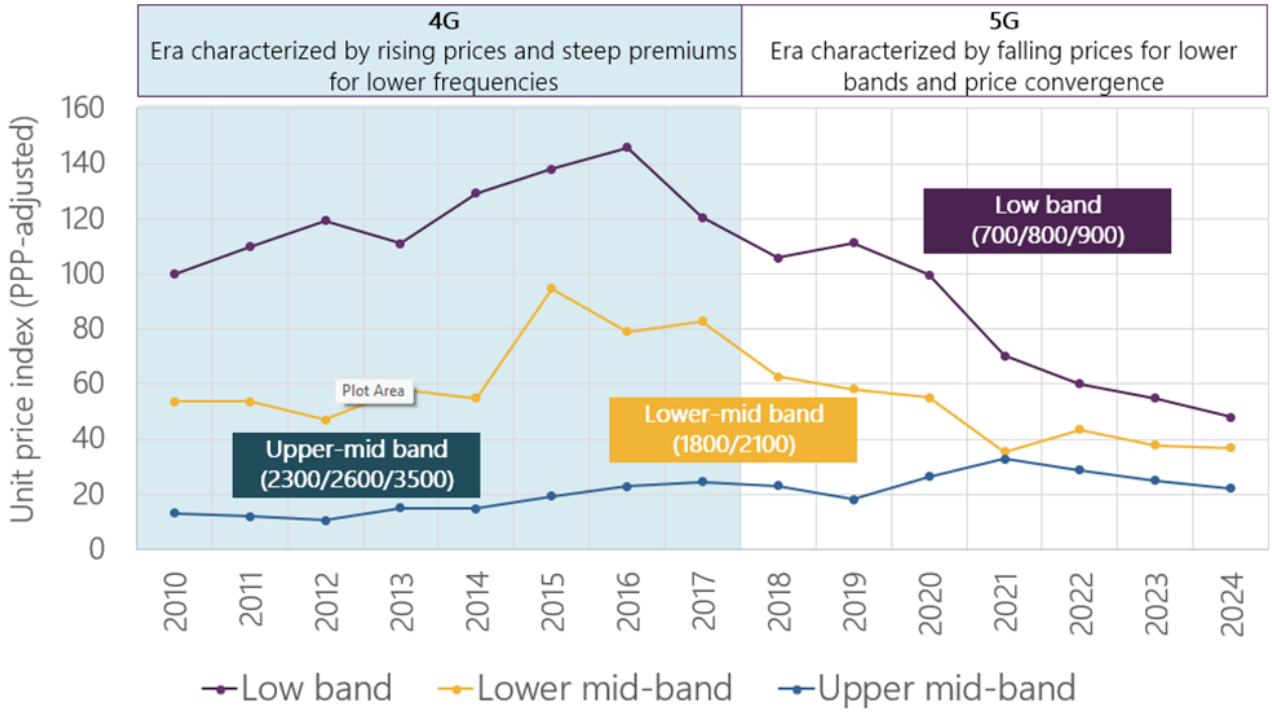
4.1.2 *Proposed reserve prices do not account for the significant decline in prices paid for spectrum across the 5G era*

Any approach of taking a simple average fails to consider the general trend in spectrum prices, which is downward. As we show here, spectrum prices have been falling, so any historic average is likely to overstate prices. It is always prudent for regulators to be conservative when setting reserve prices, but especially so when market values are declining. The high reserve prices proposed in the consultation imply that ComCom has not yet considered this observed decline in market value.

Prices paid for the spectrum available in this auction peaked in around 2015-16 and have declined significantly over the last decade. As illustrated in Figure 2, a survey of global prices by

Marsden (2024) found that prices paid for low-band spectrum (including 800 MHz and 900 MHz) have fallen by around 65% and prices paid for lower mid-band spectrum (including 1800 MHz and 2100 MHz) have fallen by over 50% from their 4G-era peaks.[2] Marsden attributes this trend to a combination of factors, including the increased spectrum supply – particularly with the release of new bands such as 700 MHz, 1400 MHz and 3500 MHz – alongside technological advances and a slowdown in data growth rates (see the NERA White Paper in Annex 1, Section 6.2 for further discussion). Similar conclusions have been reached by other studies including analyses by Aetha[3], Plum[4] and the GSMA.[5]

***Figure 2**: The downward trend in spectrum prices across the 5G era*



***Notes:** Based on 334 spectrum award price observations.*
***Source:** Marsden, R, Round-by-Round, Learnings from the First 35 Years of Spectrum Auctions, p. 110.*

4.1.3 Reserve prices are much higher than reserve prices adopted elsewhere in Europe, including in Switzerland in 2019

In the context of a spectrum auction, where efficiency of allocation rather than revenue generation is the primary goal, it is widely recognized best practice to set reserve prices at a

[2] Marsden, R, Round-by-Round, Learnings from the First 35 Years of Spectrum Auctions, Chapter 10.

[3] Aetha (2025), Why spectrum values are falling, available here.

[4] Plum (2024), Spectrum fees: saying the quiet part out loud, available here.

[5] GSMA (2025), Global Spectrum Pricing, available here.

significant discount to the expected market price. This is appropriate both to mitigate the asymmetric risk that prices are inadvertently set too high (and deny efficient demand) and to allow space for price discovery in a multi-round auction. Accordingly, a benchmark of market prices for similar spectrum sold elsewhere in Europe is informative of the potential outcome of an auction but is much too high as a level at which to set reserve price. There is also wide precedent for expert regulators to be conservative when setting reserve prices based on benchmark prices, and for their advisors to recommend caution. For example, in their report for ComReg on setting prices for 3.6 GHz spectrum for Ireland's 5G auction, DotEcon (who we understand are advising ComCom on this award) repeatedly emphasize the importance of setting prices "conservatively" as the low end of observed benchmark ranges.[6]

A reasonable approach is to set reserve prices at least 50% below a benchmark for market price. We accept that there may be some scope for differentiating between portfolio and additional spectrum. A smaller reduction may be acceptable for portfolio spectrum, given the likelihood of low or no competition. A larger reduction is necessary for additional spectrum, given the greater likelihood of competition and importance of price discovery.

As reference for this, consider Table 3, where we show the average of reserve prices adopted by European countries for the relevant bands over the last 10 years and the last 5 years. As you would expect, reserve prices have been trending downwards, as regulators catch up with the reality of lower spectrum values. Observe that the reserve prices proposed in the consultation are significantly higher than the average reserve prices for benchmarked countries. This is an obvious indicator that the reserve prices proposed by ComCom are too high.

Furthermore, the proposed reserve prices are much higher than the equivalent reserve prices adopted by ComCom for the 2019 auction, as shown in Table 3. It appears therefore that ComCom is proposing a significant change in policy, sharply increasing reserve prices from 2019, contrary to evidence that spectrum values are falling and other regulators are lowering reserve prices. The consultation provides no explanation for this policy change. We see little rationale for this other than ComCom is prioritizing auction revenues; this may adversely affect Swiss consumers and ComCom is not maintaining regulatory consistency.

[6] DotEcon (2015), DotEcon Benchmarking Report (A Report for ComReg) Document 15/140b, available here.

***Table 4**: Consultation reserve prices compared to European benchmarks for reserve prices (CHF, Price/MHz/Pop)*

	CONSULTATION RESERVE PRICES		EUROPEAN RESERVE PRICES*		SWISS RESERVE PRICES**
Band	Portfolio spectrum	Other spectrum	10-year average	5-year average	2019 award
800	0.31	0.26	0.25	0.22	0.20
900	0.31	0.26	0.25	0.22	
1800	0.21	0.17	0.13	0.12	0.10
2100	0.21	0.17	0.13	0.12	
2600 F	0.10	0.09	0.05	0.06	0.05
2600 T		0.09	0.03	0.03	0.01

***Notes:** * We include the same awards and performed the same adjustments as in Table 3.*
*** To determine equivalent prices for this award based on reserve prices from 2019, we adopt the same approach as NERA in Section X of their White Paper (see Annex I): we use 700 MHz as a proxy for 800 and 900 MHz; 1400 MHz as a proxy for 1800 and 2100 MHz; the midpoint of 1400 MHz and 3500 MHz as a proxy for 2600 FDD; and 3500 MHz as a proxy for 2600 TDD.*

4.2 Alternative benchmarks: UK annual fees and Swiss 2019 reserve prices

As a benchmark for market price, we recommend ComCom consider the 2025 UK Review of Annual Licence Fees (ALFs).[7] In the United Kingdom, once the initial 20-year term of a mobile spectrum license expires, licenses are subject to automatic renewal with annual fees based on a "*conservative estimate of the full market value*". Full market value is set with reference to UK and European benchmark prices for equivalent spectrum. Rather than take a simple average of observations, Ofcom assesses the quality of each benchmark, taking account of differences in local circumstances to arrive at a preferred estimate of market value.

UK ALFs were originally set in 2018 (900 MHz and 1800 MHz) and 2021 (2100 MHz) but all were revised downwards in 2025. In Table 5, we show both the historic and updated values of ALFs converted to CHF and adjusted for a 15-year license term.[8] We note that Ofcom's revised estimate of full market value for spectrum is significantly below the proposed portfolio price and below or equal to the reserve price for other spectrum for all bands. Our view is that ComCom should not be setting any auction reserve prices above the UK price for renewing spectrum.

Also, in Table 5, we compare the prices in the Consultation to Swiss reserve prices from the 2019 auction. Here, we adopt the NERA methodology (see Section 6.2 of their White Paper in Annex I) to infer benchmark reserve prices for bands in this auction based on equivalence to

[7] See, for example, Ofcom, Annual licence fees for 2100 MHz spectrum, Para 5.4, p. 39, available here.

[8] Note: UK licenses are benchmarked against a 20-year term, so we have adjusted them down to compare against Swiss prices for a 15-year license,

bands in this auction. We observe that 2019 prices were set conservatively, being below the updated UK ALFs. We agree with NERA that setting reserve prices for this auction at equivalent levels to the past auction is a prudent and fair approach, and one that would promote regulatory consistency.

***Table 5**: Consultation reserve prices compared to European benchmarks for reserve prices (CHF, Price/MHz/pop)*

	CONSULTATION RESERVE PRICES		**UK ALF LUMP SUM PRICES***		**SWISS RESERVE PRICES**
Band	Portfolio spectrum	Other spectrum	Historic pre-2025 prices	Updated 2025 prices	2019 award
800	0.31	0.26	0.33	0.22	0.20
900	0.31	0.26			
1800	0.21	0.17	0.24	0.17	0.10
2100	0.21	0.17	0.18	0.16	
2600 F	0.10	0.09	NA	NA	0.05
2600 T		0.09	NA	NA	0.01

***Notes:** * We take the UK Lump Sum Values for the relevant bands on a price per MHz-Pop basis, adjusted to CHF and a 15-year license term.*

4.2.1 Premium for portfolio prices should only be applied if reserve prices are reduced substantially

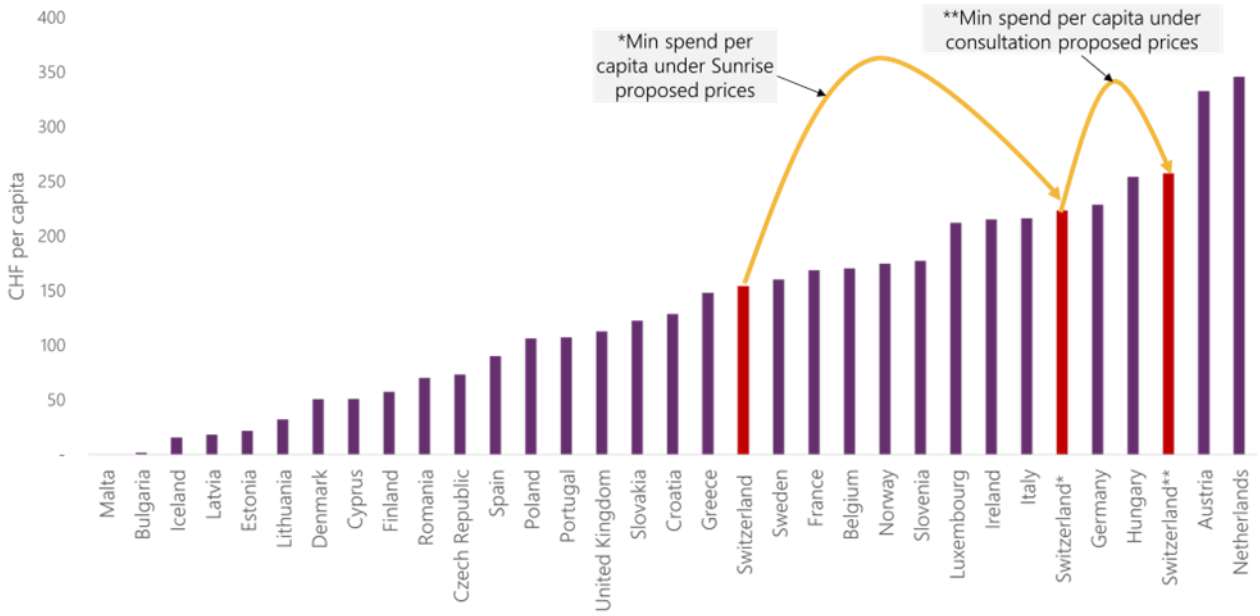
If prices are reduced as proposed here, setting a modest premium for spectrum in the portfolio package would no longer be harmful. We recognize that (absent new entrant competition) the portfolio provides a de facto partial renewal and that the associated certainty has value to MNOs. Furthermore, for the portfolio stage, competition is unlikely, so it is less important to allow for price discovery. As set out at the start of this section, our proposed reserve prices for the portfolios are based on UK estimates of full market value and our proposed reserve prices for additional spectrum are based on equivalent prices from the Swiss 2019 auction.

If, instead, prices are maintained at or close to the level proposed in the Consultation, then we petition ComCom to reduce the portfolio prices to the same level as the reserve prices. At these high prices, there is a significant risk that the portfolio prices are above final market prices and unfairly extract revenues from the industry. Moreover, lower portfolio prices are pro-competitive, as smaller, budget constrained bidders will have more money remaining to compete in the main auction for additional spectrum.

4.2.2 *Left unchanged, the financial burden on mobile operators of the reserve prices proposed in the Consultation would likely have adverse impact on the market post-auction*

Under ComCom's proposals, the mobile industry would face a collective obligation of at least CHF 919.4m. Under our proposals, the minimum obligation would be CHF 616.8m. These are very large sums, sufficient to place a financial burden on smaller MNOs. As an illustration of their magnitude, consider Figure 3. This shows total spend per capita on mobile spectrum from 2008 onwards for our sample of European countries. Observe that Switzerland is already in the middle of the range before this auction. Now consider the impact of adding the reserve prices proposed in the Consultation for this award. Switzerland would leap to third place for highest spectrum burden, behind only Austria and Netherlands, where operators were hit by exceptionally high and unusual 4G auction prices. If our recommended prices are adopted instead, Switzerland would still rise to the upper end of the table (and may rise higher owing to competition in the auction), but the burden is less extreme.

***Figure 3**: Switzerland's spend per capita in auctions would rank among Europe's top three if consultation prices are adopted*



***Notes:** Based on 159 spectrum awards from 31 European countries. For each country, we sum all auction headline revenues (excluding annual fees) since 2008 and divide by its 2025 population. Totals are converted to CHF using the June 2025 USD/CHF exchange rate.*
***Source:** NERA Gigabase of Spectrum Prices and Holdings.*

ComCom is mandated to promote allocative efficiency and downstream competition; revenues generation should be secondary goal. As many studies have shown, attempting to extract too much money from the industry only serves to weaken investment and downstream competition.

A recent report[9] by the consulting firms, Aetha and NERA, submitted by Telstra to the Australian regulator ACMA in the context of a consultation on setting spectrum renewal fees, helpfully surveys the literature on this topic:

> "Many industry studies in recent years have highlighted the link between high spectrum prices and lower investment and weaker downstream price competition:
>
> - The GSMA have published multiple studies that have identified relationships between higher spectrum prices and lower quality networks and reduced take-up of mobile data services owing to reduced incentives for investment, and between high spectrum prices and weaker downstream price competition for mobile broadband data. GSMA (2016), authored by NERA, which looked at mobile sectors worldwide estimated lost consumer welfare with a purchasing power of US$ 250bn across a group of countries where spectrum was priced above the global median.[10] Further studies by NERA for the GSMA looking at European countries (2017) and Latin American countries (2018) made similar observations.[11] And a study by GSMA Intelligence (2019) presents further evidence that "*high spectrum prices can cause negative consumer outcomes, including lower coverage levels and slower data speeds*".[12]
> - Several publications have specifically criticized the UK policy of setting spectrum renewal prices based on an estimate of full market value, on the basis that such charges are not necessary to promote efficient use, have extracted too much money from an industry, and have diverted funds from infrastructure investment. Analysys Mason (2023), writing with Professor Martin Cave, found that the basic philosophy articulated in the Cave report[13] did not support the continued use of spectrum pricing (ALFs) in its current form.[14] And Temple and Webb (2024) say that, for the UK mobile sector, "*Pricing should have been a transitory tool, used as markets were becoming established and then removed. Instead, it became a permanent feature, likely inhibiting economic gains. There is no evidence that it has or could incentivise more efficient use of the mobile spectrum in use today, although very different versions of pricing may have roles in other areas.*"[15]

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[9] Aetha Consulting and NERA (October 2024), Setting Prices for Expiring Spectrum Licences in Australia, submitted by Telstra to the ACMA, filed under "supplementary material from stakeholders: Telstra – ESL – supplementary information 3.pdf", available here.

[10] GSMA (2016), p.1.

[11] GSMA (2017), Effective Spectrum Pricing in Europe: Policies to support better quality and more affordable mobile services; and GSMA (2018), Effective Spectrum Pricing in Latin America: Policies to support better quality and more affordable mobile services.

[12] GSMA (2019), The impact of spectrum prices on consumers, p2.

[13] The Cave Report was a report commissioned by the UK government entitled Review of radio spectrum management, led by Professor Martin Cave, which played a key role in shaping the market mechanisms, including spectrum pricing, that the government and Ofcom have defined for managing access to licensed mobile spectrum in the UK.

[14] Analysys Mason (2023), p.4.

[15] Temple, S & Webb, W (2024), Emperor Ofcom's New Clothes, p54.

- Various studies have also provided case study examples of mobile market success stories where spectrum prices were low and setbacks where prices were high. While this evidence is more anecdotal, it is often compelling. For example, Coleago (2024) highlights the relative success of the mobile sector in Finland, where consumer prices are low, usage is high and investment is strong, and link this to government policies that have resulted in very low mobile spectrum fees.[16] In contrast, Myers (2013), a former chief economist at Ofcom, highlights examples of auctions in India and Australia where excessive reserve prices caused "*valuable spectrum"* to be *"left unsold and not brought into productive use to benefit the public and the economy*."[17]"

Aetha and NERA conclude that "*[t]hese many studies all point to a strong case for the ACMA to set modest prices to ESL renewals*." For the same reasons, we believe there is an overwhelming case that it is in the public interest for ComCom to adopt a conservative pricing strategy, which requires setting reserve prices much lower than proposed in the Consultation.

4.3 Extended payment terms

In addition to lower reserve prices, we request that ComCom provides an option for bidders to spread license payments across the lifetime of the license. Such an option could greatly reduce the financial strain on operators from having to pay for such a huge volume of spectrum in one year. An option to spread payments would particularly benefit Sunrise and Salt, who have lower financial strength than Swisscom, and therefore receive less favorable financing terms. This would make us more competitive in the auction and free up funds to invest in our network, thereby making us more effective competitors in the downstream market.

In the case of a 20-year license (as requested below), we would request an option to divide this into twenty equal payments. The first payment would be within 30 days of the start date of the licenses (i.e. 1 January 2029), with further payments due on each anniversary. For payments after year 1, we recognize that it would be reasonable for the Government to apply an interest rate. [… ✂ …]

Many other countries in Europe and elsewhere have embraced deferred payment terms, for example:

- France's 2020 Award of the 3.4–3.8 GHz band allowed winning bidders to spread the mandatory €350 million payment for a 50 MHz block payment in Stage I over 15 equal annual instalments, while any fees due for additional spectrum won in Stage II and for assignment position were payable in 4 annual instalments.
- Greece's 2020 Multi-band Auction offered bidders a choice between full upfront payment or paying 30% upfront and the remaining 70% through nine annual instalments, with interest tied to the Greek government's twelve-month treasury bills.
- Hong Kong's 2024 6 GHz Band Award gave licensees the choice to pay the full fee upfront or to pay the fee annually in 15 instalments. In the latter case, the first payment

[16] Coleago (2024), p.14-15.

[17] Myers, G (2023), Spectrum Auctions, p.5. He refers to six of the last seven auctions in India between 2010 and 2021, and to the 2013 Australian 4G auction, where the responsible minister intervened to increase reserve prices.

was 1/15th of the license price, with subsequent payments increased by 2.5% per annum.

- Ireland's 2022 Multi-band Spectrum Award, auction fees for the 5G auctions were split into a lump sum payment (40% of auction price) and annual instalments (the remaining 60%).
- Romania's 2022 5G Award requiring fees to be paid in eight instalments between 2022 and 2028, with specific annual amounts set in the award decision.
- Spain's 2018 3.6 GHz Auction stretched payments across 20 years in instalments, where the cumulative payment including interest grew from an initial €437.6 million to €542.1 million over the full term.

For avoidance of doubt, we are requesting that ComCom implement a deferred payment option as an addition to and not a substitute for our proposed reduction in reserve prices. Together, these measures would greatly improve the affordability of the available spectrum for smaller mobile operators.

4.4 Longer license duration

Since the 3G era, licenses in Switzerland have had a duration of 15 years. We think it is time for ComCom to revisit its approach, which has not been updated to take account of the latest industry thinking. Many leading regulators worldwide are adopting longer license terms to provide greater certainty for operators that are investing in next generation networks tied to specific frequency bands. The European Commission is a strong supporter of this approach. For the European Telecoms Code, it initially proposed a minimum license term of 25 years to increase the security of operators' investments. [18] Although the final text only provides for a minimum term of 15 years [19], the norm across Europe for new license awards is now at least 20 years, consistent with recommendations in the Draghi Report.[20]

Deploying new mobile networks involves significant upfront costs for spectrum acquisition and infrastructure development. Therefore, operators require sufficient time to recover these investments and plan for network upgrades. For any band where operators are in the process of deploying new technology, a term of 20 years or more is appropriate. Accordingly, we request that ComCom adopt 20-year licenses for the 1800 MHz, 2100 MHz and the 2600 MHz bands, all of which will be transitioned to 5G over the next ~8 years.

For the 800 MHz and 900 MHz bands, we see two viable approaches. Our preferred approach, discussed in Section 3, is a short-term extension of existing licenses to 2034 to align with expiry of the 700 MHz band, and a shift to 20+ year licenses from then on. This alignment would allow for an efficient, pro-competition allocation of low-band spectrum and may facilitate trading in the interim period. In our opinion, these advantages outweigh the benefits of granting longer licenses now. If instead, ComCom prefers to award full term licenses for 800 MHz and

[18] European Commission (2024), How to master Europe's digital infrastructure needs?

[19] Crowell, "The European Union Adopts a New Telecoms Code", https://www.crowell.com/en/insights/client-alerts/the-european-union-adopts-a-new-telecoms-code.

[20] Mario Draghi (2024), The Draghi Report: A competitiveness strategy for Europe (Part A), p. 74.

900 MHz, the term should be much longer than 15 years. Otherwise, ComCom will perpetuate an inefficient cycle of awarding 700 MHz at a different time to substitute bands.

A shift to longer licenses could also be a way of easing the long-term price burden on operators, especially if implemented alongside a reduction in reserve prices and an option for deferred payment.

Of course, longer license durations benefit consumers only if the licenses are allocated in an efficient pro-competitive way. For this reason, it is essential that this change be introduced in the context of other remedies that protect against bad outcomes, such as Swisscom winning an unduly large share of critical spectrum. Otherwise, longer licenses could lock in an anti-competitive spectrum allocation.

5 Other changes that would improve the award design

In this section, we provide comments on the proposed structure of the award, including the available spectrum, spectrum caps, the proposed stages, and the approach to assigning frequencies to winning bidders. Our detailed comments on the auction design are provided separately in Section 6.

Our key points are:

- We support ComCom proposals for the available spectrum and associated lot structure, although (as discussed in Section 2), we prefer that the low-band spectrum holdings should be extended to align with expiry of the substitutable 700 MHz spectrum, as this approach would better meet ComCom's five core principles.
- ComCom should include the unsold 1400 MHz spectrum in the auction.
- There should be a low-band cap that considers the existing holdings of each operator, including 700, 800 and 900 MHz. Notwithstanding this ask, we much prefer an in-auction cap of 50 MHz for 800 MHz and 900 MHz to no cap or higher caps.
- We object to the FDD cap because it is too permissive and could enable outcomes that would leave one or two MNOs with severe capacity constraints and diminish downstream competition. We propose that the FDD cap is replaced by a series of caps, on overall spectrum holdings (including 700, 1400 and 3500 MHz), and on mid-band FDD spectrum in the auction, that prevents any single operator from securing too large a share of spectrum.
- We support the proposed auction structure, consisting of an application stage, two-stage allocation process, and an assignment stage. We particularly welcome the adoption of a two-stage allocation process, as this provides some protection for smaller bidders against anti-competitive outcomes (although as discussed in Section 4, we think the spectrum portfolios could be structured differently).
- We request that ComCom revisit its approach to the Assignment Stage, for reasons explained below.

5.1 Spectrum availability

We propose modest changes to spectrum availability. We support the proposed lot structure.

We propose that unsold 1400 MHz spectrum be made available in the auction

ComCom proposes to include in this award only the spectrum associated with licenses expiring in 2028. We are surprised that there is no discussion of whether it is timely to include other spectrum in the award.

There are two categories of other spectrum that ComCom might have considered for allocation in this award:

1. Existing spectrum that is unallocated, namely the remaining 15 MHz block in the 1400 MHz band that was not sold in the 2019 auction.
2. Future bands, such as mmWave and 6 GHz.

Sunrise recommends inclusion of the unsold spectrum at 1400 MHz. This could be made available as a single block of 15 MHz, with an eligibility of 2 points and a reserve price unchanged from the 2019 auction. This would provide an additional option for all bidders in the auction to expand their spectrum holdings.

With respect to future bands, we think it would be premature to include them in the auction. The ecosystem for mmWave spectrum remains immature, and the business case for deployment is uncertain. A delay in allocation until there is more certainty would be prudent. Regarding 6 GHz, this could be a very important capacity band in the future, but there is no mobile ecosystem yet and discussions across Europe are still ongoing regarding the specific frequencies that will be available. In Switzerland, there will need to be reforms to the emission limits at cell sites to ensure the band is viable, and this will require public consultation that is best conducted in a separate process.

We support ComCom proposals on lot structure

ComCom proposed to package all FDD bands into lots of 2x5 MHz. We support this approach. A 2x5 MHz lot is the standard base unit for constructing larger contiguous blocks of spectrum for 4G and 5G deployments, so this approach gives bidders appropriate flexibility. We note that the clock auction rules also allow bidders to target larger blocks of spectrum without the risk of winning an unwanted subset. Accordingly, there is no need for larger units.

We support the small change to the 2600 MHz band structure, providing an additional FDD block and a small reduction in TDD spectrum. This aligns Switzerland with standard practice across Europe.

With respect to the 2600 MHz TDD band, the proposed units are two blocks of 20 MHz. We also support this approach. We see no possibility of viable deployment for a smaller unit so units of 10 MHz or less would be inappropriate. Meanwhile, the auction rules provide protection for a bidder that requires a minimum of 40 MHz, while leaving open an option for two bidders to acquire 20 MHz each if this is efficient.

5.2 Spectrum caps

Spectrum caps are an important part of the toolkit for avoiding bad allocation outcomes. As 700, 800 and 900 MHz are interchangeable in a modern 5G network, the low-band cap should consider all these bands. The proposed FDD cap is much too high and could permit outcomes where one party (Swisscom) secures half of the available spectrum, with *grave* implications for downstream competition. This cap should be reduced and restructured.

There should be a low-band cap that considers holdings of all low-band FDD spectrum

ComCom has proposed an in-auction cap of 50 MHz across the 800 MHz and 900 MHz bands, which limits each bidder to at most 5 lots in the auction. While we appreciate the inclusion of a separate low-band spectrum cap, this cap is inconsistent with basic competition policy principles and practice, in part because it is unfair to Salt and Sunrise which start the auction with one and two lots less spectrum at 700 MHz respectively than Swisscom. The rule precludes these operators from attempting to match Swisscom's frequency advantage. On the other hand, if only three MNOs bid, the cap prevents Swisscom from pursuing an increase in its holdings and ensures that each MNO will win at least 3 lots. Therefore, while we disagree with this approach on principle, we favor an in-auction low-band cap of 50 MHz over no cap because of

the pro-competitive benefits of denying options for a single MNO to foreclose rivals. The NERA White Paper (Section 3.2) explores the critical importance from both a technical and competition perspective of MNOs having at least 50 MHz of low-band spectrum across the 700, 800 and 900 MHz bands. NERA also identifies academic research that demonstrates the critical importance of ensuring that the allocation of low-band spectrum is not unduly asymmetric. For example, Ershov and Salant (2025) show that consumer prices are higher and investment incentives are reduced in markets where low-band spectrum shares are unbalanced. There is a case to be made that Swisscom's existing 80 MHz low-band holding is already too high, so rules that prevent it from increasing its low-band spectrum share are clearly necessary. The in-auction cap of 50 MHz delivers this.

A better approach, either as a replacement or supplement to the in-auction cap, would be a low-band cap that includes existing holdings. We recognize, however, that this would work best in the context of an auction that also includes 700 MHz (and perhaps, in the future, 600 MHz). Such a cap would work best if ComCom accepts our major remedy #1 and moves to align expiry dates of 700, 800 and 900 MHz.

The FDD cap is too permissive and should be replaced by a series of caps that prevent any single operator from securing too large a share of spectrum

ComCom has proposed an in-auction FDD cap of 270 MHz (27 lots), inclusive of any spectrum acquired in the portfolio stage. As we discussed in Section 2, this cap is too high and would allow exceptionally asymmetric distributions of spectrum across Switzerland's three operators. Realistically, the only bidder with the financial clout to exploit the upper reaches of this cap is Swisscom. The cap would, for example, permit it to acquire 50 MHz at 800/900 MHz, 110 MHz @ 1800 MHz, 100 MHz @ 2100 and 10 MHz at 2600 MHz FDD, as well as the entire 2600 MHz TDD band (as TDD spectrum is outside the cap). We appreciate that ComCom may view the likelihood of such an extreme outcome as low, given that we and Salt may reasonably be expected to fight to keep our businesses alive and Swisscom may shy away from the cost of trying to handicap its rivals so severely, but why would a regulator even want to allow the auction to explore such an obviously anti-competitive allocation?

More generally, we have the following concerns with the FDD cap:

1. It would allow a single bidder to acquire too great a share of the critical 1800 MHz and 2100 MHz bands.
2. It allows a single bidder to dominate mid-band FDD spectrum and also buy the 2600 TDD band, which could otherwise provide a substitute option for other bidders to expand capacity.
3. It allows a single bidder to acquire too much spectrum overall. Considering holdings of spectrum not in the auction, the cap would permit Swisscom to acquire over 50%[21] of total mobile spectrum.

Switzerland already has the most asymmetric distribution of radio spectrum amongst MNOs in Europe (see Figure 1 in Section 2). This auction should be designed in a way that explores

[21] The cap would permit Swisscom to acquire 510 MHz, against 505 MHz for Salt and Sunrise combined. Note, we exclude Sunrise's 700 MHz SDL spectrum as this is currently unusable owing to lack of ecosystem and the unsold 15 MHz in the 1400 MHz band.

paths to less asymmetric outcomes. It should not be exploring outcomes that could meaningfully increase spectrum asymmetry. Even small increases in Swisscom's spectrum holdings would lead to adverse increases in concentration.

[… ✂ …]

Our understanding is that Swisscom is not currently using or otherwise underutilizing a significant amount of spectrum, including the entire 2600 MHz TDD band. Moreover, to allow the possibility of market concentration to decrease, it is essential that the non-dominant carriers are realistically positioned to acquire at least as much spectrum as they currently have; even if this requires intervention that limits scope for in-auction competition.

In short, spectrum asymmetries contribute to market share asymmetries. This point has been recognized in some academic studies. Elliott et al (2025), Peha (2017) and Ershov and Salant (2022) all show that spectrum asymmetries tend to increase concentration in the market and harm welfare.

To address these concerns, we propose that the in-auction FDD cap be replaced with a series of caps that foreclose obviously undesirable outcomes that would exacerbate spectrum asymmetry and potentially weaken downstream competition.

Specifically, we propose the following caps:

- Total spectrum: 455 MHz (all mobile spectrum below 4 GHz, including the 700, 1400 and 3500 MHz bands);
- Lower mid band: 2x30 at 1800 MHz and 2x25 at 2100 MHz; Mid band FDD: 2x95 MHz across the 1800, 2100, 2600 MHz bands.

These proposals are consistent with the analysis and recommendations in the NERA White Paper. These caps are unlikely to place any relevant constraints on Salt or Sunrise, given their very modest spectrum portfolios relative to Swisscom's. The caps would constrain Swisscom from expanding but would allow it to win back its existing portfolio as well as provide it some flexibility to reconfigure its spectrum across bands.

The suggested total spectrum cap would preclude Swisscom from expanding its total spectrum holdings. For reference, 455 MHz is equivalent to 45% of all allocated and usable Swiss mobile spectrum[22], which we consider a more than generous limit for any one operator in a 3-player market on competition grounds. In our view, there is a strong economic case for a much tighter cap. Our view, supported by academic evidence discussed in Section 2, is that, in a three-player market, downstream competition is enhanced if operators have nearly equal spectrum holdings and certainly no more than 40% of total spectrum. Nevertheless, based on precedent, we would not oppose a cap that allows all existing operators, including Swisscom, to target an auction outcome in which they win back their existing holdings.

The other caps would place constraints on Swisscom's flexibility to expand its holdings in specific FDD bands, so as to ensure it cannot foreclose competitors. As addressed in Sections 2.3 and 3.3 of the NERA Report, all three MNOs are very dependent on access to one or both of the 1800 and 2100 MHz bands for 4G and 5G capacity, and on the 2600 MHz for incremental 4G capacity in urban high-traffic areas. If one operator is allowed to buy too much spectrum in

[22] Calculated on same basis as footnote 21.

these bands, this may result in one or two rivals being left with capacity constraints, thereby constraining their ability to compete for new customers in the downstream market. Realistically, no operator is Switzerland can build their way out of such a constraint, owing to planning and emission restrictions.

Overall, we think these measures are prudent given our observation that spectrum asymmetries in Switzerland are more pronounced than in any other European three-player market, and Swiss operators face greater regulatory constraints on their ability to densify their networks to compensate for having less spectrum.

5.3 Award structure

We support the proposed four-phase structure for the auction, as described at Paragraph 1.1.3 of the Consultation, namely:

1. an **application phase** which determines the participants in the remaining phases;
2. a **spectrum portfolio bidding phase** (if required) in which bidders that have applied for a spectrum portfolio can bid for being assigned a spectrum portfolio, using a clock auction format;
3. a **bidding phase for additional spectrum** (if required) in which bidders submit bids for the frequency blocks (lots) available after any assignment of spectrum portfolios, using a clock auction format; and
4. an **assignment phase** in which specific frequencies within the respective bands are assigned to the winners of frequency blocks.

We observe that stages 1 through 3 in combination may be characterized as a "two-stage auction", in which allocation is determined over two stages, one involving packages (portfolios) of spectrum and the second involving competition for the remaining spectrum in lots. The structure is similar to that described by DotEcon in their recent paper[23] and proposed by NERA in Section 5 of its White Paper. We note that two-stage allocations have been adopted in several European countries with satisfactory outcomes, so we are not concerned that this approach has not previously been used in Switzerland.

We support having a portfolio stage because it ensures a certain minimal level of spectrum in key bands for three MNOs, which is helpful for ensuring continuity in deployed equipment and protecting against anti-competitive outcomes. However, as NERA points out, for a two-stage auction to be effective, the regulator must find an appropriate balance between spectrum available in each stage. The Stage 1 package must be large enough to ensure that at least three MNOs have a critical mass of spectrum to be effective competitors post-auction. We share NERA's opinion that a critical mass should include both spectrum necessary for immediate network continuity and a quantity of MHz in both low and mid bands sufficient to ensure that Salt and Sunrise will not be exposed to future capacity constraints when competing for customers. Absent such capacity, neither Salt nor Sunrise can effectively compete; Swisscom would not be constrained by price or quality as its rivals would not be able to add more customers.

[23] DotEcon perspectives, Stirred, not shaken: a recipe for reassigning spectrum, 2025. Available at: https://www.dotecon.com/wp-content/uploads/2025/02/Stirred-not-shaken.pdf

ComCom's portfolios are too small to provide this certainty. It seems that, in setting the portfolios, ComCom opted to allow potentially more spectrum in the additional auction than is optimal. While it is understandable that ComCom would like to promote competition in the auction stage, not including enough spectrum in the portfolios can undermine the rationale for the portfolio which is to ensure at least three viable competitors post-auction.

The portfolios also ignore the gross asymmetry in MNO low-band holdings outside the auction, with Sunrise having just one 700 MHz lot, Salt two and Swisscom three. In summary, the proposal is better than having no portfolio phase, but the design could be improved by adopting either of our proposals in Section 3, namely extending low-band licenses or enlarging the portfolios and adapting them to take account of holdings of substitutable spectrum outside the auction.

We agree with the proposal to use the application round as a de facto "round zero" for the two allocation phases, eliciting the level of demand for portfolios and for additional spectrum at the opening prices. We are also comfortable with the provisions to cancel one or both of the bidding phases if there is no excess demand.

We also support the proposal initially to allocate spectrum as generic frequencies and then to use an assignment phase to determine spectrum frequencies, with a guarantee that all assignments within each band will be contiguous. However, we do not agree with the proposed rules for determining the bid options in the assignment round. We set out alternative proposals in Section 6.

Sunrise

6 Other changes that would improve the auction design

In this section, we provide comments on the auction rules for the three stages of the auction that may involve bidding.

Our key points are:

- We accept the adoption of a clock auction for the Portfolio Phase if competitive bidding is necessary. We support the adoption of a clock auction for the Additional Spectrum Phase if competitive bidding is necessary.
- We propose a modest but important change to the activity rules for the Additional Spectrum Phase: each bidder should be allowed exactly 2 spare eligibility points, rather than 5% of their activity. This is to avoid asymmetric treatment of bidders bidding above or below 20 eligibility points in the auction.
- We propose a change to the pricing rule for the Portfolio Phase. We accept the pricing rule for the Additional Spectrum Phase but request that the auction be run with small bid increments. We propose a cap on bid increments of the lower of 5% of the previous round price and 10% of the reserve price for each band.
- ComCom does not detail what information is released to bidders at the various stages between the Application Phase and the start of Additional Spectrum Bidding Phase. We propose an approach consistent with the spirit of ComCom's rules.
- For the Assignment Phase, we propose provision for winning bidders to negotiate with each other regarding the placement of their frequencies.

6.1 Clock auction formats for allocation phases

We agree with the adoption of clock auction formats for the portfolio and additional spectrum phases subject to our comments here.

We accept the adoption of a clock auction if competitive bidding is necessary for the portfolio phase.

ComCom proposes a simple clock auction with exit bids for the spectrum portfolio bidding phase. In practice, we do not expect that this phase will be required, as we doubt the existence of a viable business case for the portfolios at the proposed prices beyond the three MNOs. We also question the merit of allowing competitive bidding for the portfolios, given the potential disruption to downstream competition if any existing MNO failed to secure a portfolio. Notwithstanding this point, if a competitive bidding structure is required, we have no objections to the use of a clock auction.

We support the adoption of a clock auction if competitive bidding is necessary for the additional spectrum phase

ComCom's proposed rules for the clock auction for additional lots are necessarily more complex than for the portfolio stage, as there are multiple categories and bidders may require flexibility to switch demand between categories in response to evolving prices. The proposed clock auction design with exit bids is similar to that used for the Swiss 5G auction in 2019. That format worked reasonably well, affording bidders significant flexibility to adapt their demand over the auction. Such flexibility will be even more important in this auction given that some bands are

close substitutes and that bidders may have demand for minimum quantities (or otherwise want zero) to justify investing in deploying a band. Accordingly, we support the proposed format.

6.2 Activity rules

We propose a modest but important change to the activity rules. The rules state that "In each round, the activity associated with a bid must not exceed the bidder's eligibility at the start of the round by more than 5%, measured in terms of eligibility points rounded up to the next whole number." We propose this be amended to read "In each round, the activity associated with a bid must not exceed the bidder's eligibility at the start of the round by more than 2 eligibility points." [… ✂ …]

ComCom proposes an eligibility points regime in which low-band lots – 800 and 900 MHz – have a higher weighting (3 points per 10 MHz) than lower mid-band – 1800 and 2100 MHz (2 points) which in turn have a higher weighting than the 2600 MHz bands (1 point). We are comfortable with this approach which loosely reflects common wisdom regarding the valuation hierarchy across the bands. However, as ComCom implicitly recognizes in its proposal to adopt a flexible activity rule, this approach does have a potential drawback – it may unduly constrain bidders in their ability to switch between bands with different weightings.

We agree that this concern can be adequately addressed by allowing each bidder some modest flexibility each round to switch to a selection of lots with higher points value than their current activity. The rules provide 5% flexibility. In the context of this auction, we do not agree with the use of a percentage to measure flexibility. ComCom should instead adopt a fixed number of points.

The problem with using a percentage to measure flexibility in that it creates an arbitrary inflexion point for bidders:

- Any bidder active on a selection of lots rated at 20 points or higher will have flexibility to bid 2 eligibility points above their activity.
- Any bidder active on a selection of lots rated at 19 points or less will have flexibility to bid only 1 eligibility point above their activity.

It so happens that in order to win back their existing holdings (assuming that all three bidders take up a portfolio), Swisscom would need to bid for lots rated at 33 points.[24] In contrast, to win back their existing portfolios, Sunrise would each need to bid for lots rated at only 18 points[25], and Salt 17 points[26]. Even allowing for some variance in bidders pursuing larger or smaller targets, the likely consequence of these rules is that Swisscom will always enjoy 2 points of flexibility, whereas at least one and possibly both of Salt and Sunrise may at some

[24] Swisscom: 3x Low-band (9pts) + 4x 1800MHz (8 pts) + 5x 2100MHz (10 pts) + 2x 2600MHz FDD (2 pts) + 2x 2600 MHz TDD (4 pts) = 33 pts.

[25] Sunrise: 3x Low-band (9pts) + 2x 1800MHz (4 pts) + 1x 2100MHz (2 pts) + 3x 2600MHz FDD (3 pts) = 18 pts.

[26] Salt: 1x Low-band (3pts) + 3x 1800MHz (6 pts) + 3x 2100MHz (6 pts) + 2x 2600MHz FDD (2 pts) = 17 pts.

point in the auction be reduced to only 1 point of flexibility. This would position Swisscom with a strategic advantage over its smaller rivals.

[… ✂ …] Fortunately, there is an easy fix. Simply amend the rules, as we propose above, so all bidders have 2 points of flexibility regardless of their activity level. This would provide a more level playing field.

[… ✂ …]

6.3 Pricing rules

We propose a change to the pricing rule for the Portfolio Phase. We accept the pricing rule for the Additional Spectrum Phase but request that the auction be run with small bid increments. We propose a cap on bid increments of the lower of 5% of the previous round price and 10% of the reserve price for each band

All winning bidders in the portfolio phase should pay the same price, set equal to the highest losing bid

In the unlikely event of competitive bidding in the portfolio phase, the rules state that winning bidders must pay the amount of their final round bid, which could be a clock bid (according to paragraph 3.7.1) or an exit bid (according to paragraph 3.7.2). This introduces the possibility that winning bidders could end up paying different amounts for identical portfolios, and that some or all winning bidders may have to pay more for a portfolio than the highest losing bid. We object to both possibilities on principle. Such outcomes are unfair. Moreover, this approach is inconsistent with ComCom's commitment to promoting allocative efficiency which is most likely to be achieved by promoting valuation-based bidding because it departs from the "second price" principle in auction design.

We propose instead that all winning bidders should pay the amount of the highest losing bid (or the reserve price if there is no such bid). In a competitive process, this will be the exit bid of the strongest losing bidder. This rule change is consistent with the "second price" principle in auction design. Analogous to a single unit sealed bid with a second price rule, setting the payment to be equal to the exit bid of the highest loser ensures that bidders are incentivized to continue bidding until either they win or reach the limit of their willingness to pay. Without such a rule, bidders have incentives to attempt to game the situation, placing exit bids below the clock price if they anticipate that the auction is about to close. We recognize that with modest bid increments, such a deviation from straightforward bidding is risky, but ComCom should not be relying on risk to deter such behaviour when there is a simple fix to the pricing rule available.

Note, we recognise that the 2nd price analogy does not apply perfectly to the Additional Phase, so we are proposing this change only for the Portfolio Phase.

The proposed auction format will work best if bid increments are small, ideally not above 5%

ComCom states in clause 3.2.2 that "*The auctioneer will determine the price increments in such a way as to ensure an orderly and speedy conduct of the auction. However, the clock price will not rise by more than 15% from one clock round to the next.*"

We believe a 15% cap on increments is far too high for this auction, given the high starting prices and a clock auction format in which prices of all lots in the same category rising each

round there is excess demand. With 15% increments, prices can double in just 5 rounds, which could happen in rather less than one day. This is too fast from a governance perspective. It could also lead to excessive price growth in situations where there is little or no aggregate excess demand but bidders are determining which bands they prioritize for larger contiguous blocks.

In practice, we think bid increments closer to 2% would be appropriate, but we accept the Auctioneer should have some flexibility. We therefore propose that bid increments each round be capped at the lower of 5% of the previous round price and 10% of the reserve price for each band.

6.4 Information policy

ComCom does not detail what information is released to bidders at the various stages between the Application Phase and the start of Additional Spectrum Bidding Phase. To allow bidders to prepare for the Bidding Phase we request the following information:

1. After the Application Phase:
    a. the number of qualified bidders;
    b. the number of qualified bidders that have applied for portfolios;
    c. aggregate demand across all bidders at application; and
    d. an announcement as to whether the (i) the Portfolio Bidding Phase; and (ii) the Additional Spectrum Bidding Phase will be required.
2. After the Portfolio Bidding Phase (or after the application stage if no Portfolio Bidding Phase is required):
    a. The number of lots available in each category in the Additional Spectrum Bidding Phase.

It is important that bidders receive this information well ahead of the start of each phase so we can adapt our bid strategy accordingly. We propose a minimum period of 1 working day (24 hours) between each announcement and the start of the next phase.

In addition, we request that ComCom clarify whether the application bid in any way constrains bidders in the Bidding Phase for additional spectrum, other than maximum eligibility. For example, if a bidder has 2 lots at 800 MHz and 2 lots at 900 MHz in its Application Bid, can such a bidder bid for 1 lot at 800 MHz and 3 lots at 900 MHz in the Bidding Phase for additional spectrum, should this spectrum be available? Our interpretation of the rules is that there are no such restrictions, and we support this interpretation.

Finally, we support ComCom's proposal to reveal exact aggregate demand (positive and negative) for each category after each bidding round during the Additional Spectrum Bidding Phase. This strikes the right balance between providing adequate information for price discovery and limiting scope for gaming tactics.

6.5 Assignment phase options and bidding rules

For the assignment phase, ComCom has proposed an orthodox second price sealed bid auction process. This has been used before in Switzerland and widely used by other European

regulators. It provides a reasonably straightforward and quick process to assign contiguous frequencies to winning bidders in each band. This format is understood to be effective in situations where bidder preferences for frequency position are driven entirely by technical factors and their preferences across positions are modest. However, in the context of this auction, we have concerns with the use of this format and propose an adaptation to the rules to address our concerns.

Our concerns with this format in the context of this award are two-fold:

1. Bidders may have preferences to be adjacent to a specific bidder in order to facilitate options for site sharing and/or future spectrum trades. The rules make it impossible for a bidder to express such a preference in an efficient manner.
2. A likely outcome is that MNOs win back existing or similar holdings, in which case they may have preferences to remain in their existing frequency positions to avoid technical costs associated with retuning radios (etc..). The rules do allow bidders to express such preferences but such outcomes could be achieved through negotiations between carriers without the need for the uncertainty of assignment round bidding.

[… ✂ …]

Fortunately, there is an established solution that can address our concerns, pioneered by UK regulator Ofcom for the auction of 3800 MHz spectrum, which was developed to address concerns that bidders would have partner adjacent preferences to facilitate future spectrum trades.[27] In that auction, the regulator ran a standard assignment round but, prior to processing bids, allowed a period for operators to negotiate amongst themselves on frequency preferences. Where operators reached agreement on adjacency, this was factored into the winner determination, with remaining bidders enjoying priority in frequency positioning.

In the context of this auction, we propose the following rules:

1. Bid options are defined in the same way as proposed in the Consultation at Section 5.2.
2. Bidders submit bids in the same way as proposed in the Consultation at Sections 5.3 and 5.4.
3. Following the close of bid submission, there is a period of 5 working days in which bidders are free to negotiate amongst themselves regarding preferred frequency placement. During this period, rules preventing contact and swapping of information between bidders are relaxed, as all bidding is complete and assignment round bids cannot be changed.

   With respect to each band, a coalition of two or more bidders may submit to ComCom:

   - A full adjacency agreement*:* All winning bidders agree on their exact frequency positions in the band, subject to respecting the conditions on contiguous assignments and placement of unsold spectrum.
   - A partial adjacency agreement*:* A subset of winning bidders request to be positioned in adjacent spectrum and specify their preferred order from lowest to highest frequency.

[27] For a description of this process, see: Ofcom (February 2021), Award of the 700 MHz and 3.6-3.8 GHz spectrum bands: Process guidance for potential applicants and bidders in the auction, available here.

For avoidance of doubt, no bidder can participate in more than one adjacency agreement in the same band.

4. After the conclusion of the negotiation period, the Auctioneer proceeds with winner and price determination for each band as follows:
   a. If no agreements are submitted, the winner and price determination process proceeds in the normal way (as described in the Consultation at Sections 5.5 and 5.6).
   b. If a valid full adjacency agreement is submitted for a band, all assignment round bids are discarded. The frequencies are allocated according to the agreement. No assignment round prices apply to the winning bidders.
   c. If a valid partial adjacency agreement is submitted for a band, the assignment round bids associated with the participating bidders are discarded and replaced by zero bids. The winner and price determination process is then run in the normal way subject to the additional condition that the participating bidders must be assigned to adjacent spectrum. As a consequence of these rules, no assignment round price can apply to the bidders in the agreement but they also surrender any preference for position within the band other than the specified partner adjacency.

In the context of the Swiss market, we believe these rules are clearly preferable to the existing rules.

7 Annex: NERA report on re-award of expiring spectrum licences

Please see report from NERA titled "The re-award of expiring spectrum licences in Switzerland" and dated 12 September 2025, appended as part of this submission.

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The re-award of expiring spectrum licences in Switzerland

A NERA report prepared on behalf of Sunrise for submission to ComCom and BAKOM

12 September 2025

PUBLIC VERSION

This report was originally prepared for submission to ComCom and BAKOM, to be read by their staff and their advisors. This version has been prepared for public release. Some content has been redacted at the request of Sunrise.

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This paper has been authored by NERA and represents our independent views on the critical role of the expiring spectrum and its reallocation mechanism for the Swiss telecommunications market. These views may or may not align with the views of Sunrise, who is a financial sponsor to this paper. Our analysis has been informed by discussions with and information provided by Sunrise. For the avoidance of doubt, we have not had any contact with other Swiss mobile operators in developing this report. Any comments we make in this report regarding the situation of Salt and Swisscom are based on our analysis of and inferences from public data and information provided to us by Sunrise.

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Contents

Executive Summary

In 2028, licences for 573 MHz of prime mobile bands across the 800, 900, 1800, 2100 and 2600 MHz bands will expire. This spectrum is currently used by Salt, Sunrise and Swisscom, Switzerland's three mobile network operators (MNOs). As custodians of the spectrum, the Federal Communications Commission (ComCom) and the Federal Office of Communications (BAKOM) must decide whether to renew the spectrum in place or sell new licences through an auction. NERA has been asked by Sunrise to review the role that the bands play in existing mobile networks, examine the impact that changes in holdings could have on downstream competition, and explore the case for renewal or re-auction.

The three key takeaways from our paper are:

1. **This is a high stakes regulatory decision process.** The available spectrum plays an essential role in providing mobile connectivity to the entire Swiss population. Changes in spectrum allocations may result in additional network engineering costs, which are band specific and typically substantial. If an MNO was to lose access to certain frequencies or fail to secure a sufficient MHz quantity, it may experience capacity constraints and network disruption and could even fail.

2. **Competition based on three MNOs is at risk if the reallocation weakens Salt or Sunrise**. These two MNOs have relatively weak spectrum portfolios when compared to Swisscom and European peer operators. If they lose capacity in 2028, their ability to serve existing traffic demand and credibly compete for new customers may be undermined. Salt and Sunrise are at risk because they have so much less spectrum than Swisscom that is not expiring in 2028. And Sunrise is particularly vulnerable to any loss of 900 MHz as it lacks sufficient 700 MHz to provide a credible alternative for wide-area 5G coverage.

3. **A 'standard' one-stage auction with spectrum caps is unlikely to deliver a more efficient outcome than renewal.** Renewal would preserve the existing competitive balance, whereas a one-stage auction is unlikely to make things better and could make things worse. To avoid bad outcomes, an auction must be designed in a way that ensures an outcome with three MNOs each having a pro-competitive allocation of spectrum. It is possible that this could be achieved using a two-stage auction but the design would need to be carefully considered, tested and iterated.

The analysis underpinning these conclusions is set out in our paper and summarized here.

The expiring spectrum plays a critical role in the networks of the three MNOs

Swiss MNOs are presently focused on the transition from 4G to 5G technology, a process that will stretch across expiry in 2028 of the licenses being re-auctioned into the early 2030s. For all operators, the 800 MHz and 1800 MHz bands are currently the most highly utilized bands and play a critical role in supporting 4G traffic. An MNO that lost access to them in 2028 would face significant network re-engineering costs and service disruption to customers while it replanned.

Concurrently, Salt, Sunrise and Swisscom are upgrading to 5G. They need to retain significant capacity across a range of frequency bands with different propagation characteristics to expand 5G network coverage and provide capacity needed to meet the rising data demand. We estimate that each MNO requires a minimum of 2x25 MHz of low band spectrum (including their non-expiring

700 MHz) and 2x50 MHz of mid band FDD spectrum (in addition to their non-expiring 3500 MHz) to manage their traffic load and maintain their current quality of service. Having more spectrum than this would allow each MNO to more easily accommodate future traffic growth and facilitate a smooth transition from 4G to 5G networks.

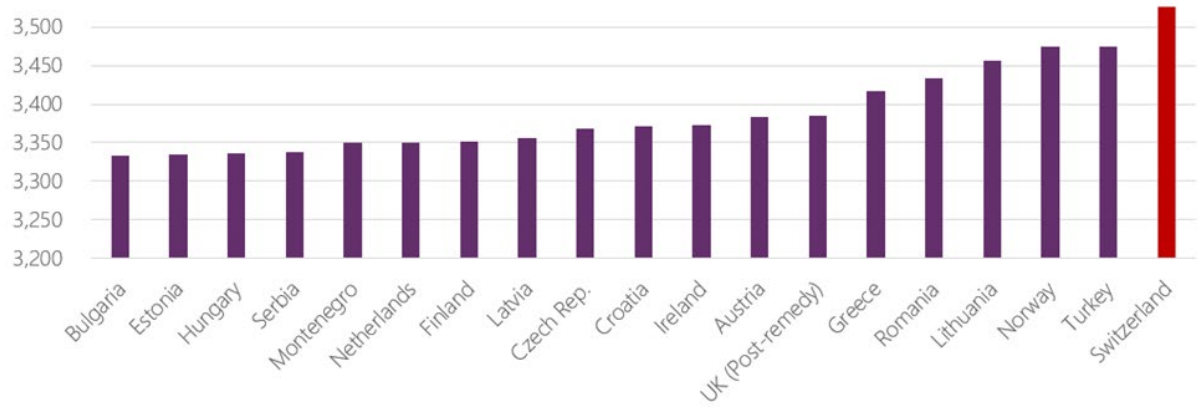
Notwithstanding Swisscom's larger share of consumers, its base requirement for spectrum is unlikely to exceed Sunrise's by much if at all owing to Sunrise's higher levels of traffic per user, and Swisscom's much larger number of cell sites. Sunrise estimates that its average traffic per site is [… ✂ …]
Put simply, Sunrise is using its existing spectrum portfolio much more intensively than Salt which, in turn, is using its spectrum much more intensively than Swisscom.

The imbalance in sites is the result of historic network design decisions that made commercial sense at the time. These differences are now largely locked in owing to regulatory and planning restrictions that make it hard for operators to add new sites. Notably, Swiss operators face exceptionally tight NIR budgets (limits on maximum permissible public exposure to radiofrequency electromagnetic fields). Consequently, operators cannot realistically address any loss of spectrum by building new sites. And the inability of MNOs to densify networks makes them particularly dependent on access to adequate low-band spectrum to service subscribers at the cell edge.

Downstream competition is at risk if smaller MNOs lose access to spectrum

When compared to other European three-player markets, the distribution of spectrum between MNOs in Switzerland is highly asymmetric, with Swisscom having unusually large holdings, and Salt and Sunrise having relatively modest holdings. As illustrated in Figure 1, Switzerland has the most asymmetric distribution of radio spectrum across MNOs in Europe across national markets that have three operators. The academic literature on spectrum holdings warns us that significant asymmetry is dangerous, as MNOs with larger holdings may enjoy lower expansion costs, and MNOs with smaller holdings may be deterred from competing intensively on price for fear of overloading their more modest network capacity.

Figure 1: Spectrum concentration (HHI) for three-player mobile markets in Europe[1]



[1] Concentration measured using the Herfindahl-Hirschman Index (HHI). For explanatory notes, see Figure 13 in Section 3.1. Source: The Gigabase, NERA's database of spectrum prices and holdings.

MNOs require access to low band spectrum (700, 800 and 900 MHz) to provide wide area and deep indoor coverage. The ability of Salt and Sunrise to maintain service quality could be at risk if either one were to lose even one 2x5 MHz block of low-band spectrum. We observe that the expiry of licences in 2028 puts Sunrise in a uniquely vulnerable position owing to its dependence on 900 MHz (rather than non-expiring 700 MHz) to provide wide-area 5G coverage.

The asymmetry in holdings of mid-band spectrum (from 1400 to 3500 MHz) between Swisscom and its rivals is exceptionally high by European standards. We highlight the risk that the networks of Salt and Sunrise could become overly congested if they do not at least secure their existing bandwidth beyond 2028. Sunrise is vulnerable because its network carries a large volume of traffic (nearly as much as Swisscom despite lower market share) and it has the smallest network of cell sites. Salt is vulnerable because it has the smallest amount of spectrum that is not expiring.

We conclude that asymmetry in Swiss mobile spectrum holdings is at the limit of acceptability from a competition perspective. If the 2028 re-licensing process was to result in even a small reduction in the spectrum available to Salt or Sunrise, this could weaken their ability to maintain or expand their customer market share. Conversely, Swisscom appears to have surplus frequencies which it is using less intensively than Sunrise. This implies that a modest redistribution of spectrum to Salt and/or Sunrise would be pro-competitive.

A competitive auction may not deliver a competitive downstream market

Swisscom enjoys large leads over Sunrise and Salt in subscriber market share, spectrum holdings, access to network assets and overall financial strength. These advantages raise doubt as to whether a 'standard' one-stage auction with spectrum caps, as previously used in Switzerland, would realistically deliver an efficient, pro-competition allocation.

A significant concern is that Swisscom may exploit its greater financial size and strength to outbid rivals for spectrum at or close to the cap. For reference, Sunrise estimates that each 1% of mobile market share has an enterprise value of around CHF [... ✂ ...], but only around CHF [... ✂ ...] for Sunrise (and a bit less for Salt). This implies that Swisscom will have high strategic value to outbid rivals for spectrum if it believes this is necessary to defend its large market share. Even if Sunrise and Salt believe they have higher technical value for spectrum than Swisscom, they may be incentivised to accommodate their larger rival, trading off sub-optimal allocations for a lower auction price. This would not be a good outcome for downstream competition.

We observe that, in both the 2012 and 2019 auctions, BAKOM relied on spectrum caps to prevent extreme asymmetries in spectrum allocation between the three MNOs. In each case, Swisscom won the maximum permitted spectrum under the caps in most available frequency bands. In hindsight, it seems unlikely that the resulting allocations were efficient, as outcomes were almost certainly distorted by the prudent financial compromises of two smaller bidders facing a relative goliath. To avoid a repeat, this award design must consider the asymmetries between the expected bidders.

We understand that ComCom may decide that it is necessary to use an auction to accommodate the possibility of new entry. While this is a legitimate regulatory goal, new entry is rather unlikely, as the business case is probably unviable and, if there was entry, there is a risk that it weakens an existing MNO, and ultimately lessons rather than enhances downstream competition. We recommend that the relicensing process prioritise preserving a downstream market with three strong competitors, even if the rules notionally allow for new entry.

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There are award designs based on renewal or a two-stage auction that could deliver an efficient, pro-competitive allocation

We identify three approaches for the re-award of the spectrum that would provide actual or de facto guarantees that three MNOs will emerge from this process with viable spectrum portfolios. These options are based around renewal and/or a two-stage auction structure:

1. **Full renewal of existing spectrum holdings.** BAKOM would issue new licences to each MNO for their existing spectrum portfolios. The complexity of running an auction is avoided, but the regulator must determine a fee and conditions for the renewal. This approach provides planning certainty for operators as they modernise their networks, and an expectation that downstream competition will endure. Potential downsides include the lack of any role for the market in determining allocation and prices, and locking in the current allocation even though it may not be fully efficient.
2. **Two-stage auction for all spectrum.** Allocation takes place in two distinct bidding phases. In the first stage, a subset of the available spectrum is allocated as three packages tailored to ensure that there will be three viable MNOs each with a competitive spectrum portfolio. In the second stage, the remaining spectrum is auctioned. Spectrum in the second stage should be packaged into smaller units so that bidders have flexibility to compete for incremental portfolios that add to their first stage packages. In recent years, several European countries have embraced two-stage awards, and the approach has been promoted by DotEcon, the company advising BAKOM on auction design.[2]
3. **Low band extension and two-stage auction for mid band.** Under this hybrid approach, existing 800 MHz and 900 MHz licences would be extended to align with expiry of 700 MHz, whereas mid band spectrum would be subject to a two-stage auction. This approach preserves the current competitive balance in low band while allowing the market to explore alternative allocations in mid band where the existing holdings are particularly unbalanced.

These are broad options, each offering scope for variation in the detailed award rules. For example, where spectrum is renewed or offered as part of a Stage 1 package, the term of the new licence could be limited to 6 years (rather than the normal 15-20 years), so expiry in 2034 coincides with other spectrum bands. This is a relevant option for low band spectrum, given the critical role and substitutability of the 700, 800 and 900 MHz bands.

To be effective, a two-stage auction must address asymmetries between the MNOs

For a two-stage auction to be effective, the regulator must find an appropriate balance between spectrum available in each stage. The Stage 1 package must be large enough to ensure that at least three MNOs have a critical mass of spectrum. In our opinion, critical mass should include both spectrum necessary for immediate network continuity and a quantity of MHz in both low and mid bands sufficient to ensure that Salt and Sunrise will not be exposed to future capacity constraints when competing for customers.

[2] DotEcon perspectives, Stirred, not shaken: a recipe for reassigning spectrum, 2025. Available at: https://www.dotecon.com/wp-content/uploads/2025/02/Stirred-not-shaken.pdf.

We have undertaken a broad analysis of potential Stage 1 packages, exploring variations in the quantity of spectrum, the composition of low band and mid band spectrum, and symmetry and asymmetry in package structure across bidders. From this, we make the following observations:

1. We recommend larger Stage 1 packages (c. 120 MHz) over smaller ones. This strengthens smaller bidders going into Stage 2 and tends to focus competition on marginal spectrum where there may be scope for improvement in allocative efficiency.
2. Stage 1 packages should provide at least an option for every MNO to secure 2x10 at 800 MHz and 2x20 at 1800 MHz at reserve price for 4G continuity. Without this security, the auction is vulnerable to strategic play and potential inefficient allocation outcomes.
3. Differences in holdings of 700 MHz are a source of significant asymmetry between the MNOs, advantaging Swisscom and disadvantaging Sunrise. This may be addressed by defining operator-specific Stage 1 packages that consider existing holdings.

Accordingly, we recommend that ComCom and BAKOM consider the following Stage 1 packages:

- **Low band:** Each operator is guaranteed 2x25 MHz of spectrum in low band after Stage 1, including its existing holdings at 700 MHz. Across the 800 MHz and 900 MHz bands, this means that Salt would be guaranteed 2x15 MHz, Sunrise 2x20 MHz and Swisscom 2x10 MHz. This will ensure a level playing field in Stage 2 when the MNOs compete for incremental low band. We further propose that bidder Stage 1 demand for 800 MHz be capped at 2 lots to ensure that all three MNOs can secure critical mass 4G holdings.
- **Mid band:** Each operator is guaranteed 100 MHz (in addition to low band and non-expiring spectrum holdings), with an option to acquire at least 2x20 MHz at 1800 MHz and 2x30 MHz across the 1800 and 2100 MHz bands. This will ensure that three operators enter Stage 2 with their future assured, thereby positioning them to pursue valuation-based bid strategies for incremental spectrum and supporting an efficient allocation.

This approach makes it unlikely that [... ✂ ...]. Nevertheless, it would be prudent to also implement spectrum caps that preclude very asymmetric outcomes. We recommend a total cap of 455 MHz, including existing holdings, plus caps of 2x40 MHz for low-band FDD (including 700 MHz), 2x35 MHz for lower-mid band (1800 & 2100 FDD) and 2x95 MHz for mid band FDD (1800, 2100, 2600 MHz bands).

Whether it adopts a renewal or auction, BAKOM should consult on the detailed rules

Depending on whether BAKOM adopts a renewal or auction, there are many design decisions to be made. These will impact bidder behaviour and may result in very different price and allocation outcomes. Given the importance of this award, it would be appropriate to consult first on high-level format and consult again on detailed rules, iterating each time based on stakeholder input.

We provide high-level recommendations on spectrum packaging, reserve prices, auction formats and key rules. For example, we propose that BAKOM adopt generic lots of 2x5 MHz for FDD bands and 10 MHz for TDD bands, and we propose a small adjustment to the 2600 MHz band plan. We observe that the unadjusted reserve prices adopted for the 2019 Swiss auction provide a suitable benchmark for pricing spectrum in 2028. We also recommend that, if an auction is adopted, BAKOM adopts a simple Clock auction design over combinatorial bidding.

1. Switzerland's mobile spectrum re-licensing challenge

In 2028, licences covering 573 MHz of prime spectrum in Switzerland will expire. This spectrum was previously awarded in the country's 2012 4G auction. The licences are currently held by Salt, Sunrise and Swisscom, Switzerland's three mobile network operators (MNOs). The spectrum accounts for 56% of their collective holdings and plays a critical role in their nationwide mobile networks. To continue their operations and maintain a competitive position in the downstream market for mobile services beyond 2028, each MNO will need to re-licence a significant proportion of their expiring spectrum.

A breakdown of each operator's holdings is provided in Table 1. In addition to the expiring licences (highlighted in purple), Salt, Sunrise and Swisscom also hold spectrum in the 700 MHz, 1400 MHz and 3500 MHz bands, which was allocated in the 2019 5G auction. This spectrum does not expire until 2034. MNOs with larger holdings in these bands are less exposed to losing spectrum expiring in 2028, as all the bands, to varying degrees, are substitutes for providing capacity on mobile networks. However, there are also important differences between bands, most notably between lower and higher frequency bands. Lower frequency signals propagate further and provide coverage to locations distant from base stations or deep indoors. Higher frequency signal penetration is weaker but greater bandwidths are available to provide large capacity and high data speeds. Consequently, all three operators, to varying extents, are vulnerable to losing spectrum in specific bands.

Table 1: Mobile spectrum holdings of Swiss MNOs

	Salt		Sunrise		Swisscom	
	MHz	Share	MHz	Share	MHz	Share
700 FDD	20	Low band 25%	10	Low band 35%	30	Low band 40%
700 TDD	-		10		-	
800	20		20		20	
900	10		30		30	
1400	10	Lower Mid band 29%	15	Lower Mid band 22%	50	Lower Mid band 49%
1800	50		39.6		60	
2100	39.6		19.6		59.2	
2600 FDD	40	Upper Mid band 25%	50	Upper Mid band 32%	40	Upper Mid band 43%
2600 TDD	-		-		45	
3500	80		100		120	
TOTAL	269.6	26%	294.2	29%	454.2	45%
Expiring	159.6	16%	159.2	16%	254.2	25%
Not expiring	110	11%	135	13%	200	20%

Source: *The Gigabase, NERA's database of spectrum prices and holdings.*
Notes: *Spectrum associated with licences expiring in 2028 is highlighted in purple.*

As custodians of the spectrum, the Federal Communications Commission (ComCom) and the Federal Office of Communications (BAKOM) must determine how to re-licence the spectrum. It is

obvious that it should continue to be allocated to mobile services, as the available bands support services using fourth generation (4G) mobile technology that will continue to be used through 2028 and have either already been deployed or will be deployed to support fifth generation (5G) services. Swiss citizens and businesses depend on 4G and 5G mobile connectivity to undertake activities that are an essential part of modern life. Accordingly, the key decision for the regulator is whether to maintain the existing division of spectrum between the country's three MNOs through renewal or explore a redistribution through an auction.

In this report, NERA explores the case for renewal or re-auction of the spectrum. Our analysis is set out over five further sections and an appendix:

- In Section 2, we show that the expiring spectrum plays a key role in supporting the networks operated by the three MNOs and we identify the specific frequencies and quantities that are most important for network continuity. We show that continued access to 800 MHz and 1800 MHz is essential for all operators to manage the transition from 4G to 5G, and that Sunrise's 5G network depends on continued access to 900 MHz.
- In Section 3, we highlight the risks to downstream competition and continuation of a three-player market if one or more MNOs lose access to critical spectrum or do not secure sufficient capacity. We estimate that each operator requires a minimum of 2x25 MHz of low band spectrum and 2x50 MHz mid band spectrum to maintain competitiveness, with larger allocations being highly desirable.
- In Section 4, we explore the relationship between competition in an auction for mobile spectrum and competition in the downstream market. We find that there is a significant risk that an auction without appropriate safeguards may not deliver an efficient outcome and could result in a lessening of downstream competition.
- In Section 5, we identify three viable approaches for the re-award of the spectrum in the expiring licence bands. These involve either full or partial renewal of the spectrum, or a tailored two-stage auction design that ensures there will be three operators with a pro-competitive allocation of spectrum and bid competition focused on residual spectrum.
- In Section 6, we address important rules for a renewal or auction, and make high-level recommendations on spectrum packaging, reserve prices, auction format selection and key auction rules. We observe that the unadjusted reserve prices adopted for the 2019 Swiss auction provide a suitable benchmark for pricing spectrum in 2028.
- In the Appendix, we provide additional analysis of possible package structures for Stage 1 of a two-stage auction. We find that the Stage 1 packages most likely to support an efficient pro-competitive allocation are those with operator-specific packages that take account of holdings of non-expiring spectrum.

2. The expiring spectrum plays a critical role in the networks of the three MNOs

In this section, we explore the role of mobile spectrum in supporting the networks operated by the three Swiss mobile network operators (MNOs) – Salt, Sunrise and Swisscom. Our analysis is in three parts:

- In Section 2.1, we provide an overview of how the three MNOs are using their spectrum licences to service legacy 3G and 4G networks and new 5G networks. With 3G networks being turned off, the current focus is on the transition from 4G to 5G, a process that will stretch across licence expiry in 2028 into the early 2030s. The expiring spectrum will also play a critical role in future 6G provision in the 2030s.
- In Section 2.2, we explore what spectrum is needed to preserve access to 4G during the transition to 5G. We identify the 800 MHz and 1800 MHz as the key bands for managing the sunsetting of 4G. An MNO that loses access to these bands in 2028 would face disruption to customers and significant additional costs in replanning its network.
- In Section 2.3, we address the spectrum required to expand and maintain 5G networks (and ultimately build 6G networks) and maintain adequate capacity to meet rising data demand. We estimate that Sunrise requires a minimum of 2x25 MHz of low band spectrum and 2x50 MHz of mid band spectrum (in addition to TDD spectrum at 3500 MHz) in order to manage its existing traffic load and maintain quality of service. Sunrise ideally requires more low band and mid band spectrum to manage future traffic growth and facilitate a smooth transition from 4G to 5G/6G networks. We surmise that the minimum requirement for Salt and for Swisscom is similar.

2.1. How Swiss MNOs use their spectrum

For the last 25 years, mobile networks across Europe have been in transition from legacy to new technologies. In Switzerland, 2G networks have recently been shut down and 3G networks are being shuttered (but may still be operational through re-licensing of the expiring spectrum). Today, most traffic is carried over established 4G networks, but consumers are rapidly transitioning to 5G connections.

Recent and current primary uses of frequency bands in Switzerland are illustrated in Figure 2. The 800, 1800 and 2600 MHz are the primary 4G bands, whereas 5G deployment is focused on 700, 900 and 2100 MHz bands. Variations between operators reflect the size of their holdings in specific bands. For example, Sunrise relies more heavily on 2600 MHz for 4G and 5G than rival operators owing to its weakness in 2100 MHz. In contrast, Swisscom's relative abundance of 2100 MHz has enabled it to use the band for both 4G and 5G.

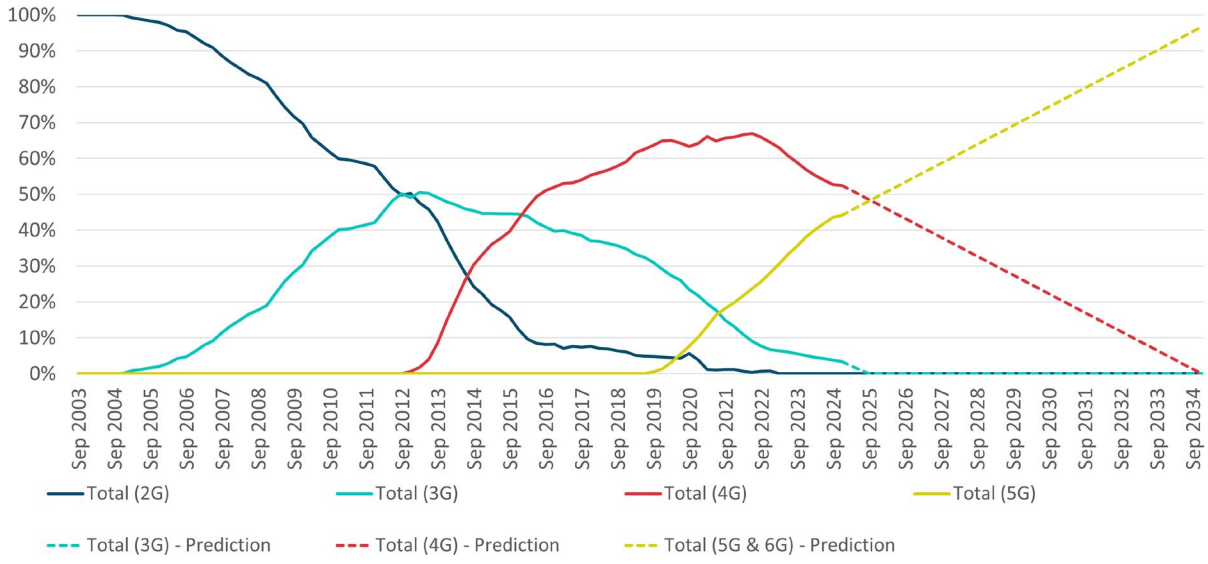
Figure 2: Primary bands supporting mobile technologies in Switzerland

	Sunrise				swisscom				Salt.			
	Tech.	Bands	Launch	Off date	Tech.	Bands	Launch	Off date	Tech.	Bands	Launch	Off date
2G	EDGE	900/1800	2005*	2023	EDGE	900/1800	2005*	2021	EDGE	1800	2005*	2020
3G	HSPA+	900	2011*	After 2025	HSPA+	900	2009*	After 2025	HSPA+	2100	2011*	After 2025
4G	LTE-A	800/ 1800/2600	2015*	Mid-2030s?	LTE-A	Multi	2014*	Mid-2030s?	LTE-A	800/900/ 1800/2600	2014*	Mid-2030s?
5G	NSA	700/2600	2019	2040s?	NSA	700/2100	2019	2040s?	NSA	1800/2100	2020	2040s?
	NSA	3500	2020	2040s?	NSA	3500	2020	2040s?	NSA	3500	2020	2040s?
	SA	900/3500	2025	2040s?								

Notes: ** Indicates launch date for relevant upgrade; some site may be running earlier versions of technology.*
Source: *Adapted by NERA using information from Sunrise and Telegeography GlobalComms Database. Information about Salt and Swisscom's approach to deploying 5G SA not available.*

In Figure 3, we report how traffic has transitioned across technologies since 2003, and how it may evolve into the 2030s based on a simple linear extrapolation. The current situation is that a large majority of traffic is carried on 4G networks with a growing minority carried over new 5G networks. Looking forward, traffic will continue to migrate from 4G to 5G networks, with 5G traffic surpassing 4G by the end of 2025. Our projections imply it may be possible to sunset 4G technology by the mid-2030s.

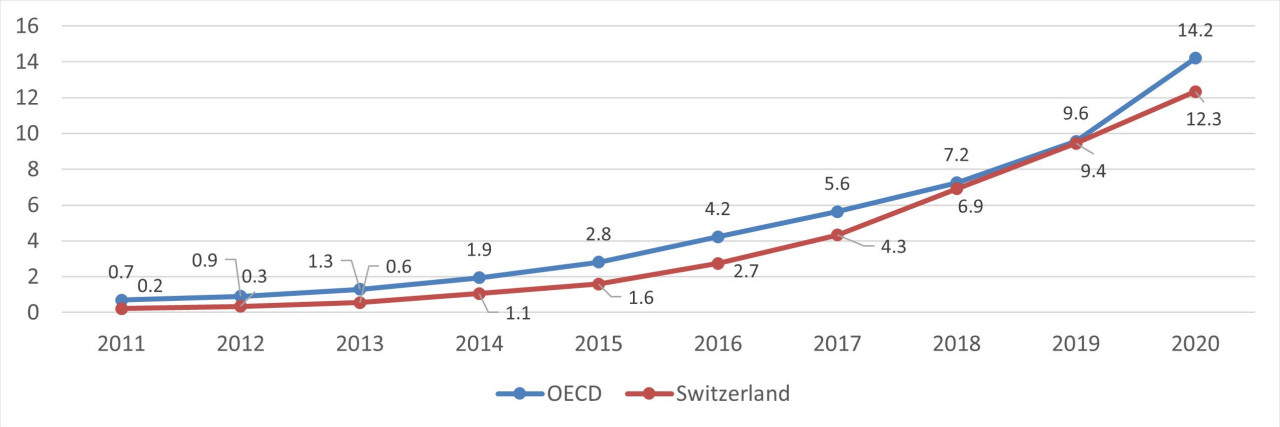
Figure 3: Swiss mobile traffic technology migration – historic and forecast



Source: *Telegeography GlobalComms Database for historic data; forecasts developed by NERA.*

This transition takes place against a background of rapidly expanding traffic levels. Over the last decade, annual growth rates in mobile data traffic often exceeded 40% in OCED countries, including Switzerland.[3] In recent years, growth rates have slowed significantly, but the absolute volume of traffic continues to expand. Looking forward, even if traffic growth only averages 10% per annum from 2028-2035., the volume of data carried by Swiss networks will double. If data demand averaged 20% growth, this milestone would be reached in 2032.

Figure 4: Average monthly mobile data usage per mobile broadband subscription



Source: *OECD Going Digital Toolkit, Average monthly mobile data usage per mobile broadband subscription, https://goingdigital.oecd.org/en/indicator/15.*

Technology transition helps operators to manage growth in data traffic, as 5G technology and deployment of associated network equipment, such as massive MIMO antennas, enable more efficient use of radio spectrum. However, efficiency improvements are insufficient to keep pace with traffic growth.

The two remaining tools for adding spectrum are densification of the tower (cell site) network and adding spectrum. In most markets, the technical value of spectrum reflects the trade-off between the cost of spectrum acquisition the cost of adding new sites. However, in Switzerland, structural issues make it slow and difficult to densify networks (see Section 2.3 for further discussion). Accordingly, the most important source of additional capacity for Swiss operators to meet traffic demand growth is deploying more spectrum at busy sites.

Technology transition also has implications for the role of specific frequency bands in Swiss mobile networks:

- For 4G LTE networks, the key bands for all three operators are 800 MHz and 1800 MHz, with 2600 MHz also important for incremental capacity at busy sites. As we will show, loss of access to these bands when spectrum licences expire in 2028 could be very disruptive to the quality of service available to an MNO's customers that are using 4G. This is primarily a timing issue. As 5G advances, it is becoming increasingly easier to substitute equivalent bands, meaning that the current dependence on 800 MHz and 1800 MHz will be greatly reduced by the early 2030s.

[3] OECD Going Digital Toolkit (accessed August 2025), "Average monthly mobile data usage per mobile broadband subscription", available at: https://goingdigital.oecd.org/en/indicator/15.

- Early deployments of 5G in Switzerland have been on a Non-Standalone (NSA) basis. 5G networks are built on top of existing 4G LTE infrastructure, rather than as a separate 5G core network. This allows for a faster rollout of 5G while leveraging existing investments in 4G infrastructure.
  [… ✂ …]
- 5G networks are designed to use a broader range of mobile bands with more varied configurations of frequency blocks than 4G LTE. For example, 700 MHz, 800 MHz and 900 MHz, and 1800 MHz and 2100 MHz respectively, can be deployed interchangeably. These same bands can also be aggregated to provide complementary capacity. Consequently, Swiss networks are less dependent on specific bands for 5G deployment. However, each MNO needs a critical mass of capacity in different frequency ranges to provide a high-quality 5G service and manage traffic growth. As we will show, the ability of Sunrise and Salt to meaningfully compete for new customers could be compromised if they fail to maintain spectrum holdings at least equivalent to their current portfolios through 2028. Swisscom appears to have more flexibility.

Understandably, in this context, each of the three MNOs has called for renewal of their existing holdings. Such a scenario would enable each of them to maintain service quality and competitiveness in the downstream market. In contrast, even the loss of a single 2x5 MHz block in a key band in 2028 could cause disruption to an individual operator. For example, our analysis below suggests that each MNO needs a minimum of 2x10 at 800 MHz and 2x20 MHz at 1800 MHz for 4G network continuity, and a minimum of 2x25 MHz low band (i.e. 700, 800 or 900 MHz) and 2x50 MHz of mid band FDD spectrum (i.e. 1800, 2100 and 2600 MHz) for combined 4G/5G capacity.

Notwithstanding this conclusion, technical analysis does suggest that some reconfiguration of spectrum is possible between operators without disrupting networks. Some alternative allocation outcomes (e.g. a modest transfer of spectrum from Swisscom to Salt or Sunrise) could be pro-competitive, i.e. be more beneficial to Swiss consumers and the Swiss economy. The challenge for BAKOM, if it wants to explore such allocations, is to design an award process that facilitates this without exposing MNOs to outcomes that could require them to make large incremental spend on re-engineering their networks, with a likelihood of disruption to the consumer experience and a destabilising impact on downstream competition.

2.2. Spectrum required to preserve 4G during transition to 5G

Over 50% of mobile data in Switzerland is currently carried using 4G technology. Despite increasing 5G traffic, it will be up to ten years before the 4G network becomes obsolete. The spectrum allocations for the coming years therefore need to be assigned such that all three operators can maintain a quality 4G network.

Today's 4G deployment is heavily reliant on the 800 MHz and 1800 MHz bands. In addition, operators rely on the 2600 MHz band for additional 4G capacity in urban areas. This dependence is reflected in Sunrise's current weekly traffic profile by band, shown in Figure 5.
[… ✂ …]

Figure 5: [... ✂ ...]

In Figure 6 and Figure 7, we show the Physical Resource Block (PRB) load[4] for each of these bands at busy hour on Sunrise's network, for downlink and uplink respectively.
[... ✂ ...].

[4] In the context of mobile networks (including 4G LTE), a Physical Resource Block (PRB) represents the smallest unit of resources that can be allocated for data transmission. PRB utilization refers to how much of the available PRBs in a network are being used by users. High PRB utilization indicates that the network is under heavy load, potentially leading to decreased performance, including slower speeds and increased latency, for users.

Figure 6: [… ✂ …].

Figure 7: [… ✂ …]

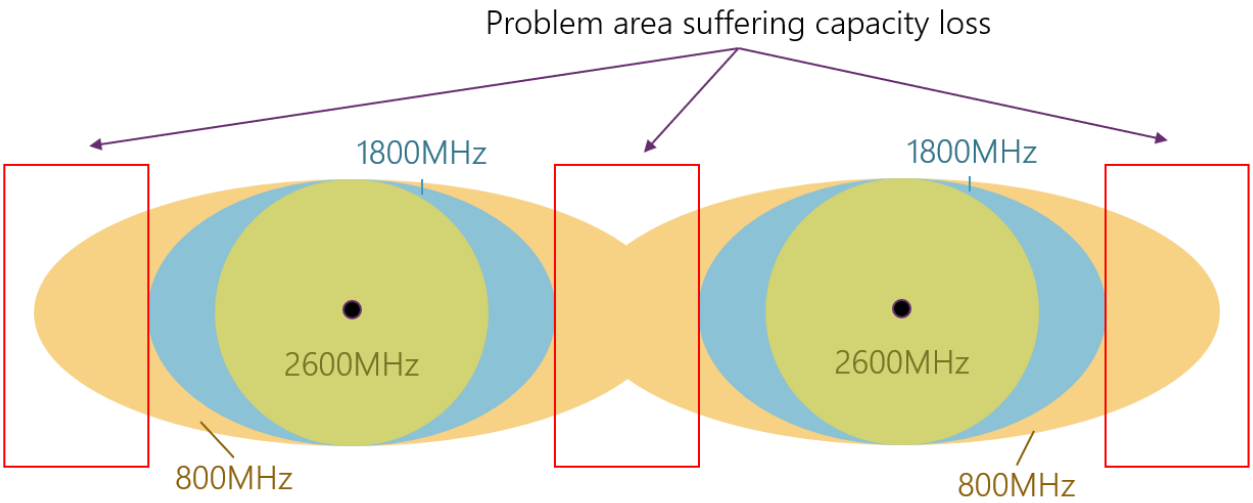
These figures together highlight the importance of the three prime 4G bands to Sunrise's ability to service its daily traffic requirements. In the following, we assess each band in turn.

800 MHz band

[... ✂ ...]

Our understanding is that Salt and Swisscom are similarly dependent on LTE800.

Figure 8: Illustration of areas dependent on LTE800 coverage



Source: *Sunrise.*

While all three operators could benefit from having more 800 MHz, the impact on any network that lost 800 MHz capacity would be severe:

- Cell throughput is broadly proportional to the bandwidth. A bandwidth reduction of 2x5 MHz at 800 MHz would reduce cell throughput by 50% for both Uplink and Downlink. This would translate to a decrease from 16 Mbps cell throughput to only 8 Mbps for downlink and from 2.2 Mbps to 1 Mbps for uplink. Meanwhile, a carrier that gained 2x5 MHz could increase cell throughput to 24 Mbps for downlink and over 3 Mbps for uplink.
- User throughput is also linked to bandwidth and can be improved through carrier aggregation across different bands. However, carrier aggregation is primarily deployed between mid bands, not sub-1 GHz bands, owing to the greater propagation of frequency bands and potential for signal interference. Consequently, in locations that can only be serviced by low band, a 2x5 MHz reduction in 800 MHz would result in a reduction of throughput by 50%. On the same basis, a 2x5 MHz increase to 2x15 MHz could increase throughput by 50%, which would be 3X that of a carrier with only 2x5 MHz.
- A loss of 800 MHz spectrum would affect 4G coverage. The 800 MHz band is the primary band for 4G coverage in Switzerland. For example, whereas Sunrise's current 4G outdoors coverage spans 97.4% of the country, a loss of 800 MHz spectrum, without alternative measures, would result in a coverage reduction of more than 15%. The loss of indoor coverage would be equally alarming: today's coverage of 65.4% would drop to 42.8% and deep indoor coverage would almost halve from 23.9% to 12.3%. These differences can be visualized by comparing Figure 9 (Sunrise's existing coverage) and Figure 10 (Sunrise

coverage without 800 MHz). Observe the significant loss in indoor coverage (blue) in more densely populated areas and outdoor coverage (green) in rural areas of Switzerland

- We suppose that loss of 800 MHz would have a similar impact on Salt and Sunrise.

Figure 9: [... ✂ ...]

Figure 10: [... ✂ ...]

An operator that lost 800 MHz would need to explore alternative methods to provide the lost connectivity, so as to mitigate the damage to network performance and customers. There are several options, but none are economically attractive:

1. Over time, the problem will be solved by (a) deploying 5G NSA networks, which support 4G at 700 MHz and 900 MHz; and (b) customers upgrading their phones to ones that support 4G and 5G use of these bands. This process could be accelerated. However, this would require that an operator that lost 800 MHz has access to adequate quantities of 700 MHz and 900 MHz, which is not a given (see Section 2.3). Even if the operator has the necessary spectrum, a bigger problem is the disruption to those customers that have not upgraded to compatible phones or are in areas where 5G NSA equipment is not yet deployed.

   If we suppose that an award in which the operator loses spectrum takes place in 2026 and the current licence ends in 2028, an operator would have an 18-month window to accelerate its rollout of new technology and launch a handset upgrade campaign to try to transition as many customers as possible. This would be expensive, presumably involving heavy subsidies for handset upgrades, and divert investment from other initiatives. Most likely, such an initiative could not be implemented fast enough to avoid network performance issues, so the operator would suffer poor publicity and likely lose customers to rivals.

2. An operator could densify its base station network, so that geographic and indoor areas currently only served by LTE800 signals could be reached by LTE1800 signals. This might be a viable strategy in a few locations but would be economically infeasible as a broader solution. In general, the lead time for building new sites in Switzerland is too long to bring new sites on board in time to plug the performance gap, and power limits and other local regulations may preclude sites in many locations (see Section 2.3 for further discussion). It also does not make economic sense to widely deploy new sites if the problem is owing to temporary 4G capacity constraints that would be resolved within 5-10 years owing to the migration of customers to 5G networks.

In conclusion, no operator can realistically afford to lose any 800 MHz spectrum as soon as 2028. Such a loss would result in an MNO experiencing a very uneven network performance, and customers suffering from disruption and lost welfare. If disruption is severe, an operator could be seriously weakened or even fail. Any reallocation of 800 MHz between the three MNOs that takes place before 2030 would therefore be a threat to continuation of a three-player market. However, a later reallocation, say in the early 2030s when 4G networks are approaching the end of their lifespan, may be acceptable, provided the operator losing 800 MHz has enough alternative low band spectrum.

1800 MHz

The 1800 MHz band is the workhorse of the 4G network. It is the lowest available frequency band where operators can deploy a full 2x20 MHz carrier.
[... ✂ ...].

A loss of spectrum at 1800 MHz spectrum would have substantial effects on network quality.
[... ✂ ...].

As LTE carrier size is capped at 2x20 MHz, performance degradation is likely only a serious problem for an operator whose holdings at 1800 MHz fall below 2x20 MHz.
[... ✂ ...]

In summary, for any operator, a reduction in 1800 MHz holdings below 2x20 MHz in 2028 would be harmful to network quality. The impact would not be as devastating as a loss of 800 MHz but it would be welfare destructive and may drive customer churn. This is primarily a timing issue, as 2028 is simply too early in the transition from 4G to 5G. A loss of some 1800 MHz spectrum in the early 2030s might be much less impactful given that a large majority of traffic would by then have migrated to 5G, and equivalent frequency bands might more readily be substituted. Accordingly, we conclude that to preserve network quality and downstream competition, it would be prudent to ensure that every operator retains at least 2x20 MHz in the 1800 MHz band.

2600 MHz

The 2600 MHz band serves as the urban capacity layer for the 4G network. It supplements the core bands by providing capacity in areas with high peak traffic loads – usually in urban areas. This is illustrated by [... ✂ ...] shown in Figure 11.

Figure 10: [... ✂ ...]

[... ✂ ...]

Again, as LTE carrier size is capped at 2x20 MHz, performance degradation is likely only a problem for an operator whose holdings at 2600 MHz fall below 2x20 MHz. The 2600 MHz FDD band is typically the last carrier to be added to a 4G network, and it is typically deployed at busier sites that are priority areas for 5G deployment. Therefore, it is also potentially the first legacy 4G band that could be redeployed as traffic migrates to 5G networks. [... ✂ ...]

[... ✂ ...]

2.3. Spectrum required to build 5G networks and mitigate capacity constraints

5G networks are significantly more flexible than their 4G predecessors. Firstly, they can use much larger contiguous bandwidths than 4G, up to 100 MHz where available (and more in the future) enabling significantly higher speeds and capacity. Secondly, they are built to operate across a wider range of frequency bands, with software defined radio (SDR) that enables remote reconfiguration. Carrier aggregation is built in from the beginning. Provided the appropriate radios are deployed, the 700, 800 and 900 MHz can be deployed interchangeably, as can the 1800 or 2100 MHz bands. Thirdly, improvements in antenna technology (specifically massive MIMO) have increased spectral efficiency as well as the coverage of mid band frequencies. As a result, operators are less reliant on specific frequency bands for their 5G implementation.

By 2028, approximately two-thirds of Swiss mobile traffic will be carried over 5G networks, and this could approach 100% by the mid-2030s. It is expected that 6G service will be launched in 2030s, but the timing and spectrum requirements for this are uncertain. It is possible that 6G will primarily be a software upgrade, thereby allowing for more seamless transition of spectrum between technologies.

5G band requirements

The first bands to be deployed in Switzerland for 5G were 700 MHz and 3500 MHz. Licences for these frequencies do not expire until 2034. Therefore, unlike 4G networks, investments in 5G are less at risk from potential changes to spectrum holdings. However, Swiss operators are in the process of refarming other bands for 5G.
[… ✂ …]

Overall, access to spectrum for 5G is less about access to the specific bands in this award process and more about having sufficient capacity overall to meet rising traffic levels. Data growth rates have fallen in recent years and are expected to continue to fall through 2030.[5] However, absolute capacity requirements are still growing and may double in Switzerland over the next five years.[6]

Spectrum to provide 5G capacity must also be located in three frequency ranges:

- **Low band spectrum (700, 800 and 900 MHz).** With 800 MHz dedicated to 4G, operators require access to 700 MHz and/or 900 MHz to provide coverage in both rural and indoor settings. Today, almost 75% of traffic is consumed indoors[7], which underscores the importance of low band spectrum for a high-quality connection that can penetrate indoor spaces. [… ✂ …]
- **Mid band spectrum (1400 MHz through 3800 MHz).** The mid bands provide the larger frequency blocks necessary to provide high capacity and high speeds. Owing to its large size, the 3500 MHz is particularly important for densely populated areas. As traffic grows,

5 See, for example, Analysys Mason (2023), "Operators and vendors need to plan for more conservative mobile data growth in the near future", available at: https://www.analysysmason.com/research/content/articles/cellular-data-traffic-rdnt0/.

6 Traffic volumes will double in five years if growth averages 14-15% per annum.

7 This estimate includes in-car and in-train connectivity.

other frequency bands can be aggregated with 3500 MHz to provide incremental capacity. In this respect, the other mobile bands, including 1800, 2100, 2600 FDD and 2600 TDD, are broadly interchangeable. Operators should have a general preference for fewer bands (and therefore fewer radios) and higher contiguous bandwidths, as this provides maximum capacity and performance at the least cost.

- **Lower mid band spectrum (1800 and 2100 MHz FDD).** Operators' preferences for larger spectrum blocks are more easily accommodated in the upper mid band. However, it is important that some of their uplink and downlink capacity is in 'lower mid band spectrum', ideally 1800 MHz or 2100 MHz, owing to the superior propagation and indoor penetration associated with these bands. With the use of massive MIMO antennas, the 3500 MHz bands provides reasonable downlink coverage, but the uplink range from handset to base station is more limited. Therefore, operators aggregate lower mid band frequencies with 3500 MHz to increase uplink capacity, with the added benefit that this also increases downlink capacity. The 1800 MHz and 2100 MHz bands are ideal for this, with 2100 MHz generally more available owing to the need to continue deploying 2x20 MHz of 1800 MHz for 4G. 2600 MHz FDD and TDD can also be used in this way but are not as valuable owing to weaker propagation. The 1400 MHz band is unsuitable as it is a downlink only band.

  In the 4G era, uplink capacity was not a big concern, as downlink traffic has always dominated data use. However, uplink traffic is expected to increase owing to the rise of applications such as cloud storage services, communication services and video sharing, and video inputs for processing by artificial intelligence.[8] In anticipation of such developments, operators need to expand their network capacity. Given the propagation limits of upper mid band spectrum, this will make it even more important that each operator holds a healthy portfolio of low band and lower mid band spectrum for 5G.

[8] "Uplink traffic dominated by communication and cloud-storage services", Ericsson (2023).

Figure 11: [... ✂ ...]

Capacity requirements for 5G

Rising mobile data traffic requires more network capacity, which must be delivered either through deployment of more spectrum or a densification of the existing cell site grid.

In Switzerland, a significant densification of the network is not feasible owing to the difficulties of building new sites.
[... ✂ ...]

The main hurdles to building new mobile sites in Switzerland are:

i) regulatory limits on the non-ionizing radiation (NIR) generated by cellular networks, which are ten times stricter than the ICNIRP guidelines[9] for installations in areas where people spend a significant amount of time;

ii) the complex permitting process, including widely varying requirements at the commune level; and

iii) finding owners and communities that are willing to host antennas.

In Table 2, we set out three short case studies that illustrate the difficulties faced by Sunrise in building new sites. Given these challenges, it is unrealistic to expect that any of the three MNOs could meaningfully compensate for an inadequate spectrum portfolio by building a large number of new sites. Instead, operators must rely on sufficient spectrum holdings to meet traffic requirements. This makes it particularly important that Switzerland is amongst the leaders in Europe in allocating new spectrum bands as they become available and that any changes to holdings of legacy spectrum from 2028 do not leave any one of the three operators with an insufficient frequency portfolio to manage their traffic growth.

[9] ICNIRP guidelines are recommendations from the International Commission on Non-Ionizing Radiation Protection that set limits for human exposure to non-ionizing electromagnetic fields (EMF) from various sources like radiofrequency (RF), low-frequency (LF), static, and optical radiation. These guidelines are based on scientific evidence of adverse health effects and aim to keep exposure below established thresholds or as low as reasonably achievable to protect public and occupational health. The exposure limits of 4 V/m in Switzerland are ten times lower than the 41 V/m limit typically adopted in Europe in accordance with these guidelines.

Table 2: Examples of long delays in efforts to build new mobile sites

Project	Challenge	Description	Status
LU097-1 **Kantonsspital** (Luzern), project submitted in 2019	Overloaded authorities and reticence by property owners	The cantonal authorities took years to review the planning application and handle the objections. The request first suspended because of push-back by the owner and afterwards subject to bureaucratic delay.	Delay of 6 years and rising
LU141-1 **Hünenberg** (Zermatt), building permit application submitted in 2020	Complexity because of planning zones	Planning zones and the fight against new regulations have led to delays of several years.	Delay of 5 years and rising
BE053-1 **Ostermundigen** started in 2019	Complex permitting process	Very complicated cascade regulations lead to delays in acquisition and problems in permitting. The detailed 9-page evaluation report was seen as insufficient by the authorities to approve the request. The effort to justify a new site in the canton AG can lead to delays and even the loss of projects.	Current delay of 6 years

Source: *Sunrise.*

[… ✂ …]

Table 3: [… ✂ …]

[… ✂ …]

3. Downstream competition is at risk if smaller MNOs lose access to spectrum

In this section, we consider the impact on downstream competition from possible changes in spectrum holdings, considering our analysis of the spectrum needs of the MNOs for 4G and 5G in Section 1. Our analysis is in four parts:

- In Section 3.1, we set out the current distribution of spectrum across the three MNOs in Switzerland. We observe that, relative to other European three-player markets, this is highly asymmetric, with Swisscom having unusually large holdings, and Salt and Sunrise having relatively modest holdings. Furthermore, Swisscom has significantly larger holdings of non-expiring spectrum. We also survey the academic literature on spectrum holdings which warns that significant asymmetries in spectrum holdings between MNOs tend to reduce incentives to compete on price and infrastructure rollout, thereby harming consumers.
- In Section 3.2, we focus on holdings of low band spectrum (700, 800 and 900 MHz) and consider how competition could be impacted if these change from the current position.
  [… ✂ …]
- In Section 3.3, we focus on mid band spectrum (from 1400 MHz up to 3500 MHz) and explore the linkages between holdings through 2028 renewal and downstream competition. The asymmetry in holdings between Swisscom and its rivals is exceptionally large across this range.
  [… ✂ …]
- In Section 3.4, we conclude that the current asymmetry in spectrum holdings is at the limits of acceptability from a competition perspective. If the 2028 re-licensing process was to result in even a small reduction in the spectrum available to Salt or Sunrise, this could weaken their ability to maintain or expand their customer bases. Conversely, Swisscom appears to have surplus frequencies and could absorb a loss of spectrum in certain bands with little or no impact on its ability to compete. A modest redistribution of spectrum away from Swisscom and to Salt and/or Sunrise could be pro-competitive.

3.1. Swisscom has an unusually big advantage in total spectrum

The current distribution of mobile spectrum in Switzerland is highly asymmetric. Table 4 sets out the total holdings of each operator by band. Swisscom has 45% of all allocated mobile spectrum, well ahead of Sunrise with 29% and Salt with 26%. The asymmetry also extends to spectrum not expiring in 2028. Swisscom has 200 MHz of spectrum that is not expiring, whereas Sunrise has only 135 MHz and Salt just 110 MHz. These low quantities of non-expiring spectrum mean Salt and Sunrise face greater risk than Swisscom in the re-licensing process as they are so much further behind the critical mass of holdings they require to continue delivering quality 4G and 5G.

Table 4: Mobile spectrum holdings of Swiss MNOs

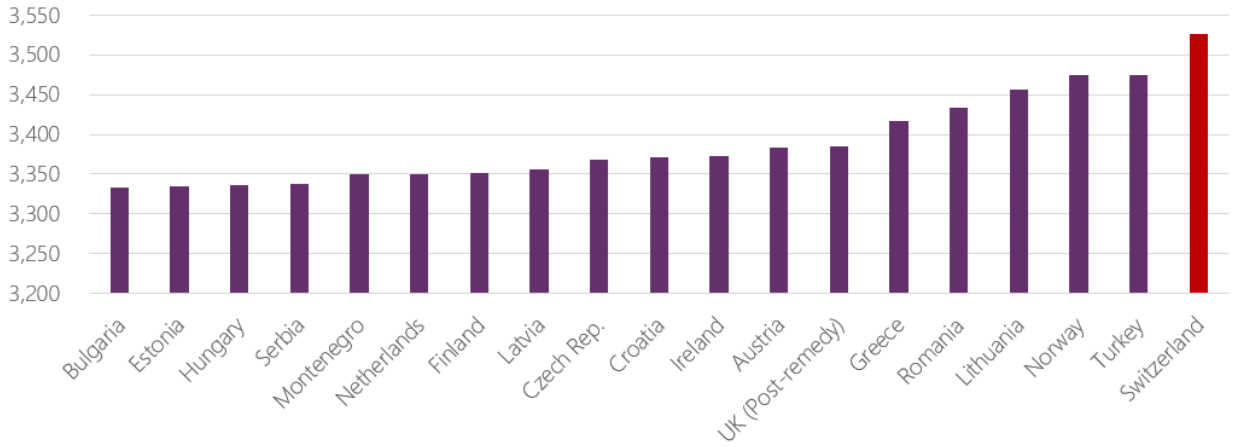
	Salt		Sunrise		Swisscom	
	MHz	Share	MHz	Share	MHz	Share
700 FDD	20	Low band 25%	10	Low band 35%	30	Low band 40%
700 TDD	-		10		-	
800	20		20		20	
900	10		30		30	
1400	10	Lower Mid band 29%	15	Lower Mid band 22%	50	Lower Mid band 49%
1800	50		39.6		60	
2100	39.6		19.6		59.2	
2600 FDD	40	Upper Mid band 25%	50	Upper Mid band 32%	40	Upper Mid band 43%
2600 TDD	-		-		45	
3500	80		100		120	
TOTAL	269.6	26%	294.2	29%	454.2	45%
Expiring	159.6	16%	159.2	16%	254.2	25%
Not expiring	110	11%	135	13%	200	20%

Source: *The Gigabase, NERA's database of spectrum prices and holdings.*

Compared to other European three-player markets, Switzerland has an unusually high concentration of spectrum in the hands of a single player. The Herfindahl-Hirschman Index (HHI) is a common measure of market concentration that is used to determine market competitiveness. It is commonly applied to market shares in downstream mobile markets. In Figure 13, we use HHI to compare concentration in spectrum holdings across European three-player mobile markets. We observe that Switzerland, with a spectrum HHI of 3,526, has the highest concentration of spectrum holdings amongst European three-player markets. This reflects Swisscom's huge and unusual spectrum advantage over its smaller rivals.

Spectrum is a critical input for the provision of mobile services and is the main determinant of network capacity. It is not necessary for operators to have the same spectrum holdings in order to be competitive in the downstream market. As UK regulator Ofcom has argued, some heterogeneity in holdings may encourage differentiation in network design and go-to-market strategies, and this could improve competitive choice for consumers. Nevertheless, it is widely recognized that significant asymmetries could result in operators with larger holdings establishing an unreplicable advantage with respect to capacity and quality of service, and operators with smaller holdings being constrained in their ability to compete for customers.

Figure 12: Spectrum HHI for three-player mobile markets in Europe



Notes: *Calculations exclude 5 MHz at the top and bottom of 2600 MHz TDD which in Europe is either unallocated or subject to low power restrictions to protect adjacent FDD use. Figures for Czechia exclude spectrum allocated to Nordic Telecom, as it is not established as an MNO. UK includes Vodafone's pending spectrum transfers to VMO2. Romania accounts for the acquisition of the frequency assets of Telekom Romania Mobile by Vodafone Romania and Digi Romania, which was approved in July 2025.*
Source*: The Gigabase, NERA's database of spectrum prices and holdings.*

For example, in the context of a four-player market, UK regulator Ofcom adopted the view that:

> "*… very asymmetric spectrum holdings – for example, a single operator having more than around 37% of useable mobile spectrum for a sustained period – could pose a risk to competition and hence to consumer outcomes*." [10]

Switzerland has three players not four. Even allowing for this difference, it may be argued that Swisscom's current 45% share of spectrum is at or above the threshold for ensuring a competitive downstream market. This raises a specific risk that the remaining spectrum allocated to the smaller operators is too small to allow them to grow, and they may be constrained in their ability to service the expanding data demand of their existing customers and to compete for new customers. In particular, operators with too little spectrum may be reluctant to engage in price competition, owing to concern that they will not be able to accommodate the increased traffic if they are successful in expanding market share.

A substantial academic literature has emerged highlighting concerns about very uneven distributons of spectrum:

- Peha (2017) develops a model that explores how to divide spectrum resources among MNOs considering the economies of scale from deploying more spectrum to service rising demand for data, a trend that has continued through the 4G and 5G eras. He identifies two competing objectives for policymakers: increasing downstream competition (though having operators with viable spectrum holdings) and lowering the cost of capacity (which requires scale in spectrum holdings). This paper shows that it "*is Pareto optimal with respect to these two objectives*" if "*spectrum is divided fairly evenly among MNOs, regardless of whether the*

[10] Ofcom, Award of the 2.3 and 3.4 GHz spectrum bands, Competition issues and Auction Regulations, Statement 11 July 2017, para 1.33.

number of competing MNOs is large or small." On this basis he concludes that "*Large disparities in spectrum holdings are therefore not in the public interest*."[11]

- Peha's findings aligned with earlier warnings in Cramton et. al (2011), which addresses the need for pro-competitive measures in auction design that prevent excessive concentration in spectrum holdings.[12]
- Elliott et al. (2025) extend that Peha analysis by estimating the optimal mobile market structure using a structural model of demand, in which consumer choice depends on both price and quality, and network build costs.[13] They find that the optimal market structure should also limit the number of firms with spectrum to three or four, and that asymmetric spectrum allocations have an adverse effect on social welfare (defined as the sum of consumer and producer surplus).

  Elliot et al. consider a situation where one operator has a 50% spectrum share and two operators have around 25% spectrum share each. The authors conclude that, "*In line with Peha (2017), our results suggest that asymmetric spectrum allocations are inefficient*." In their model, the larger operator gains an advantage in average download speeds and is consequently able to charge a premium price, an outcome that harms consumer welfare. We note that the spectrum share structure analysed is only slightly more concentrated than the existing structure in Switzerland shown in Table 4.
- Rey and Salant (2019) in a theoretical optimal auction design model argue that consumer surplus will tend to be maximized if spectrum is allocated in a way that equalizes MNO costs.[14] If all MNOs are nationwide full-service operators, this will typically require that mobile spectrum holdings are reasonably balanced, and undue deviation from this could lead to a lessening of downstream competition.

To have a competitive proposition at the wholesale level, an MNO needs a critical mass of spectrum in the low, lower mid and upper mid band ranges. A firm with insufficient spectrum, either overall or in any of these ranges, will struggle to meet capacity in many locations, will be vulnerable to poor network performance and may be unable to compete to increase market share.

In the following subsections, we explore the impact of differences in holdings in the low band and mid band ranges. In both cases, we observe that Swisscom currently has a large spectrum and network capacity advantage, whereas Salt and Sunrise are constrained. We conclude that in any award scenario where Sunrise and Salt lose spectrum in this award could be detrimental to downstream competition. However, scenarios where they gain some spectrum from Swisscom may be pro-competitive and add to overall social welfare. An award might also explore alternative configurations, such as Sunrise gaining spectrum at 1800 / 2100 MHz, or an operator focusing on fewer bands, provided this did not unduly undermine the efficiency of deployed radios. The

[11] Peha, J. M. (2017). Cellular economies of scale and why disparities in spectrum holdings are detrimental. Telecommunications Policy.

[12] Cramton, P., E. Kwerel, G. Rosston, and A. Skrzypacz (2011). Using spectrum auctions to enhance competition in wireless services. The Journal of Law and Economics 54(S4), S167–S188.

[13] Jonathan T. Elliott, Georges V. Houngbonon. Marc Ivaldi, and Paul T. Scott (2025); "Market Structure, Investment, and Technical Efficiencies in Mobile Telecommunications," Journal of Political Economy.

[14] Rey, P. and Salant, S., Allocating Essential Inputs, Working Paper, available at: https://www.tse-fr.eu/publications/allocating-essential-inputs.

challenge for BAKOM is to identify an award design that could realistically challenge the status quo without worsening asymmetry and risking reduced downstream competition.

3.2. Holdings of low band spectrum are asymmetric

The current distribution of low band spectrum in Switzerland is asymmetric. Swisscom has 2x40 MHz, compared to Sunrise with 2x30 MHz and Salt with 2x25 MHz.[15] In comparison to other European countries, the scale of the differences is not extreme but is likely at or close to the acceptable limit from a competition perspective. Observe that, in Figure 14, in Europe, Swisscom has amongst the largest sub-1 GHz holdings whereas Salt has amongst the least. Sunrise's low band holdings are in the mid-range of European MNOs but a loss of just one lot would drop it to the same ranking as Salt.

In Switzerland, as in many countries, access to sub-1 GHz spectrum is particularly important to provide wide-area coverage in rural areas, deep indoor coverage in urban areas and reliable uplink. It is generally accepted that operators do not require exactly the same spectrum holdings to be able to offer a compelling service proposition to customers. However, any operator with too little bandwidth may be unable to compete for customers that expect higher speeds and may lack the network capacity necessary to compete to significantly grow market share at the expense of a rival with a larger network. A shortfall in sub-1 GHz spectrum could be particularly damaging, as network performance (availability and speed) in areas that cannot be reached by higher bands may be sensitive to the loss or gain of a single 2x5 MHz frequency block. The player with the smaller holdings is at a disadvantage.

In the literature on spectrum holdings, there is particular sensitivity around holdings of sub-1 GHz holdings, owing to its unique role in coverage. For example, Ershov and Salant (2025), using a novel data set from almost all the European 4G auctions during 2009-2019 (they exclude microstates), find that firms with larger ex ante market shares won a larger share of the sub-1 GHz spectrum.[16] These effects were more pronounced in ex ante more concentrated markets. They further observed that spectrum auctions tended to adversely affect consumer prices as measured by ARPU, and more so in more concentrated markets. These results occurred despite pro-competitive provisions in auctions to protect market structure, such as spectrum caps. They also found evidence that low band asymmetries adversely affected investment incentives in ex-ante concentrated markets.

Sensitivity over relative holdings of low band spectrum have also led to legal dispute in a 5G award. Three Ireland challenged a proposal by the Irish regulator ComReg (advised on auction design by DotEcon) to cap its holdings at 2x35 MHz, thereby limiting it to bidding for 2x10 MHz of 700 MHz, when its two rivals could bid for 2x15 MHz each. The auction went ahead in December 2022 with the legal challenge unresolved, but the case was dropped after all three bidders won 2x10 MHz each. The situation may be contrasted with Switzerland, where Swisscom was permitted to bid for and ultimately won enough 700 MHz to lift its sub-1 GHz holdings to 2x40 MHz.

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15 Our analysis excludes the 700 MHz SDL band as the ecosystem for this band is not well developed. Unless and until this ecosystem matures, the band is not relevant to competition analysis. In Switzerland, Sunrise holds 10 MHz of 700 MHz SDL.

16 Daniel Ershov and David Salant – "Auctions and mobile market competition: evidence from the European 4G auctions," https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4168166.

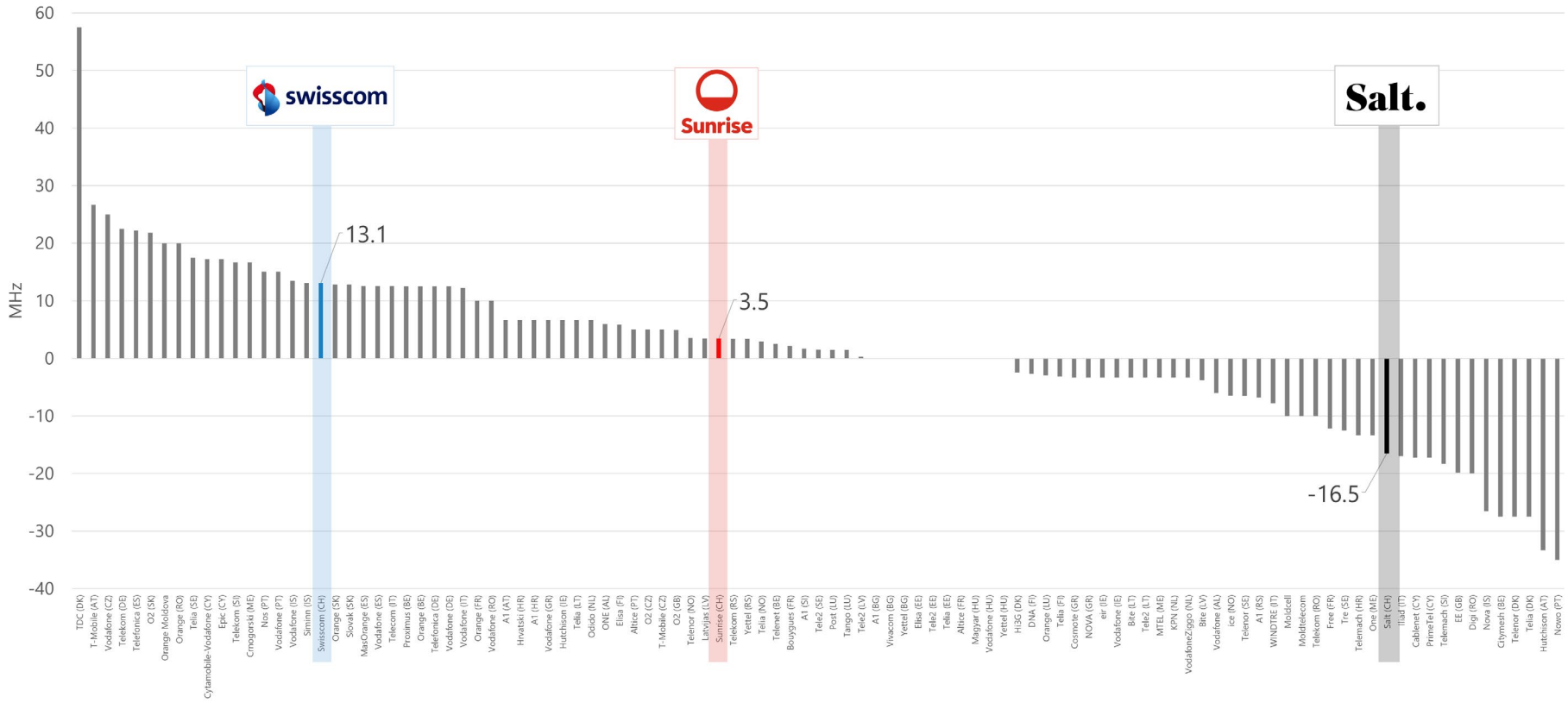
One may infer from this that Swisscom's current holdings are already at or even beyond the acceptable range in a conventional three-player market. Such a conclusion is reinforced by a comparison of MNO low band spectrum holdings across Europe. In Figure 14, we plot how much sub-1 GHz spectrum each European MNO has relative to an even share in their local market. Swisscom has amongst the larger holdings, Sunrise is in the mid-range, and Salt is towards the lower end of a European hierarchy.

Given these asymmetric starting points, even small shifts in Swiss holdings could have a big impact on downstream competition:

- If Salt were to lose 2x5 MHz, it would have only 2x20 MHz low band (20% of the total available), placing it close to the bottom of the hierarchy. In the short term, Salt may be able to cope with a loss of 2x5 MHz at 900 MHz, given it has 2x10 MHz in each of the 800 MHz and 700 MHz bands for 4G and 5G respectively. However, in the medium-to-long term, it is doubtful this combination would provide sufficient capacity and wide-area coverage to credibly compete to grow downstream market share.
- If Sunrise were to lose 2x5 MHz low band, it would be reduced to 2x25 MHz, the same level as Salt. Given its much higher traffic levels and limited base station network, this would be a very small portfolio, raising doubts about its ability to sustain its current market share and its share of traffic. Moreover, any loss at 800 MHz or 900 MHz would eat into 4G or 5G capacity immediately, as its single 2x5 MHz at 700 MHz is not a good substitute.
- If Swisscom were to gain 2x5 MHz, it would move to the top of the hierarchy. This spectrum would have to come from either Salt or Sunrise. The value of this spectrum to Swisscom would likely come more from the competitive constraints imposed on a smaller rival than from the modest performance enhancement to its own network. Conversely, Swisscom would likely not be much affected much by a reduction in its 900 MHz holdings, as it has 2x15 MHz at 700 MHz for 5G. Like Sunrise and Salt, Swisscom's network performance would be adversely affected by any loss of spectrum at 800 MHz owing to the band's centrality to its 4G network.

A loss of low band spectrum could technically be compensated for by network densification, which would make it easier to use higher frequency bands to reach customers located at the cell edge. However, as discussed, Swiss emission limits and construction delays limit the ability of all MNOs to build new sites in a timely and cost-effective manner. From a competitive perspective, this is particularly problematic as Swisscom enjoys a large site count advantage, an advantage that it now effectively locked in by regulatory constraints. This reinforces the vulnerability of Salt and Sunrise to losses in low band spectrum: any loss of sub-1 GHz spectrum could limit their ability to compete in the downstream market.

Figure 13: European MNOs: Difference in low band spectrum holdings from equal split between operators



Notes: *We sampled 100 operators across 26 countries. We excluded very small new MNOs. The graph shows the delta in low band spectrum holdings in comparison to an equal split.*

Source: *The Gigabase, NERA's database of spectrum prices and holdings.*

A further complication is that all three MNOs need to win back 2x10 MHz at 800 MHz in 2028 to avoid disruption to 4G services as they continue their transition to 5G. This implies that gains or losses in low band are likely to be focused on 900 MHz.
[... ✂ ...]

In conclusion, this award process raises serious concerns about the future distribution of low band spectrum in Switzerland across the three MNOs and its impact on downstream competition. Any scenario where Sunrise and Salt lose sub-1 GHz spectrum (and by extension, any scenario where Swisscom gains) is likely to be detrimental to competition. In contrast, scenarios where Salt and/or Sunrise gain low band spectrum from Swisscom could be pro-competitive.

3.3. Holdings of mid band spectrum are highly asymmetric

The current distribution of mid band spectrum holdings in Switzerland is amongst the most asymmetric in Europe. Swisscom has 375 MHz, compared to Sunrise with 215 MHz and Salt with 220 MHz. As illustrated in Figure 15, Swisscom holds over 100 MHz more mid band spectrum than what would be required for an equal share, resulting in both Sunrise and Salt each holding approximately 50 MHz less mid band spectrum. This disparity in allocation is only exceeded by Denmark, where TDC has the largest mid band spectrum holdings in Europe. Notably, Salt and Sunrise are amongst the least well-endowed major operators in Europe in total spectrum holdings.

Deficiencies in mid band spectrum give rise to several potential competition concerns:

1. Owing to the larger bandwidths availabile, mid band spectrum is the primary source of network capacity. An MNO with too little capacity may experience network congestion and poor customer service. Even if an MNO has sufficient capacity to service its existing customers, it might be deterred from vigorously competing for additional subscribers owing to concerns this would lead to network congestion and poor service.
2. The lower mid bands, including 1400 MHz, 1800 MHz and 2100 MHz, offer superior propagation relative to higher mid bands. Each operator requires a critical mass of frequencies in these ranges to maintain quality across cell areas. Access to 1800 MHz or 2100 MHz is especially important for 5G uplink, where power limits constrain coverage of higher frequencies. The distribution of these frequencies in Switzerland is exceptionally asymmetric, with Swisscom having 49%, compared to Salt with 29% and Sunrise with 22%.
3. Larger blocks of mid band spectrum are required to provide the highest network speeds. An operator with small blocks of spectrum may not be able to offer the same quality of service, so may be a weaker competitor, especially for high-vaue users.
4. Swiss MNOs lack alternatives to spectrum to expand capacity owing the limitations on network densification. Absent regulatory change, Swisscom effectively enjoys an unreplicable lead in total number of cell sites.

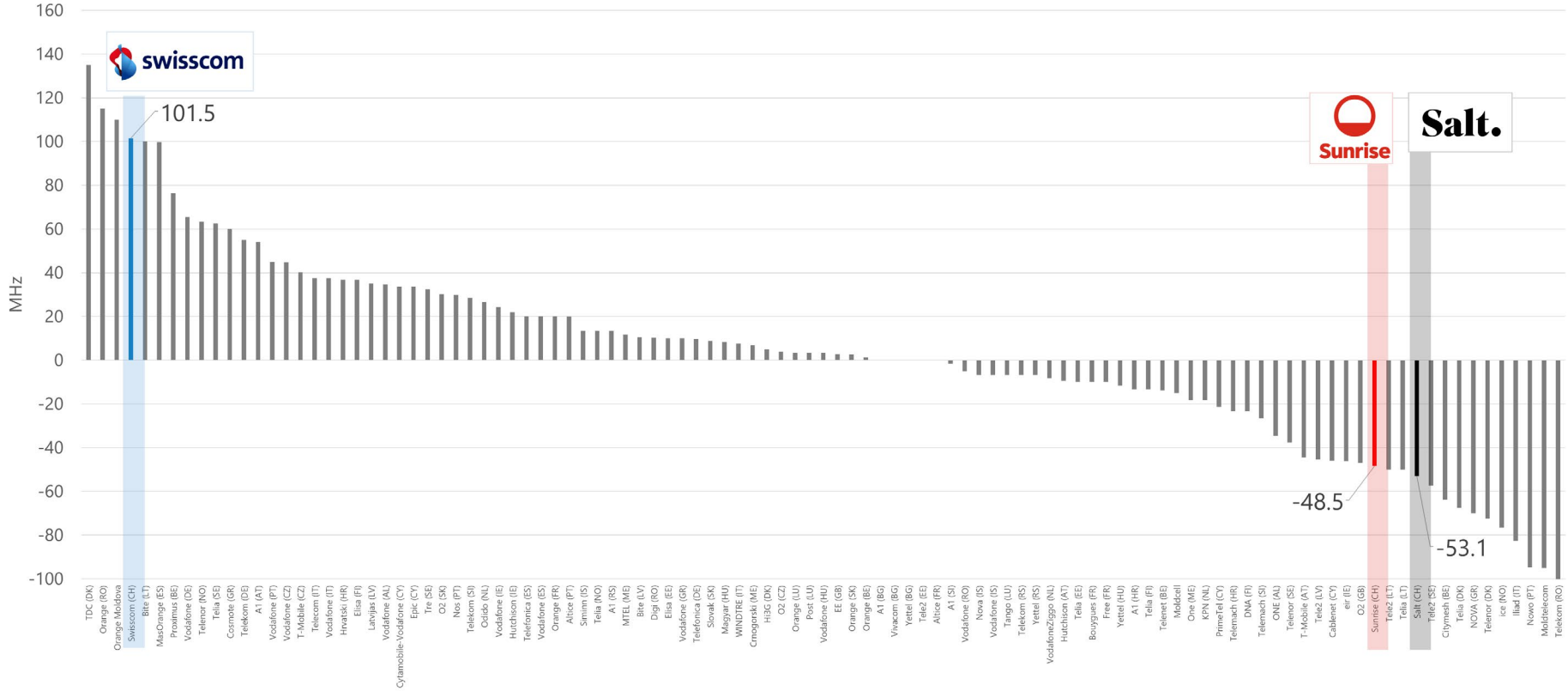
All three Swiss operators hold between 80 MHz and 120 MHz spectrum at 3500 MHz spectrum.This is a large block of spectrum supporting high capacity and high speeds. In the near term, it implies that in areas that can be reached by 3500 MHz signals, all three operators should have sufficient 5G capacity and can offer excellent speeds. Of more immediate concern therefore is the potential for capacity and performance differences in areas outside of 3500 MHz coverage, which includes 54.7% of the Swiss landmass and 12.67% of population. In the longer term, as traffic continues to grow and migrates to 5G networks, overall holdings may become an increasing issue, raising the prospect that Salt and Sunrise will not be able to grow without more spectrum.

A closer examination of Sunrise's and Salt's holdings reveals different vulnerabilities. Sunrise has weaker combined holdings at 1800 MHz and 2100 MHz and, after allowing for 4G network needs, has very little of this type of spectrum for 5G.
[... ✂ ...]
Salt has stronger 1800 MHz and 2100 MHz holdings but lacks overall capacity. For both these companies, a major risk is that such a large proportion of their total spectrum will expire in 2028. Absent renewal, Salt's remaining share of all spectrum is just 11% and Sunrise is not much better at 13%. This is not nearly enough to meet their capacity needs.

In contrast, it appears that Swisscom has significantly larger mid band spectrum holdings than it will need for the foreseeable future. Swisscom has 2x80 MHz of FDD and 100 MHz of TDD spectrum between 1400 to 2600 MHz spectrum. In comparison to Sunrise's spectrum holdings, Swisscom holds roughly 50% more FDD spectrum in these bands, and more than 500% more TDD spectrum. Notably, it does not appear to be making meaningful use of its 2600 MHz TDD holdings, which it has held since 2012, and it is likely using its combined 1800 MHz and 2100 MHz holdings much less intensively than Salt or Sunrise. Swisscom will also need to re-secure a large amount of spectrum in the re-licensing process, but as it enters the process with a 20% share based on its non-expiring spectrum, it is in a much stronger strategic position than Salt or Sunrise.

In conclusion, if Sunrise and Salt were to lose mid band spectrum, they would be constrained in their ability to compete for market share and, depending on traffic growth, may ultimately be forced to shed customers to prevent a decline in network quality. This would only serve to further widen the already substantial gap between the market shares of Swisscom and of Sunrise and Salt.

Figure 14: European MNOs: Difference in mid band spectrum holdings relative to equal split between operators



Notes: *We sampled 100 operators across 26 countries. We excluded very small new MNOs. The graph shows the delta in low band spectrum holdings in comparison to an equal split.*
Source: *The Gigabase, NERA's database of spectrum prices and holdings.*

3.4. The scope for redistributing spectrum between MNOs in 2028 is narrow

Existing asymmetries in mobile spectrum holdings in Switzerland are at the limit of acceptability from a competition perspective. If the 2028 re-licensing process results in Salt or Sunrise losing spectrum, they would likely be diminished as a competitive force, owing to lack of network capacity. A loss of spectrum in certain key bands could cause them to fail. Conversely, Swisscom could afford to relinquish some spectrum with little or no impact on its ability to compete.

Our conclusions on acceptable and unacceptable allocation outcomes, from a competition perspctive, are set out in Table 5. This explores the impact on each MNO of winning specific quantities of low band and mid band spectrum in the 2008 licence expiry process. We find that a modest redistribution of spectrum away from Swisscom and to Salt and/or Sunrise could be pro-competitive. Any other deviation from the status quo could weaken downstream competition.

[... ✂ ...]

Table 5: Impact of spectrum allocation on downstream competitiveness of Swiss MNOs

		Destroy May no longer be viable competitor	Weaken Likely to lose market share	Maintain Positioned to maintain share	Enhance Positioned to grow market share
Salt.	Low band	1 lot; or any outcome no 800	2 lots (including 1-2 lots at 800)	3 lots (including 2 lots at 800)	>3 lots (including ≥ 2 lots at 800)
	Mid band	<8 lots; or <3 lots at 1800	8-9 lots (Including 3-4 lots at 1800)	10-12 lots (incl. 4 lots at 1800)	>12 lots (incl. ≥4 lots at 1800)
Sunrise	Low band	≤4 lots; or any outcome no 800	4 lots (including 1-2 lots at 800)	5 lots (including 2 lots at 800	>5 lots (including ≥ 2 lots at 800
	Mid band	<8 lots; or <3 lots at 1800	8-9 lots (Including 3-4 lots at 1800)	10-12 lots (incl. 4 lots at 1800)	>12 lots (including ≥4 lots at 1800)
swisscom	Low band	1 lot; or 2 lots & ≤2 lots at 800	2-3 lots, including 2 lots at 800	4-5 lots (including 2 lots at 800)	>5 lots (including ≥ 2 lots at 800)
	Mid band	<8 lots; or <3 lots at 1800	8-11 lots (Including 3-4 lots at 1800)	12-16 lots (incl. 4 lots at 1800)	>16 lots (including ≥4 lotsat 1800)

Notes: *Red outcomes are ones where an MNO may be vulnerable to failure and market exit; Orange outcomes are ones where there is likely to be a lessening of downstream competition; Green outcomes are ones where downstream competition will likely be same or more effective than today.*
Source: *NERA.*

4. A competitive auction may not deliver a competitive downstream market

In this section, we explore the relationship between competition in an auction for mobile spectrum and competition in the downstream market. Reflecting the asymmetries between MNOs identified in Sections 2 and 3, we identify a significant risk that an auction without appropriate safeguards may not deliver an efficient outcome and could result in a lessening of downstream competition.

Our analysis is in three parts:

- In Section 4.1, we argue that although new entry may be a legitimate regulatory goal in general, it is rather unlikely in the Swiss mobile market, as the business case is probably unviable. Even if ComCom concludes that the award design must accommodate the possibility of new entry, our view is that a more important priority is preserving a downstream market with three strong competitors.
- In Section 4.2, we observe that two smaller MNOs are constrained in their ability to challenge Swisscom for spectrum, owing to financial asymmetries. This creates a challenge for ComCom and BAKOM when designing an award process. The rationale for using an auction is that the market should be best placed, through bidding competition, to identify the most efficient allocation of spectrum. However, in Switzerland, there is a material risk of market failure in an auction owing to the competitive imbalance between the expected participants.

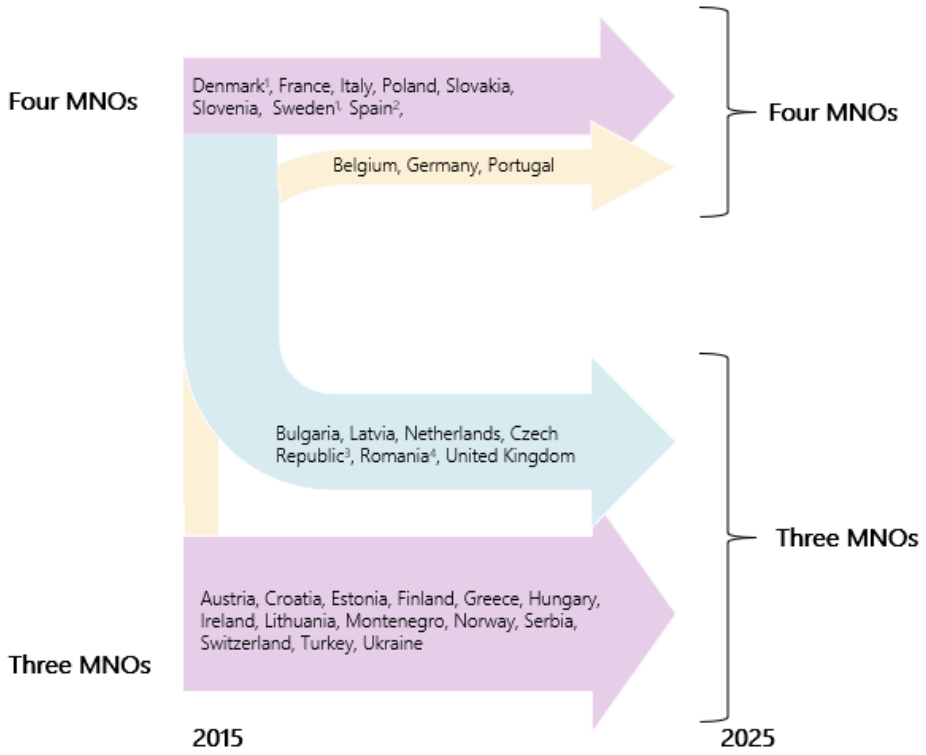
  In previous auctions in 2012 and 2019, BAKOM adopted spectrum caps as a tool to prevent extreme asymmetries in spectrum allocation between the three MNOs. In both these auctions, Swisscom won the maximum permitted spectrum under the caps in most available frequency bands. In hindsight, it is debatable whether allocative efficiency was realized or was distorted by the prudent financial compromises of two smaller bidders facing a relative goliath.
- In Section 4.3, we conclude that a 'standard' single stage clock auction with spectrum caps cannot provide the level playing field required to incentivize Salt and Sunrise fully to compete with Swisscom. Such an auction is at best likely to reinforce the status quo and at worst could result in a smaller MNO losing spectrum, thereby weakening three-player downstream competition. Accordingly, the case for auctioning rather than renewing expiring spectrum depends on whether it is possible to a identify an alternative auction design that reduces risk for the smaller MNOs.

4.1. New entry is rather unlikely

In our opinion, new entry in the Swiss mobile market is unlikely. The business case looks unattractive, and precedent in Switzerland and across Europe is against entry. Entry is also potentially undesirable: an entrant may take spectrum from Salt and Sunrise rather than Swisscom, but the smaller MNOs already have modest holdings and, as we have shown, losing spectrum may detract from their ability to compete with Swisscom.

In recent years, the general trend in European markets has been from four to three players. In Figure 16, we surveyed 31 European markets, identifying 20 three-player markets and only 11 four-player markets (of these 11, Denmark and Sweden have operators that share network and spectrum, and Spain's fourth operator is a hybrid MNO/MVNO, so these three countries might alternatively be classified as having only three wholesalers,). Between 2015 and 2025, 6 markets consolidated from four-to-three MNOs, whereas only 3 markets (Belgium, Germany and Portugal) have moved in the opposite direction. Competition authorities have generally been sympathetic to mergers between third and fourth players, for example in the UK, a merger between Vodafone and Three was recently approved with modest remedies.[17]

Figure 15: Number of MNOs by country, Europe, 2015 and 2025



Notes: [1]Countries where operators share spectrum or networks. [2]Spain consolidated to a 3-player market with merger of Orange and MASMOVIL but will return to 4 players with the launch of Digi Spain's network in H2 2025 (Digi will operate as a hybrid MVNO and MNO). [3]Excludes Nordic Telecom with 100 MHz at 3500 MHz. [4]Consolidation in Romania from 4 to 3 players was approved in July 2025.
Source: Analysys Mason (2025), 'The recent Vodafone-Three merger suggests that most Europeans may soon have three MNOs per country', TeleGeography, and NERA research.

The economics of the mobile industry favor larger operators, as they can spread their fixed costs across a larger customer base and potentially negotiate better deals with vendors. Smaller operators may struggle to achieve the necessary scale to be profitable and competitive. At the wholesale level, entry costs tend to be high, owing to the need to acquire spectrum, build networks and compete to quickly attract customers from rival networks in saturated markets.

[17] See: https://www.gov.uk/cma-cases/vodafone-slash-ck-hutchison-jv-merger-inquiry.

Switzerland looks a particularly unpromising market for new entry. The market is not large (under 9 million pops), limiting revenue potential, and wages are high, which increases entry costs. Building a new nationwide mobile network would be difficult (arguably impossible) owing to strict planning regulations, geographical challenges, and local opposition to new infrastructure. And power emission restrictions limit options for sharing existing towers. The market structure is also uninviting. Sunrise and Salt have long had only modest success in winning market share from Swisscom, which services over 50% of subscribers, and it is non-obvious why a new player would expect to be more successful.

For ComCom, even exploring new entry has risks. As we have shown, Salt and Sunrise already have limited spectrum portfolios and their ability to manage network congestion and compete with Swisscom for customers may be compromised if they lost spectrum to a new player. Salt's market share is under 20%, which is low for a wholesale operator; if it became smaller, its financial viability might be in doubt. There is a risk that new entry might fail but damage the second and/or third operator in the process, thereby weakening downstream competition in the long run. Subsequent consolidation may or may not alleviate such problems.

For all these reasons, we see no realistic possibility of there being a fourth national wholesale operator in Switzerland. A more limited form of entry, such as an MVNO that wants some capacity to offload traffic on to its own network, is more plausible but still seems unlikely. And without measures to ring fence the spectrum holdings of Salt and Sunrise, it would still bring risk. Accordingly, Swiss consumers may be better served by an award process that sustains or strengthens Salt and Sunrise as competitors to Swisscom, rather than one that prioritizes the exploration of new entry.

Addressing the legal obligation to enable entry

Notwithstanding the weak case for entry, we understand that ComCom and BAKOM may believe that they are under a legal obligation to design an award process that allows for the possibility of entry. We take no opinion on Swiss law on this issue, but we note that many regulators in Europe have determined that they have discretion to extend mobile licences if the current use case is considered reasonably efficient and renewal is deemed to be in the national interest.

Even if re-auction is considered necessary, auctions can be designed in a way that prioritize there being three viable national wholesalers. In Section 5.2, we explore how this can be done using a two-stage auction, in which the first stage allocates critical spectrum to three wholesale operators. In this scenario, a hypothetical new entrant bidder could compete in the first stage to displace an existing MNO or, if it is pursuing a hybrid-MVNO strategy, compete only in the second stage for incremental spectrum.

4.2. Asymmetries between the three MNOs are a barrier to fair competition in auctions

The Swiss telecommunications market is characterized by a significant competitive imbalance between the major players, with respect to financial power, market shares and network assets. Swisscom generated revenues of CHF 11bn in 2024, of which CHF 8bn came from the Swiss

market. This compares to 2024 revenues of CHF 3bn for Sunrise and CHF 1bn for Salt.[18] As of end-2024, Swisscom enjoyed a 52.6% mobile market share and a 48.3% fixed broadband market share; its closest competitors, Sunrise (28.8% and 32.5%) and Salt (18.6% and 6.4%) were well behind.[19] Swisscom also has the largest mobile base station network, with an estimated [... ✂ ...] sites, nearly as many as Salt ([... ✂ ...]) and Sunrise ([... ✂ ...]) combined.[20]

Owing to its formidable market share across both fixed and mobile, Swisscom enjoys significant economies of scale. If Swisscom anticipates shifts in market shares depending on who wins spectrum, this will impact how it values incremental spectrum relative to its rivals. Sunrise estimates that each 1% of mobile market share has an enterprise value of up to CHF [... ✂ ...] to Swisscom. For Sunrise, owing to its lower margins, high average data consumption and lower average revenue per user, an additional 1% market share is worth only CHF [... ✂ ...].[21] Sunrise estimates that Salt's value for each 1% of market share is slightly lower than Sunrise owing to its smaller subscriber base and weaker economies of scale.

As Ershov and Salant (2025) show, it is common in Europe for large mobile operators to buy more spectrum and spend more money in spectrum auctions than smaller operators, but still spend significantly less as a proportion of revenues and average revenue per user (ARPU).[22] The implication is that auctions are placing much greater financial strain on smaller players, and this can impact allocation. Such distortions are more likely in countries, such as Switzerland, where there is a single large operator with high market share.

Given this imbalance, it is reasonable to question whether a conventional spectrum auction can deliver an efficient allocation outcome.

[... ✂ ...]

This would not be a good outcome for downstream competition.

A key rationale for using auctions to award spectrum is that the willingness to pay of bidders should be broadly reflective of the value that they can generate for the economy and society. However, as pointed out by Borenstein (1988)[23] and reiterated by Cramton et al. (2011), "*an auction that awards spectrum to bidders with the highest values may not assure economic efficiency because the bidders' private values of the spectrum may differ from social values as a result of the market structure*."[24] We see a significant risk that an auction is distorted because Swisscom has

18 Publicly reported data.

19 Telegeography GlobalComms Database.

20 Data provided by Sunrise.

21 These calculations are based on a high-level analysis of enterprise value to adjusted EBITDA after leases (adj. EBITDAaL) multiples and margins using public data. As Salt is not a public company and does not report the same data, it is not possible to calculate an exact number for Salt.

22 Daniel Ershov and David Salant – "Auctions and mobile market competition: evidence from the European 4G auctions," https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4168166.

23 Severin Borenstein (1988). "On the Efficiency of Competitive Markets for Operating Licenses," The Quarterly Journal of Economics.

24 Cramton et al. (2011), "Using Spectrum Auctions to Enhance Competition in Wireless Services," The Journal of Law and Economics.

higher willingness to pay owing to its financial advantages and desire to defend its high market share.

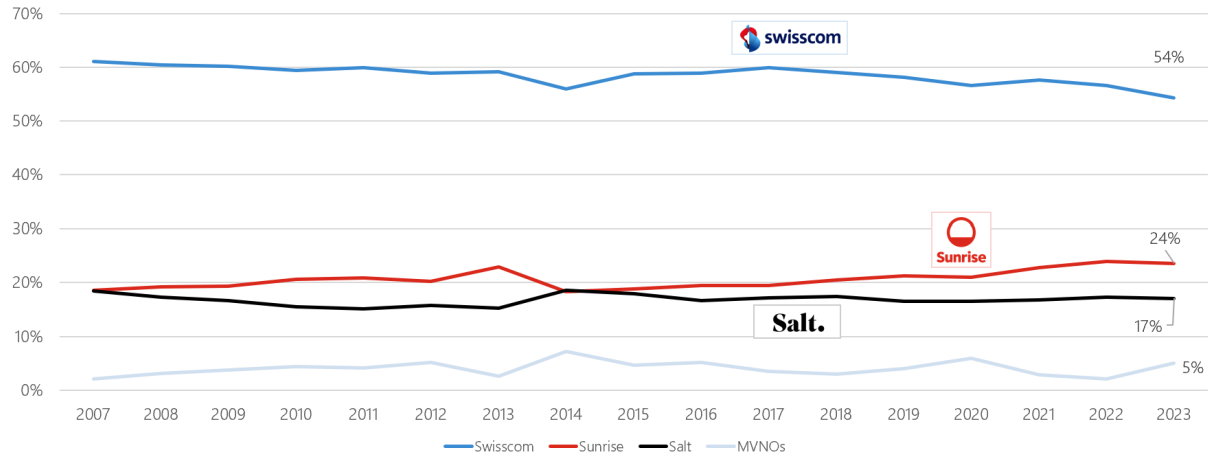
A relevant consideration here is the extent to which financial asymmetries may distort demand reduction incentives across operators in an auction. Demand reduction is a common bid tactic in multi-unit spectrum auctions whereby bidders deliberately sacrifice some of their demand below valuation with the aim of inducing a lower auction price for their remaining demand. Demand reduction tends to depress auction revenues but, in a situation with three sizable bidders, it will only impact the efficiency of allocation if bidders adopt different reduction strategies. The academic literature makes the point that bidders seeking larger quantities have stronger incentives to reduce demand, as they can save more money.[25] In certain circumstances, this effect could be pro-competitive, providing an incentive for large bidders to constrain their behaviour. However, in a situation where bidders have asymmetric financial strength, such as Switzerland, demand reduction incentives may in practice fall more heavily on weaker bidders. This will result in allocation outcomes that are both less efficient and less competitive. There may also be a cumulative effect across frequency bands and auctions, with the larger bidder securing a series of small-to-medium gains in MHz over rivals that on aggregate becomes a large advantage.

Over the last 15 years, the Swiss market has seen only modest shifts in spectrum shares. As illustrated in Figure 17, according to BAKOM data, MNO market shares have varied in relatively narrow ranges of between 54% and 61% for Swisscom and between 15% to 24% for Salt and Sunrise from 2015 to 2023. Asymmetry in spectrum allocation may have contributed to this stasis, as associated constraints on expanding network capacity may prevent smaller operators from pushing as hard to expand market share than they would if they had more flexibility.

The current asymmetric distribution of spectrum in the Swiss market is the legacy of two multi-band auctions: the 2012 4G auction; and the 2019 5G auction. In both these auctions, Swisscom won the maximum permitted spectrum in most of the available bands, with the remaining MHz split between Salt and Sunrise. It is questionable whether these outcomes were efficient.

[25] See, for example: Cramton, P. (1997), 'The PCS Spectrum Auctions: An Early Assessment', J. Econ. Manag. Strat. 6, 431–497.

Figure 16: Market share of Swiss MNOs, 2007-23



Notes: *Market shares reported by BAKOM for MNOs exclude MVNOs, so are lower than wholesale market shares reported by TeleGeography that we cite elsewhere in this paper.*
Source: *BAKOM (2025)*[26]

Several concerns arise both with respect to the behaviour of the bidders in the two Swiss auctions, and the subsequent usage of the spectrum:

- **4G auction.** Many commentators have highlighted the peculiar outcome of the 2012 auction, which used a package bid format known as the combinatorial clock auction (CCA): Swisscom acquired a package of 255 MHz spectrum that was essentially a superset of Sunrise's 160 MHz package but paid 25% less.[27]
  [… ✂ …]
  Salant (2014) describes the outcome as "unfair".[28]

- **5G auction.** The outcome of the 2019 auction was also impacted by strategic play. With 2x60 MHz of spectrum available at 700 MHz and 300 MHz available at 3500 MHz, there was an obvious outcome that would have shared the spectrum equally between three operators. However, the auction format allowed for bidders to win up to 2x15 MHz at 700 MHz and 120 MHz at 3500 MHz. In early bidding, it quickly became apparent that Swisscom was demanding spectrum at the cap. This created a strategic dilemma for Salt and Sunrise: should they fight Swisscom based on their business case and risk a price war; or concede early and accept a smaller quantity of spectrum at a lower price. Sunrise opted to concede at 700 MHz and Salt subsequently conceded at 3500 MHz.
  [… ✂ …]
  If so, this means the auction allocation was inefficient.

26 BAKOM, 'Market shares on mobile networks', Last accessed: June 4, 2025. https://www.bakom.admin.ch/bakom/en/homepage/telecommunication/facts-and-figures/statistical-observatory/structure-of-the-market-and-employment/market-shares-on-mobile-networks.html

27 See Marsden, R. (2024), 'Round-by-Round, Learnings from the First 35 Years of Spectrum Auctions', NERA, p.88-89, available at: https://www.amazon.com/Round-Round-Learnings-Spectrum-Auctions/dp/B0D55GTV6S.

28 Salant, D. (2014), 'A Primer on Auction Design, Management, and Strategy', MIT Press, p.141-142.

The suspicion that the existing allocation of spectrum in Switzerland is not fully efficient is reinforced by the technical evidence on spectrum use that we presented in Section 1. Sunrise estimates that its mobile sites are currently handling around [... ✂ ...] per site per month, compared to [... ✂ ...] for Swisscom and [... ✂ ...] for Salt. Given the much smaller spectrum holdings of Sunrise and Salt, this implies that Swisscom is using spectrum less intensively, and its network has significant actual or potential spare capacity.

Moreover, it is apparent that Swisscom acquired surplus spectrum in both auctions which to date it has not needed to deploy. For example, it does not appear to be making meaningful use of its 45 MHz at 2600 MHz TDD nor its 50 MHz at 1400 MHz. Our understanding is that it has only deployed 100 MHz at 3500 MHz, with the remaining 20 MHz fallow (pending technology upgrades that would allow 5G carriers greater than 100 MHz), whereas Salt could be deploying that spectrum now in its 5G network. We presume that Swisscom has deployed all 2x15 MHz at 700 MHz for its 5G network but this raises a question as to why it also needs 2x15 MHz at 900 MHz, given it plans to turn off its 3G network. These blocks of bandwidth have future option value to Swisscom but it is not unreasonable to think that some of this spectrum might be in better use today if it had been acquired by Salt or Sunrise.

Looking forward to the forthcoming award, the power imbalance between the operators has not meaningfully changed. Therefore, if an auction were run along similar lines to 2019, there is a high likelihood that Swisscom would be positioned to buy an outsize share of spectrum.

4.3. A single stage auction with spectrum caps cannot be expected to deliver an efficient pro-competitive allocation

In Swiss auctions, spectrum caps have been the primary tool used to prevent allocation outcomes that are considered undesirable from a competition perspective. These caps have been effective in a narrow sense, in that Swisscom's acquisitions have often been at the cap, so the constraints may have prevented it from buying more. However, they were ineffective in 2019 in encouraging Salt or Sunrise to compete against Swisscom for marginal spectrum. In 2012, they provided no protection to Sunrise from the limitations of its (substantial) budget constraint and its strategic vulnerability owing to its need to secure a large amount of 900 MHz. Looking forward, if ComCom and BAKOM want to promote a competitive award process, it is evident that spectrum caps may not be a sufficient measure by themselves to deliver an efficient outcome.

In Table 6, we compare the spectrum caps used in the 2012 and 2019 auctions with Swisscom's actual acquisitions. Most purchases are at the caps and others are close to the cap. In this regard, Swisscom's behaviour is not particularly unusual. There are many other instances of strong market leaders bidding to the cap. For example, we observe that market leader HT bid to its cap in both Croatian 5G auctions (although we note though that the caps were tighter than in Switzerland).

Table 6: Swisscom spectrum acquisitions vs caps, 2012 and 2019

Auction & Year	Band	Cap 1	Cap 2	Cap 3	MHz won	At cap?
2012	800	-	2x25	2x135	2x10	Yes
	900	2x20			2x15	Yes
	1800	2x35			2x30	No
	2100	2x30			2x30	Yes
	2600 FDD	-			2x20	No
	2600 TDD	45 (supply)			45	Yes
2019	700 FDD	2x15			2x15	Yes
	700 TDD		25		-	N/A
	1400 (core)				25	Yes
	1400 (other)	50 (supply)			25	No
	3500	120			120	Yes

Notes: Bands where Swisscom bought to the cap are highlighted in red.
Source: *The Gigabase, NERA's database of spectrum prices and holdings.*and original BAKOM auction releases.

Such outcomes suggest that spectrum caps, in the context of a single stage auction, constrain total acquisition but do little to alter competitive dynamics, particularly in markets with a well-established incumbent. If an auction is adopted for the forthcoming award, caps will again be necessary to prevent undesirable allocations. However, by themselves, caps will not work as an incentive for Salt and Sunrise to risk competing with Swisscom for marginal spectrum if this could lead to high prices for their entire spectrum portfolio.

To illustrate the limitation of spectrum caps, suppose this award was re-run with the same caps as the 2012 auction (when the same spectrum was awarded) but with a single stage clock auction format, as used in 2019. The following analysis suggests that this would likely result in an outcome similar to the 2012 auction, with Salt and Sunrise lacking incentive to challenge Swisscom's large holdings. We also see a non-trivial risk that Swisscom could gain spectrum and/or Salt and Sunrise might inefficiently take spectrum from each other. Such allocation outcomes would be perverse given our analysis in Section 1 has already demonstrated that Salt and Sunrise are close to minimum acceptable holdings from technical and downstream competition perspectives, and an efficient auction should be exploring whether they should gain spectrum from Swisscom.

Consider the bidding incentives of participants in each of the FDD bands in such an auction:

- **800 MHz.** All three operators would have strong incentives to settle for 2x10 MHz each to protect their 4G networks. However, as the cap would allow bidders to bid for up to 2x25 MHz, each operator has
  [… ✂ …]
- **900 MHz.** Bidders can be expected to at least demand their existing holdings. In principle, the caps provide the opportunity for Salt and Sunrise to explore if they could take a block

from Swisscom, thereby reducing inequality in low band spectrum holdings.
[... ✂ ...]

- **1800 MHz.** The auction should ideally test if Sunrise wants to expand its holdings relative to Salt and Swisscom, but if it does so, it risks retaliation in low band. Swisscom may be tempted to pursue an extra block in expectation that smaller bidders might concede demand rather than endure price increases in a band where they need to retain a minimum of 2x20 MHz to secure 4G continuity.
- **2100 MHz.** An auction should explore if Sunrise (which only has 2x15 MHz) has the value to expand its holdings, most likely taking MHz from Swisscom, but if it does so, it risks retaliation in low band. It is also possible that Sunrise might inefficiently gain spectrum at the expense of Salt rather than Swisscom because the former is more price sensitive.
- **2600 MHz FDD.** The lax 2x135 MHz cap affords Swisscom plenty of room to explore if it can gain spectrum at the expense of Salt and Sunrise. Salt and Sunrise are disproportionately likely to consider inefficient concessions in this band, even though they would lose valuable 4G capacity and future 5G capacity, as these frequencies are less critical to their business.

In conclusion, given the asymmetries between the three MNOs, a single stage clock auction with spectrum caps cannot be expected to incentivize valuation-based bidding. And without valuation-based bids, an efficient, pro-competitive spectrum allocation cannot be guaranteed. A more innovative design will be required if Salt and Sunrise are to be induced to compete with Swisscom for marginal spectrum. In the next section, we explore DotEcon's proposal for a two-stage auction, which has potential to address this concern. Without such innovation, an auction is likely redundant, as it cannot be expected to improve on the status quo associated with direct renewal and, without tighter caps than in 2012, could deliver a worse outcome for the Swiss economy and its citizens.

5. Allocation options for the expiring spectrum

In this section, we identify viable approaches for the re-award of the spectrum in the expiring licence bands. In the previous section, we concluded that a 'standard' single stage Clock auction of all available frequencies is not a good option. Even with relatively tight caps, this approach could potentially expose the two smaller operators to losing critical spectrum and/or paying a very high price, depending on how aggressively Swisscom bids in the auction. Such outcomes would likely not represent an efficient allocation of spectrum, could cause disruption to consumers and weaken downstream competition, all contrary to ComCom's objectives. In our analysis, we therefore focus on award options that provide actual or de facto guarantees that three MNOs will emerge from this process with viable spectrum portfolios.

In our opinion, the actual or de facto guarantees necessary to ensure MNO viability can be achieved either through direct renewal of existing licences or an auction structure with appropriate safeguards. DotEcon (the company advising BAKOM on auction design[29]) recently published a paper exploring the case for "two-stage auctions" for spectrum in expiring licence bands.[30] Although this paper does not mention Switzerland, the proposed approach has obvious relevance to the Swiss market.

The key features of a two-stage auction are:

1) the first stage can provide certainty over access to critical spectrum; and

2) the second stage focuses competition on incremental spectrum.

As a consequence of this structure, smaller bidders are less exposed to demand reduction incentives and strong bidders have less ability to exert market power, as compared to a one-stage auction.

For a two-stage auction to be successful, the regulator must find an appropriate balance between spectrum available in each stage. The first stage package must be large enough to ensure that at least three network operators have a critical mass of spectrum. As we discuss below, in our opinion, critical mass should include both spectrum necessary for immediate network continuity and a quantity of MHz in both low and mid bands sufficient to ensure that Salt and Sunrise will not be exposed to capacity constraints if they pursue growth strategies.

On this basis, we have identified three allocation options based around renewal and/or a two-stage auction structure:

1. Full renewal of existing spectrum holdings (discussed in Section 5.1).

2. Two-stage auction for all spectrum (discussed in Section 5.2).

3. Low band extension and two-stage auction for mid band (discussed in Section 5.3).

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29 (24226) 808 Consulting and support for the allocation of mobile frequencies via an electronic spectrum auction, https://www.simap.ch/en/project-detail/5eebae7b-6724-4953-b74c-d1fed473660a.

30 DotEcon perspectives, Stirred, not shaken: a recipe for reassigning spectrum, 2025. Available at: https://www.dotecon.com/wp-content/uploads/2025/02/Stirred-not-shaken.pdf.

These are broad options, with Option 3 being a hybrid of Options 1 and 2. Within each option, there is scope for variation with respect to the detailed award rules and execution. In the following, we describe each option, explore some relevant variants, and lay out their pros and cons from both regulatory and operator perspectives. Specifically, on pros and cons, we assess each option on five metrics of particular relevance to spectrum awards: certainty of allocation; efficiency of allocation; impact on downstream competition; revenue generation / fair pricing; and simplicity of process.

5.1. Option 1: Full renewal of existing spectrum holdings

A full renewal of the existing holdings would involve issuing new licences to each MNO for their existing spectrum portfolios at 800, 900, 1800, 2100 and 2600 MHz, starting immediately from expiry of the existing licences. The complexity of designing and implementing an auction is avoided but the regulator must still make decisions with respect to the level of renewal fee, any changes to the licence terms and conditions, and the licence duration. The key advantages of this approach are simplicity and certainty, including an expectation that downstream competition based on three MNOs will endure. Potential downsides include the lack of any role for the market in determining allocation and prices, and the possibility that the current allocation is not fully efficient.

Precedent for full renewal of spectrum licences

There are many examples of OECD countries that have opted to renew expiring licences in the same or equivalent band. Examples include:

- Australia, which recently announced plans to renew almost all existing spectrum holdings, subject to new spectrum fees;
- Canada, which has opted to renew all expiring mobile licences, subject to substantial annual fees;
- Germany, which granted a five-year extension in 2023 for the 800 MHz, 1800 MHz, and 2.6 GHz bands, aligning their expiration dates to facilitate future spectrum planning;
- the United Kingdom, which has renewed spectrum holdings at 900 MHz, 1800 MHz, and 2100 MHz on an indefinite basis (5-year rolling renewal), subject to market-price based annual fees;
- Spain, which added ten years to the duration of all major mobile bands (800 MHz, 900 MHz, 1800 MHz, 2.1 GHz, 2.6 GHz, and 3.5 GHz), in 2023, on a no-fee basis; and
- The United States, which has a policy of automatic renewal at token fees for any operator that has met and sustained the build-out requirements.

The German case is particularly relevant for Switzerland given that it involves many of the same frequency bands, and the fact that Germany had hitherto preferred to re-auction expiring spectrum licences. In March 2025, BNetzA, the German telecommunications regulator, decided to prolong operators' existing licenses in the 800, 1800 and 2600 MHz bands.[31] The aim was to align their expiry with that of the 700, 900, 1400, and remaining 1800 MHz spectrum licenses. In their decision paper, the BNetzA cites sustainable and fair competition and efficient use of frequencies as a reason for the extension.

Much of BNetzA's reasoning for renewal is directly relevant to the Swiss market:

- **Fair competition.** The BNetzA reasoned that the aim of the extension is to make the spectrum available in a larger and more competitive context. A later reallocation would harmonize the license durations for spectrum expiring after 2030, in 2033 and in 2036. This will allow more spectrum to be included in the award and counteract regulation-induced scarcity.

  The BNetzA says that this option provides operators with more spectrum, while at the same time giving more time for emerging technical and market developments to materialize:

  > "*The more spectrum is made available in an allocation procedure, the more likely it is that allocation applicants will be able to obtain a sufficient amount of spectrum for adequate business continuity. If smaller amounts of spectrum (in total and in the individual bands) are made available in successive award procedures, operators have strong incentives to immediately satisfy their spectrum requirements deemed essential by submitting maximum bids. The mere prospect of being able to acquire the required spectrum in a future allocation procedure does not constitute a comparably secure basis for the necessary investment decisions.*"[32]

- **Continuation of vital connectivity.** The BNetzA agreed with established MNOs that the 800 (in particular),1800 and 2600 MHz bands are crucial to operators' networks and their ability to comply with coverage obligations. The extension of operators' current allocations prevents a disruption to networks and a resulting reduction in network quality. It also gives established network operators the opportunity to expand their networks to cope with the potential future loss of specific frequency allocations without any noticeable consequences for end customers.
- **Combined low band, and mid band allocation.** BNetzA highlights that allocating all spectrum at once ensures operators can arbitrage between similar spectrum – in particular in low band – to ensure continued coverage and the acquisition of spectrum reflecting its business's requirements.
- **Clarity.** A postponed reallocation procedure allows more time for clarity on the harmonization status of any new IMT bands in the sub-1 GHz bands. The World Radio Conference in 2031 is poised to provide further insights into the use of the 614 – 694 MHz and the 6.425 – 7.125

[31] BNetzA (2025), Entscheidung über die Nichtanordnung eines Vergabeverfahrens und Verlängerung von Frequenzen in den Bereichen 800 MHz, 1.800 MHz und 2.600 MHz sowie eine Entschließung zur späteren Durchführung eines wettbewerblichen Vererfahrens. https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Frequenzen/OffentlicheNetze/Mobilfunk/Pr%C3%A4sidentenkammerentscheidung2025.pdf?__blob=publicationFile&v=2.

[32] Ibid. p.27

MHz band, which could influence operators' preferences and demand for the spectrum that is to be re-awarded in the future.

Renewal fees

It is widely accepted that it is best practice not to set fees above a conservative estimate of market value. By market value, we mean an estimate of the price that the spectrum might sell for in a competitive auction not impacted by anti-competitive or strategic bidding.

Setting renewal fees no higher than a conservative estimate of market value is best practice because it helps avoid the significant harms that can result from overpricing spectrum. Spectrum valuation is inherently imprecise, and the market value of mobile spectrum has declined in the 5G era owing to increased supply, slowing data demand, technological progress, and higher capital costs. Referencing historical auction prices without appropriate adjustment risks overstating the current value. If fees are set too high based on historical benchmarks, mobile operators may face financial strain, leading to underinvestment, reduced downstream competition, and, ultimately, higher prices or lower quality for consumers.

The principle of asymmetric risk further justifies a conservative pricing approach. While setting fees slightly below the actual market value may have a limited impact – mainly resulting in distributional shifts – setting them above market value poses a much greater risk. It can lead to market failure by making spectrum unaffordable or unattractive, stalling infrastructure development and technological deployment. By applying a substantial discount, regulators build in "headroom" to accommodate future market shifts, enable spectrum trading, and reduce the industry's financial burden.

Some countries have opted to set minimal or no renewal fees, for example, the United States and Spain. This approach offers several advantages. Firstly, it makes it easier to trade spectrum because licences are not encumbered by high fees or potential balance sheet write-downs. Secondly, at a time when operators are struggling with low profitability and high network build out costs, it frees up capital to invest in networks or engage in downstream price competition. A downside of this approach is that it deprives the state of revenues for a public resource and, in cases where renewal terms were not previously defined, may deliver windfall gains to incumbent MNOs.

Some other countries have chosen more aggressive pricing structures. The United Kingdom charges annual fees for 900, 1800 and 2100 MHz spectrum that are based on a "*conservative estimate of market value*", derived from benchmark prices for UK and European auctions. One issue that has arisen with this approach is that because spectrum prices have been declining worldwide, whereas general inflation has gone up, Ofcom's dependence on historic, inflation-adjusted benchmarks led it to set prices in 2018 that are now significantly above market value. Ofcom recently concluded a review of fees that implements substantial reductions.[33] Australia is currently consulting on renewal pricing and also proposes to use international benchmarks to estimate market value. A novel feature of the Australian approach is that it proposes to apply an index to historic benchmarks linked to increasing spectrum supply and trends in mobile service revenues.[34]

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33 Ofcom (2025), "Statement: Review of Annual Licence Fees". Available at: https://www.ofcom.org.uk/spectrum/innovative-use-of-spectrum/consultation-review-of-annual-licence-fees.

34 ACMA (2025), "Expiring spectrum licences (stage 3) – preliminary views". Available at https://www.acma.gov.au/consultations/2025-04/expiring-spectrum-licences-stage-3-preliminary-views.

This approach reduces the benchmark value of historic benchmarks, thus at least partially addressing the global decline in spectrum prices.

We return to the issue of appropriate fee levels and reserve pricing in Section 6.2.

Coverage and quality of service obligations

Some countries have opted to impose coverage and quality of service obligations either partially or fully instead of charging a fee for renewal. For example, in its recent decision to extend the licenses for the 800, 1800 and 2600 MHz spectrum, the German regulator did not charge any upfront fee. Operators were only subject to the continued payment of administrative annual fees. Instead, the regulator imposed significant coverage and quality of service obligations in exchange for the license extension. In explicit recognition of this trade-off, the BNetzA highlighted that if the annual fees for the existing spectrum were to be raised, then the coverage and quality of service obligations would need to be lowered accordingly.[35]

When taking this approach, it is critical that the regulator understands the costs associated with any obligations that go beyond what a commercial operator could be expected to deliver, absent regulation. The combined value of these costs and any renewal fees should be below a conservate estimate of market value. Otherwise, operators might opt not to acquire valuable spectrum or be obliged to divert precious resources from more productive, consumer-welfare enhancing activities, such as 5G network development and price competition.

Most countries that opt for this approach are seeking to close gaps in mobile coverage. This may not be needed in Switzerland, as all three operators already provide excellent geographic coverage. For example, Sunrise advises us that their 4G service provides outdoor coverage to 97.4% of Switzerland's landmass and 99.99% of the Swiss population. One area where obligations may be more relevant is with respect to network security and resilience.

Licence duration

We see three plausible options for duration for new spectrum licences:

1. A standard term of 15 years;
2. A longer term of 20-25 years; or
3. Limited licence extension (c. 6 years) to align with other bands.

In recent auctions, licences in Switzerland have had a duration of 15 years. This duration is generally seen as the minimum term to enable operators to invest in new equipment and access new frequency bands. Deploying new mobile networks involves significant upfront costs for spectrum acquisition and infrastructure development. Therefore, operators require sufficient time to recover these investments and plan for network upgrades. Shorter license durations may deter investment owing to the uncertainty surrounding long-term returns and technology planning.

[35] BNetzA (2025), Entscheidung über die Nichtanordnung eines Vergabeverfahrens und Verlängerung von Frequenzen in den Bereichen 800 MHz, 1.800 MHz und 2.600 MHz sowie eine Entschließung zur späteren Durchführung eines wettbewerblichen Vererfahrens, https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Frequenzen/OffentlicheNetze/Mobilfunk/Pr%C3%A4sidentenkammerentscheidung2025.pdf?__blob=publicationFile&v=2.

While the European Commission had initially proposed a minimum license term of 25 years to increase the security of operators' investments, the final text of its Telecoms Code only provides for a minimum term of 15 years.[36] The trend in Europe has been towards longer license durations, with most countries now adopting terms of at least 20 years. Nevertheless, in specific cases, the duration of licenses has been reduced to align them with the expiry of existing licenses, for example Denmark's 900 MHz licenses.

The case for longer licence terms generally applies to bands that are subject to investment in new technology and deployment of new equipment. It is arguably less relevant to bands that are already in use. In this case, a shorter extension may be adequate provided this broadly aligns with the lifecycle of embedded equipment.

With respect to the bands available in this process, a potential extension to align with expiry of the 700 and 3500 MHz bands in 2034 could provide continuity to MNOs and future regulatory flexibility. As in Germany, the expiry date would roughly align with the sunsetting of 4G technology, so the issue of safeguarding investments in 4G would be addressed. Aligning expiry dates might also enable trading of 700 MHz and 900 MHz, so Salt and Sunrise could explore consolidating their low band holdings into two bands (i.e. 800 MHz plus one other), which would be a more efficient way of deploying 5G. And with all major bands expiring in 2034, the regulator would preserve a future opportunity to revisit mobile spectrum allocations in the round. A significant downside is that the term would not be long enough to support investment in 5G in the expiring bands, so operators may require some certainty regarding their ability to renew critical spectrum in the future.

Pros and cons of Option 1: Full renewal

We assess this option against five criteria:

Criteria	Assessment	Explanation
1. Certainty of allocation	Excellent	Full renewal provides complete certainty to operators over spectrum availability, with is very advantageous for 4G-5G transition planning. Extending all licences only to 2034 could create future uncertainty for operators but this could be addressed through regulatory assurances on future renewals.
2. Efficiency of allocation	Acceptable but may not be optimal	Without any bidding, there is no opportunity for market to explore alternative allocations that may be more efficient than the status quo. The primary concern here is not exploring scope for some transfer of spectrum from Swisscom to Salt and Sunrise. More positively, eliminating bidding scenarios where [... ✂ ...] means a very inefficient allocation is not possible.
3. Impact on downstream competition	Sustains existing competition	Full renewal preserves the status quo with three credible wholesalers. The risk that a smaller MNO falls below critical mass spectrum holdings is eliminated. However, the possible upside for competition if smaller operators expand capacity is not explored.

[36] Crowell, "The European Union Adopts a New Telecoms Code", https://www.crowell.com/en/insights/client-alerts/the-european-union-adopts-a-new-telecoms-code.

4. Revenue generation / fair pricing	Good	All prices will be set administratively. BAKOM can trade off government need for revenue and industry desire to avoid high spectrum acquisition costs that could divert funds from investment. However, the potential to use price discovery to identify bidder preferences is lost.
5. Simplicity of process	Excellent	Full renewal is the simplest award process. It is supported by all MNOs.

Overall, we conclude that full renewal is a satisfactory option. This option scores very well on certainty and simplicity and mitigates risk for the Government and operators. It precludes outcomes in which spectrum is allocated very inefficiently and/or grossly overpriced and will preserve existing downstream competition. However, it precludes exploration of alternative allocation outcomes, notably those in which Salt or Sunrise gain spectrum from Swisscom, that might be even more efficient and better for downstream competition.

5.2. Option 2: Two-stage auction for all spectrum

In a two-stage auction, allocation takes place in two distinct bidding phases, rather than the more standard one-stage auction. In the first stage, a subset of the available spectrum is allocated and priced, typically in the form of a limited number of spectrum 'packages', which may combine spectrum from multiple bands. The packages can be tailored to ensure that there will be a minimum number of operators (three in Switzerland) that can provide wholesale mobile network capacity and that each of these operators has a critical mass of spectrum to be competitive. In the second stage, the remaining spectrum is allocated and priced. Typically, spectrum in this phase is packaged into smaller units, so that bidders have wide flexibility to compete for incremental portfolios that add to their first stage packages.

This setup is particularly relevant in settings where:

1. some or all the available spectrum is already in use in existing networks or essential to deploy a new mobile technology, so operators risk being competitively crippled or failing if they do not secure certain frequencies; and
2. there are significant asymmetries between the bidders, raising concerns that the efficiency of a single-stage auction might be compromised by demand reduction, budget constraints and/or aggressive tactical bidding by a strong bidder.

These conditions both apply in Switzerland. All the available spectrum is associated with expiring licences and Swisscom is obviously stronger in an auction owing to its market leadership position and superior finances. We see an opportunity for the first stage packages to be designed in a way that ensures that three operators emerge with minimum portfolios that both support 4G and 5G network continuity and ensure competitive viability. To deliver this, the first stage packages will need to be reasonably symmetric, accounting for all mobile holdings, not only those in this process. This approach would then set up Salt and Sunrise to compete with Swisscom in the second stage for incremental spectrum on a more level playing field than has been the case in prior multi-band awards in Switzerland.

As discussed below, the DotEcon paper appears to anticipate a more dynamic structure for the first stage than has been previously attempted in European awards using two allocation stages. We see

some merit in exploring this approach but foresee risk to Salt and Sunrise if the first stage rules and package composition are too weighted in favour of within-auction competition rather than downstream competition.
[... ✂ ...]

Precedent for two-stage auctions

Although two-stage auctions are a relatively new concept and not well-described in the academic literature on auctions, we have identified eight recent European auctions that broadly followed this structure. These are described in Table 7.

A two-stage auction is often considered where existing mobile operators have made significant investments in their networks, and where losing the spectrum on offer constitutes a threat to their business. Regulators recognise that mobile operators now face a more challenging market than in the 2010s with slowing data growth, diminishing ARPUs and substantial sunk-cost investments. In this environment, operators may face financial constraints in their ability to compete for critical spectrum, and a one-stage auction could expose the market to outcomes where a key competitor loses essential capacity and the ability to leverage efficiently spectrum-dependent technology. A two-stage auction provides a mechanism to ensure at least three operators secure a critical mass of spectrum and focuses competition on marginal spectrum, thereby eliminating the possibility of auction outcomes that could undermine downstream competition and destroy consumer welfare.

The implementation of the two-stage auctions we have highlighted in Table 7 mirrors this thinking. None of the auctions were competitive in the first stage. All de-facto renewals only saw applications for the first stage packages by existing incumbent operators. Any competition for the spectrum was limited to the second stage, where the remaining spectrum was sold.

Stage one packages

The stage one packages in Switzerland should be tailored to achieve two aims:

1. **Ensure that the three existing MNOs retain sufficient spectrum to continue cost effectively their existing 4G network operations.** In our opinion, this requires that Salt, Sunrise and Swisscom all secure a minimum of 2x10 MHz at 800 MHz and 2x20 MHz at 1800 MHz.
2. **Ensure that three network operators have sufficient overall capacity to grow their 5G networks and maintain sufficient capacity and quality of service to be able to compete for subscribers.** In our opinion, this requires that Salt, Sunrise and Swisscom each have a minimum of 2x25 MHz of low band spectrum (across the 700, 800 and 900 MHz combined) and 2x50 of mid band FDD spectrum, of which at least 2x30 MHz should be at 1800 MHz or 2100 MHz.

Table 7: Examples of European spectrum auctions with two allocation stages

Award	Bands	Renewal?	Spectrum caps	Incumbent set-aside	Entrant set-aside	# Bidders	Competi-tiveness 1st stage	Competi-tiveness 2nd stage	New entrant / non-MNO participation?	New entrant / non-MNO winners?
Belgium (2022)	700, 900, 1400, 1800, 2100, 3500	Partial	Medium	Actual	Yes	5	N/A	High	Yes	Yes
Denmark (2016)	1800	Partial	High	De facto	None	3	None	High	No	No
Denmark (2019)	700, 900, 1400, 2300	Partial	High	De facto	None	3	None	High	No	No
Denmark (2021)	1400, 2100, 2300, 3500, 26000	Partial	High	De facto	None	3	None	High	No	No
France (2020)	3500	No	Lax	De facto	None	4	None	Medium	No	No
Greece (2020)	700, 2100, 3500, 26000	Partial	Medium	De facto	None	3	Low	Low	No	No
Hungary (2021)	900, 1800	Yes	Medium	De facto	None	3	None	Low	No	No
Netherlands (2024)	3500	No	Medium	De facto	None	3	None	Low	No	No

Source: *The Gigabase, NERA's database of spectrum prices and holdings.*

When constructing these packages, there are several complications that must be considered:

1. **Substitution across low band frequencies**

   In a 5G network, 700, 800 and 900 MHz are essentially interchangeable. Given that 800 MHz is dedicated to 4G, the 700 MHz and 900 MHz are substitutes for 5G cell edge coverage and capacity. However, only 900 MHz is available in this award. And, because 700 MHz is distributed asymmetrically across the three MNOs, operators have different critical mass requirements for 900 MHz. Specifically, [... ✂ ...]

   In summary, to propel all operators to critical mass in low band spectrum, the first round packages will need to be asymmetric. Under any other approach, [... ✂ ...], thereby undermining the benefits of having an auction. For example, simply reserving one lot of 900 MHz for each operator would make it [... ✂ ...]. And reserving two lots at 900 MHz for all bidders may [... ✂ ...].

   Asymmetry in first round package structure may be contentious. For example, Swisscom might categorize it as a 'reward for failure' in the 700 MHz auction. One way to ease such concerns could be to limit the term of new 900 MHz licences so that they expire at the same time at 700 MHz in 2034 and set a reserve price at least equivalent to the pro-rated selling price of 700 MHz in the last auction. A further advantage of this approach is that it would turn the new 900 MHz licences into direct substitutes for 700 MHz, [... ✂ ...].

2. **Substitution across mid band frequencies**

   The four mid band frequency bands are substitutes for each other but exhibit much more pronounced hierarchies in terms of performance and value than low band. The 1800 MHz and 2100 MHz have the highest value, owing to their superior propagation, especially for uplink. The 3500 MHz has the weakest propagation and lowest per MHz value but offers superior bandwidth for 5G. The two 2600 MHz bands are in an intermediate position with respect to propagation, but their value is complicated by ecosystem challenges: they are third choice after 800 MHz and 1800 MHz for 4G capacity, and second choice to 3500 MHz for adding high capacity 5G service owing to limited block size. In Switzerland, the FDD spectrum is integrated into local networks, whereas it is our understanding that Swisscom's TDD spectrum has been little used.

   Our view is that downstream competition and continuity goals can be achieved with symmetrical stage one packages for mid band spectrum. With all mid band frequencies except 3500 MHz expiring in 2028, the starting position for operators going into an auction is more balanced than in low band. There are differences in 3500 MHz holdings but importantly, all three operators have critical mass (80 MHz or more) and that band is more a complement than substitute for the other mid band frequencies. Notably, 1800 and 2100 MHz are strong complements to 3500 MHz in providing uplink capacity.

   Each MNO needs a critical mass of capacity for 4G and 5G networks. Given the set-up of existing 4G networks, it would be inefficient for any mobile operator to have less than 2x20 MHz of 1800 MHz spectrum. Operators also need additional capacity for 4G in urban areas and 5G more generally. For the reasons we set out in Section 3, we think that 2x50 MHz across the three FDD bands is a reasonable base level of capacity, with all operators then being positioned to compete for additional capacity in Stage 2.

Of this 2x50 MHz, we anticipate that MNOs will require at least 2x20 MHz at 1800 MHz for 4G and a further 2x10 MHz at1800 or 2100 MHz for 5G uplink capacity. The remaining 2x20 MHz could be in any of the three FDD bands. As operators may mildly prefer 1800 MHz over 2100 MHz and more strongly prefer 1800 and 2100 MHz over 2600 MHz, some thought is required as to how to structure the first stage packages across the bands, and how to set reserve prices fairly. Depending on structure, there could be a degree of competition for 1800 MHz and 2100 MHz in the first stage, or this could be deferred to the second stage.

3. **New entry**

   As discussed in Section 4.1, we think new entry in Switzerland is rather unlikely. If there is a new entrant, it would likely either (a) replace an existing MNO, perhaps acquiring all or most of that MNO's network; or (b) be a hybrid MNO-MVNO, deploying some own spectrum and otherwise relying on wholesale access to an existing MNO's network. Realistically, we see no room at this time for a fourth wholesale operator, so we recommend that BAKOM prioritize the design of three packages for three wholesale operators in the first stage.

   We understand that ComCom may be concerned that it is legally obliged to accommodate the possibility of new entry in the award. A two-stage auction structure could accommodate either type of entry identified above. An aspiring wholesaler could compete to knock out an incumbent in Stage 1, and a hybrid MNO-MVNO could compete for a limited spectrum portfolio in Stage 2. A concern with allowing a fourth bidder into the Stage 1 process is that the auction might become a proxy for a takeover bid, with prices based on broader market value rather than spectrum value.

In Appendix A, we undertake an analysis of different package structures for Stage 1, exploring variations in the quantity of spectrum, the composition of low band and mid band spectrum, and symmetry and asymmetry in package structure across bidders. We make the following observations:

1. We recommend larger Stage 1 packages (c. 120 MHz) over smaller ones. This strengthens smaller bidders going into Stage 2 and tends to focus competition on marginal spectrum where there may be scope for efficiency improvements.
2. Stage 1 packages should provide at least an option to secure 2x10 at 800 MHz and 2x20 at 1800 MHz at reserve price for 4G continuity. Without this security, the auction is vulnerable to strategic play and potential inefficient allocation outcomes.
3. The differences between the three MNOs in holdings of 700 MHz is a source of significant asymmetry between the bidders, [... ✂ ...]. The best way to address this is to create tailored asymmetric Stage 1 packages that consider existing holdings.

Accordingly, we recommend that BAKOM consider the following Stage 1 packages:

- **Low band:** Operators are guaranteed 2x25 MHz of spectrum in low band after Stage 1. This amount includes each operator's existing holdings at 700 MHz. This means that any three of the following potential bidders can acquire at most the following spectrum in Stage 1 across the 800 MHz and 900 MHz bands:

- Swisscom: 2x10 MHz[37]
- Salt: 2x15 MHz[38]
- Sunrise: 2x20 MHz[39]
- Entrants (if applicable): 2x25 MHz each

We further propose that bidder Stage 1 demand for 800 MHz be capped at 2 lots to ensure that all three operators have the opportunity to secure critical mass 4G holdings.

- **Mid band:** 100 MHz, with a guaranteed option to acquire at least 2x20 MHz at 1800 MHz and 2x30 MHz across the 1800/2100 MHz bands.

A novel aspect of the DotEcon paper is the potential for operators to select from a menu of spectrum blocks in Stage 1, with the potential for competition if first preferences conflict. This approach could be accommodated here. Specifically, auction rules could be implemented that give bidders some flexibility to compete for spectrum across bands in Stage 1 while maintaining the overall package size in MHz for both low and mid band spectrum.

In the likely scenario where only the three MNOs participate in the auction:

- No competition for low band would be expected. The likely outcome would be [... ✂ ...].
- There would likely be excess demand for 1800 MHz and 2100 MHz. We propose that 2x20 MHz at 1800 MHz be allocated to each operator at reserve price to ensure 4G continuity. Bidders could then compete for remaining lots within their 2x50 MHz Stage 1 caps.

If there was an entrant in Stage 1, the auction process would result in one bidder being eliminated, with the three others winning packages.

Approach to 700 MHz

One of the major complications in determining Stage 1 packages is the non-availability in this auction of 700 MHz, given that it is a direct substitute for 900 MHz in 5G networks. As proposed above, this could be addressed by linking the amount of low band spectrum in Stage 1 packages available to each operator to their 700 MHz holdings. This is our preferred approach owing to simplicity, but it does require setting asymmetric within-auction caps.

An alternative approach would be to invite MNOs to include their 700 MHz holdings in this auction under a "buy-back" mechanism. This approach was pioneered by the FCC for the award of 37 GHz in 2019. Existing spectrum licensees contribute their spectrum into the auction and may either bid to retain it and, if they win, pay zero, or allow another bidder to acquire the licence, in which case they will receive the associated auction revenues.

37 For Swisscom, 2x25 less its holdings of 2x15 at 700 MHz = 2x10 MHz.

38 For Salt, 2x25 less its holdings of 2x10 at 700 MHz = 2x15 MHz.

39 For Sunrise, 2x25 less its holdings of 2x5 at 700 MHz = 2x20 MHz.

In the context of a Swiss two-stage auction, this could work as follows:

- All bidders agree to include their 700 MHz in the auction, with a 2028 start date aligned with the 900 MHz band.
- All licences have a common term, say 15-20 years. The remaining term of 700 MHz licences (to 2034) is recognised as having a value equal to X% of the total auction price. The extension period (from 2034) would have a residual value of 1-X%.
- In Stage 1, all bidders select a package of five 2x5 MHz lots, including at most two lots of 800 MHz. If demand for 700 MHz or 900 MHz exceeds supply, then the price of lots in that category is increased. Bidding continues in discrete rounds until an allocation that supports three winners with five lots is identified.
- Any unallocated 700 MHz, 800 MHz or 900 MHz lots are offered in Stage 2.
- At the end of the process, if a bidder wins fewer 700 MHz lots than they had before the auction, they will receive a rebate of X% of the average selling price of a 700 MHz lot for each lot they surrender.

An advantage of this approach is that it reconciles the licence term for all low band frequencies, enabling efficient substitution. This could allow operators to concentrate their 5G deployment in a specific low band. Participation could be voluntary. Each operator's Stage 1 package would be increased by one low band block for each block of 700 MHz that it contributes to the auction. Operators would be incentivized to participate because they would expect to win back equivalent holdings and the award process would enable them to extend their licence term into the 2040s.

Reserve prices for first and second stages

In our analysis of the reserve prices and final selling prices for spectrum in the 2019 auction in section 6.2, we find that the price level was reasonable, being at the lower end of a conservative estimate of market value. Given the equivalence of 700, 800 and 900 MHz bands, it makes sense to peg the reserve price for this auction to the reserve price of 700 MHz. This also provides a degree of fairness across operators if the first stage packages account for holdings of 700 MHz. Similarly, it would be reasonable to peg the reserve prices for 1800 and 2100 MHz to 1400 MHz, and 2600 MHz to an intermediate level between 1400 and 3500 MHz.

Licence duration

The same considerations apply as discussed for Full Renewal in Section 5.1. There is a strong case for aligning the expiry dates of 700, 800 and 900 MHz bands, especially if Stage 1 packages are based on total low band holdings. This could be achieved through a short term to 2034, or by incorporating 700 MHz licences into an award process using the buy-back mechanism.

Pros and cons of Option 2: Two-stage auction

We assess this option against our five criteria:

Criteria	Assessment	Explanation
Certainty of allocation	Very sensitive to structure of Stage 1 packages	If Stage 1 packages are sufficient large and include key spectrum, risk for all bidders is greatly reduced relative to a one-stage auction. Conversely, if packages are not large enough, smaller bidders are at risk of being squeezed and may hold back on investment.
Efficiency of allocation	Potential to improve efficiency but depends on design	The scope for a two-stage action to explore efficient allocations is very sensitive to the rules, especially the composition of Stage 1 packages. An optimal design should focus competition on marginal spectrum, making it possible for all bidders to pursue value-based bid strategies without fear of having their price for core spectrum bid up. A bad design would open up the possibility of outcomes less efficient than the status quo.
Impact on downstream competition	Potential to improve or worsen competition depending on design	An auction would allow the market to explore outcomes that may be better for competition than the status quo. Such outcomes, if they exist, almost certainly involve Salt and/or Sunrise improving their portfolio, taking some MHz from Swisscom. However, without spectrum cap guardrails, an auction might also enable worse outcomes for competition.
Revenue generation / fair pricing	Ambiguous	An auction has potential to generate significantly higher revenues than renewal at a fixed price. A worry here is that the smaller MNOs are financially constrained and may inefficiently economise on their demand. If the auction is designed in a way that focuses price increases only on incremental (non-core) spectrum, then this risk is diminished.
Simplicity of process	Complexity may be acceptable	A two-stage auction is not a simple award process. To justify the complexity, the regulator must be reasonably certain that the design will enable the market to explore potentially better outcomes for downstream competition without unduly exposing MNOs to risk.

Overall, we conclude that the potential performance of a two-stage auction is sensitive to the auction design, in particular the size and structure of the Stage 1 packages. A good design can mitigate risk and uncertainty for the MNOs and may allow the market to explore alternative allocations that might be more efficient and pro-competitive than the status quo. However, an inadequate design could expose the industry to a very expensive process and/or might result in outcomes that are less efficient than full renewal.

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5.3. Option 3: Low band licence extension and two-stage auction for mid band

This option is effectively a hybrid of Options 1 and 2. Under this approach, existing 800 MHz and 900 MHz licences would be extended to align with expiry of 700 MHz, as set out under Option 1, whereas mid band spectrum would be subject to a two-stage auction, as set out under Option 2. This bifurcated approach preserves the current competitive balance in low band while allowing the market to explore alternative allocations in mid band.

In previous analysis, we have shown that downstream competition could be sensitive to small changes in low band holdings. Both Salt and Sunrise are currently at or close to minimum thresholds for low band capacity needed to maintain 5G network quality, especially given the barriers to densifying mobile networks in Switzerland. Renewal eliminates the risk that they fall below this critical threshold. From a regulatory and operator perspective, this is a simple, low-cost solution to eliminate risk.

Precedent for partial renewal

This option is a form of partial renewal. With some spectrum renewed and the remainder auctioned. An example of this approach is the Canadian 2600 MHz, where incumbents were allowed to repurpose a capped portion of existing holdings for mobile. The remaining spectrum, including any reclaimed spectrum above the cap, went into the auction. Many of the two-stage auctions described in Table 7 were de facto partial renewals, as there was no competition for packages in the first stage.

Stage one mid band packages

Low band renewal would lock in Swisscom's low band advantage, with a total of 8 blocks, compared to 6 blocks for Sunrise and 5 blocks for Salt. Given that low band spectrum provides alternative capacity to mid band spectrum, it would be reasonable to account for this when determining the composition of stage one mid band packages.

In Section 5.2, we proposed a 100 MHz mid band package for each operator, linked to a 2x25 MHz package for low band (including 700 MHz holdings). On this basis, it would be reasonable to adjust stage one packages by operator as follows:

- Swisscom: Reduced from 100 MHz to 70 MHz, as they would have 2x40 MHz low band.
- Sunrise: Reduced from 100 MHz to 90 MHz, as they would have 2x30 MHz low band.
- Salt: Unchanged at 100 MHz, as they would have 2x25 MHz low band.

Under this approach, no low band spectrum would be available for an entrant, so there is no realistic prospect of a new entrant replacing an existing MNO in Stage 1. We therefore do not propose any adjustment to the (probably hypothetical) 100 MHz mid band package that an entrant could compete for.

Renewal fees and reserve prices

The same reasoning applies as discussed under Options 1 and 2.

Licence term

As discussed in Section 5.1, there is a strong case for limiting a low band extension to 2034, to align with 700 MHz. This would allow a broader reevaluation of low band portfolios in the mid-2030s, when 4G networks are at the end of their life. And, in the intermediate period, it may facilitate efficient swaps of 700 MHz and 900 MHz spectrum between operators.

Ideally, mid band spectrum sold at auction would have a longer term, say 20 years, to support a stable investment climate.

Pros and cons of Option 3: Renewal of low band & two-stage auction for

We assess this option against our five criteria:

Criteria	Assessment	Explanation
Certainty of allocation	Good subject to structure of Stage 1 packages	The renewal of low band spectrum provides considerable certainty to bidders for 4G and 5G planning. If the Stage 1 packages include sufficient mid band spectrum, then risk for the MNOs is substantially mitigated. Even if packages are smaller, ring-fencing existing low band allocations mitigates scope for strategic play in the auction.
Efficiency of allocation	Potential to improve efficiency	The scope for efficiency improvements is constrained to mid band spectrum. This may be acceptable as mid band is the range where spectrum holdings are most imbalanced in Switzerland (see Figure 15). As with Option 2, bidding dynamics will still be sensitive to size of Stage 1 packages. Larger packages would help to protect smaller players from bad outcomes and focus competition on marginal spectrum.
Impact on downstream competition	Potential to improve competition	The scope for the market to explore outcomes that may be better for competition than the status quo is more constrained than Option 2. However, smaller bidders may have more freedom to pursue larger portfolios. Guard rails would be necessary to preclude bad outcomes.
Revenue generation / fair pricing	Ambiguous (less risk than Option 2)	Fixing the price of low band spectrum eases financial risk for all bidders. This may free up budget for competition for mid band holdings.
Simplicity of process	Complexity may be acceptable	Removing low band from the auction would somewhat reduce complexity of running a two-stage auction but it is still not a simple award process.

This option is best assessed relative to Option 2. The renewal of low band spectrum increases certainty for bidders over allocation and price and modestly simplifies the process. The range of allocation option that can be explored is reduced. This is good from the perspective of eliminating bad outcomes but it is possible that some opportunity to further improve allocative efficiency and downstream competition will be foreclosed.

6. Candidate auction formats and key rules

If ComCom opts to auction some or all of the spectrum, then BAKOM will need to package the available spectrum into lots and set reserve prices for generic lots in each band. BAKOM will also need to select an auction format and draft rules and procedures. In a two-stage auction, the same or different auction formats may be used for each stage. Furthermore, a process for assigning specific frequencies to winners of generic frequency lots will be required.

In this section, we present initial thoughts on:

- **Spectrum packaging.** In Section 6.1, we propose that BAKOM adopt generic lots of 2x5 MHz for FDD bands and 10 MHz for TDD bands. We also recommend a small adjustment to the FDD/TDD split in the 2600 MHz band which would create an extra 2x5 MHz lot.
- **Reserve price setting.** In Section 6.2, we recommend setting prices at equivalent levels to the 2019 auction. This recommendation is based in part on a discussion of the implications of the downward trend in prices paid for mobile spectrum across the 5G era.
- **Auction formats.** In Section 6.3, we recommend multi-round auctions rather than sealed bids for allocation, and simple clock designs over combinatorial bidding. We find that an auction may not be required for the assignment round.
- **Auction rules.** In Section 6.4, we argue that spectrum caps are required even if a two-stage auction is adopted. We also recommend that any activity rules should allow for flexibility to switch between bands in auction, and information rules should favor price discovery but not strategic play.

6.1. Spectrum packaging

We recommend generic lots of 2x5 MHz or 10 MHz in all bands

It is important that spectrum is packaged in a way that allows bidders to express the following demand preferences:

- The base unit of demand for spectrum in all available bands is 2x5 MHz (i.e. 10 MHz total) for FDD bands and 10 MHz for TDD. This structure is broadly compatible with the deployment of both 4G and 5G technology.
- In each band, bidders will predictably have preferences for larger blocks of frequency suitable for either 4G (up to 2x20 MHz) or 5G use (the larger the better up to 100 MHz). In low bands, it may be viable to deploy as little as 2x5 MHz if a bidder lacks alternative low band capacity but this would not offer a good return on the cost of deploying the associated radio equipment. In each of the 1800 MHz, 2100 MHz and 2600 MHz bands, all MNOs can be expected to have a minimum demand of 2x10 MHz and a strong preference for larger quantities, as a single 2x5 MHz carrier does not provide sufficient capacity to justify the expense of deploying the associated radio.
- MNOs have strong preferences for contiguous spectrum within band. This is optimal for deploying 5G and also 4G (up to 2x20 MHz). Although it may be possible to deploy

multiple non-contiguous carriers in the same frequency band, this is non-standard and would result in additional equipment deployment costs.

These preferences can readily be accommodated by adopting the following structure:

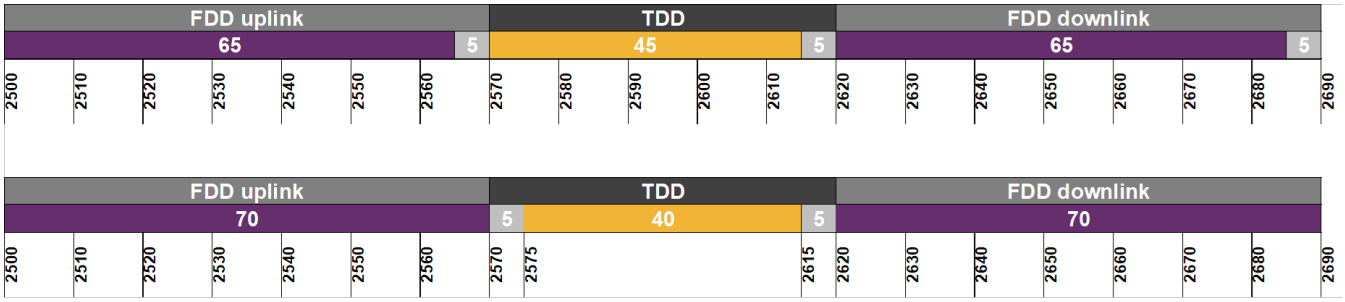
1. Initially allocating spectrum on a **generic frequency basis**, with a follow up assignment process in which all winning bidders are guaranteed contiguous spectrum within each band. This is standard practice in many spectrum auctions, including in Switzerland.
2. In a two-stage auction, ensuring that the **minimum package size offered in each band in the first stage is a viable portfolio**, i.e. at least 2x10 MHz at 800 MHz, 2x5 MHz at 900 MHz, and 2x10 MHz / 20 MHz or larger in all other bands.
3. In an open allocation stage (second stage of a two-stage auction):
    - providing bidders with the flexibility to compete for incremental spectrum in **base units of 2x5 MHz or 10 MHz**; and
    - applying a combination **of bidding restrictions and spectrum floors** to ensure that no bidder is exposed to winning an unviable quantity of spectrum in any band.

These recommendations are a good fit with the existing band structures at 800 MHz, 900 MHz, 1800 MHz and 2100 MHz. As discussed below, a small update to the 2600 MHz band plan would facilitate implementation.

We recommend a modest adjustment to the 2600 MHz band plan

For 2600 MHz, we recommend that ComCom consider a modest adjustment to the lot structure. Currently, the band is configured with 2x65 MHz FDD and 45 MHz TDD, with three unused guard blocks of 5 MHz each. An alternative structure which has been more widely adopted in Europe is to have 2x70 MHz FDD and 40 MHz TDD (with two guard blocks of 5 MHz at either end of the TDD band that can be awarded to the adjacent TDD user but subject to power restrictions to protect FDD). These two configurations are illustrated in Figure 18.

Figure 17: Current and Proposed Band Plans for the 2600 MHz Band



Source: *NERA.*

Looking forward, we think that the second plan would allow for more efficient use of the spectrum and straightforward spectrum packaging in an auction. Our understanding is that Swisscom has made little use of the TDD spectrum, whereas the FDD spectrum has been extensively deployed for 4G. Increasing the amount of FDD would therefore increase 4G and/or 5G capacity.

In a renewal scenario (Option 1), this reconfiguration would result in a slight reduction of Swisscom's TDD holdings from 45 MHz to 40 MHz. it would also create a new FDD lot with no incumbent that could be offered for auction.

In an auction setting, the revised TDD band could be made available as 4 blocks of 10 MHz, potentially with a bidding restriction that only bids for 2 blocks (20 MHz) or 4 blocks (40 MHz) are permitted, to ensure no MNO ends up with an unviable 10 MHz TDD allocation. The FDD band could be made available as 14 lots of 2x5 MHz. If one or more MNOs do not acquire any 2600 MHz FDD lots in the first stage of the auction, then a spectrum floor of two lots could assist them by eliminating the risk of winning a single unviable 2x5 MHz allocation.

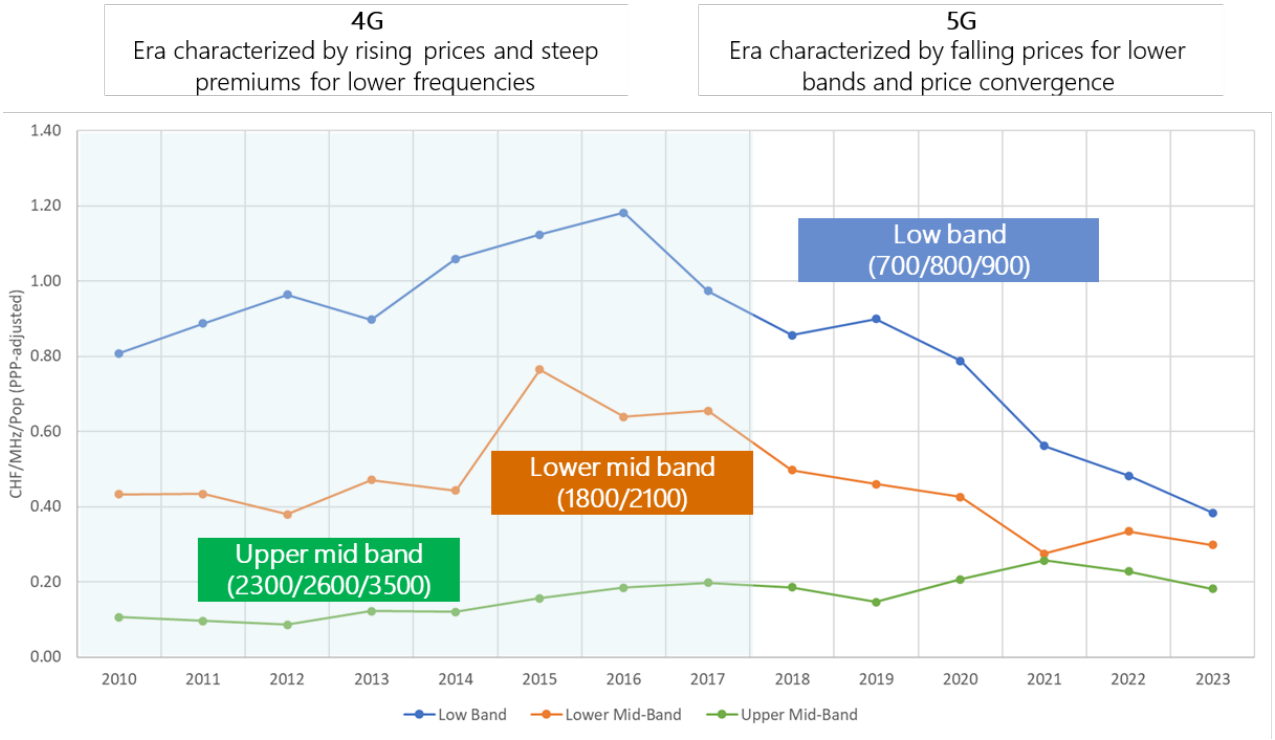
6.2. Reserve price setting

Here we address relevant information for setting reserve prices for an auction in Switzerland to be scheduled for 2026. The same considerations would also broadly apply for setting fixed fees for any renewal fees for spectrum not subject to auction. There is a case for being more conservative when setting reserve prices than when setting fixed renewal fees, as prices can go up and allowing headroom versus expected market value can facilitate competitive bidding and price discovery.

Worldwide, spectrum prices have been declining and converging

Spectrum auction prices have experienced notable shifts, as illustrated in Figure 19. A peak in spectrum prices occurred around 2015-2016, coinciding with the end of the 4G era. In the 5G award era, spectrum prices, measured on a per MHz basis, have exhibited a pronounced downward trend which may primarily be attributed to the increase in spectrum supply, which has reduced scarcity. Over this period, prices for low band (sub-1 GHz) and lower mid band (1700-2200 MHz) spectrum have halved, while the upper mid band (2300-4000 MHz) spectrum has maintained its value, albeit with a decline since 2021. Notwithstanding this price reduction, the overall financial burden on MNOs has escalated owing to the necessity of acquiring larger amounts of spectrum to accommodate rising mobile data traffic.

Figure 18: The downward trend in spectrum prices across the 5G era



Notes: *Based on 334 spectrum award price observations.*
Source: *Marsden, R, Round-by-Round, Learnings from the First 35 Years of Spectrum Auctions, p. 110.*

Given this decline, historic benchmarks of spectrum prices are likely to exaggerate the current and future market value of spectrum. Several factors contribute to this overstatement. The significant increase in spectrum supply, coupled with technological advancements such as network densification and massive MIMO antennas, has reduced the premium traditionally associated with specific frequency bands. Additionally, the slowdown in data traffic growth and the financial strains faced by the mobile industry, including increased costs of capital and low profitability, have further diminished operators' willingness to pay high spectrum prices.

In the context of setting renewal or reserve prices for spectrum, it is prudent to apply a significant discount when using historical benchmarks. Spectrum valuation techniques, such as benchmarking and valuation modelling, are often imprecise. Setting prices based on outdated benchmarks risks overestimating market value, which could impose undue financial burdens on operators and lead to market inefficiencies. A conservative pricing strategy, in which prices are set at a substantive level but well below the average of European benchmarks, can mitigate these risks. This approach not only provides a buffer against further declines in spectrum values but also reduces the financial strain on the mobile industry, fostering a more competitive and investment-friendly environment.

Setting prices at equivalent levels to the 2019 auction would be a reasonable approach

We reviewed the reserve prices set for the 2019 auction (Table 8) and found they broadly aligned with a conservative pricing approach. Accordingly, a sensible approach to setting reserve prices in the upcoming auction may be to base them on 2019 prices.

Table 8: Swiss 2019 auction prices

Bands 2019 auction	Reserve price 2019 (2x5 MHz / 10 MHz)	Final price 2019 (2x5 MHz / 10 MHz)
700 MHz (FDD)	17.78 M	26.7 M
1400 MHz	8.89 M	16.9 M
3500 MHz	0.89 M	5.3 M

Note: *No inflation adjustment, 15-year license duration. Prices in CHF. Final price for 1400 MHz band calculated as the weighted average of all spectrum sold.*
Source: *The Gigabase, NERA's database of spectrum prices and holdings.*

As the bands sold in 2019 were different from those available in this award, a methodology is required for converting from one band to another:

- **800 & 900 MHz.** These bands offer similar propagation and use profiles to 700 MHz. Therefore, we recommend applying the 700 MHz reserve price to these two bands.
- **1800 & 2100 MHz.** The 1800 MHz and the 2100 MHz band are close substitutes and should therefore be priced similarly. Of the bands in the 2019 auction, the 1400 MHz band is the closest substitute. 1400 MHz offers superior propagation and more downlink capacity, but it has a less well-developed ecosystem and does not support uplink. On balance, we recommend applying the 1400 MHz reserve price to these two bands.
- **2600 MHz (TDD).** The 2600 MHz (TDD) band is closest in nature to the 3500 MHz band. The two band used the same TDD technology. 2600 MHz offers superior propagation but the available bandwidth is only 40-50% of the carrier size available to Swiss operators at 3500 MHz. On balance, we recommend applying the 3500 MHz reserve price to this band.
- **2600 MHz (FDD).** The 2600 MHz (FDD) band is an inferior substitute for the 1800 and 2100 MHz bands, owing to its weaker propagation, but it is well integrated into 4G ecosystem and offers superior propagation relative to 3500 MHz. On balance, we recommend setting a reserve price at the mid-point of the reserve prices for 1400 MHz and 3500 MHz.

We recommend making no adjustment to 2019 prices when setting 2026 prices. General price inflation in this period is more than offset by the decline of spectrum prices worldwide, as illustrated in Figure 19.

The resulting reserve prices are set out in Table 9. If prices are set at these levels and all spectrum is sold, an award can be expected to secure minimum revenues of CHF 543 M. We consider this to be affordable for the industry, meeting the Government's requirement to raise revenues in return for allocating a scarce public resource while still allowing headroom for price competition if there is an auction.

We note that this level of revenue exceeds the CHF 375 million budget[40] identified as necessary to improve the quality of the fiber telecommunications network in Switzerland (gigabit strategy). It is

[40] Schweizerische Eidgenossenschaft (2025), Bundesgesetz über die Förderung des Ausbaus von Breitbandinfrastrukturen, available at: https://backend.bakom.admin.ch/fileservice/sdweb-docs-prod-bakomadminch-files/files/2025/04/15/2d3d7f77-56d1-4d6b-a027-0c025284d0cb.pdf.

our understanding that the budget for this initiative is supposed to flow from the next two Swiss spectrum auctions. This approach would achieve the target in only one auction.

Table 9: Reserve prices for 2026 award if based on 2019 auction reserve prices

Bands 2026 auction	Comparable bands 2019 auction	Available supply (MHz)	Implied reserve price per 10 MHz	Minimum revenues
800 MHz, 900 MHz	700 MHz	2x65	17.78 M	231 M
1800 MHz, 2100 MHz	1400 MHz	2x135	8.89 M	240 M
2600 MHz (FDD)	1400 / 3500 MHz	2x70*	4.89 M	68 M
2600 MHz (TDD)	3500 MHz	40*	0.89 M	4 M
TOTAL				**543 M**

Notes: *Based on 15-year license duration. Prices in CHF. * Assumes 2600 MHz band is replanned as described in Section 6.1.*
Source: *NERA.*

6.3. Auction formats

If a two-stage auction is adopted, an auction format may be required for Stage 1 and will be required for Stage 2. As all spectrum is from existing licences and the likely scenario is for only MNOs to win spectrum, we do not anticipate than an auction will be needed for assignment.

We recommend multi-round auctions rather than sealed bids for allocation

For the allocation stages, we anticipate that bidders will have strong preferences for multi-round auctions rather than sealed bids. Given the high value of the available spectrum and the close linkages across bands, we expect bidders to place high value on price discovery and the scope to switch demand in response to changes in relative prices. This is particularly important for Stage 2 but also relevant for Stage 1 if bidders have flexibility over package composition and bidding is required to resolve conflicting demand.

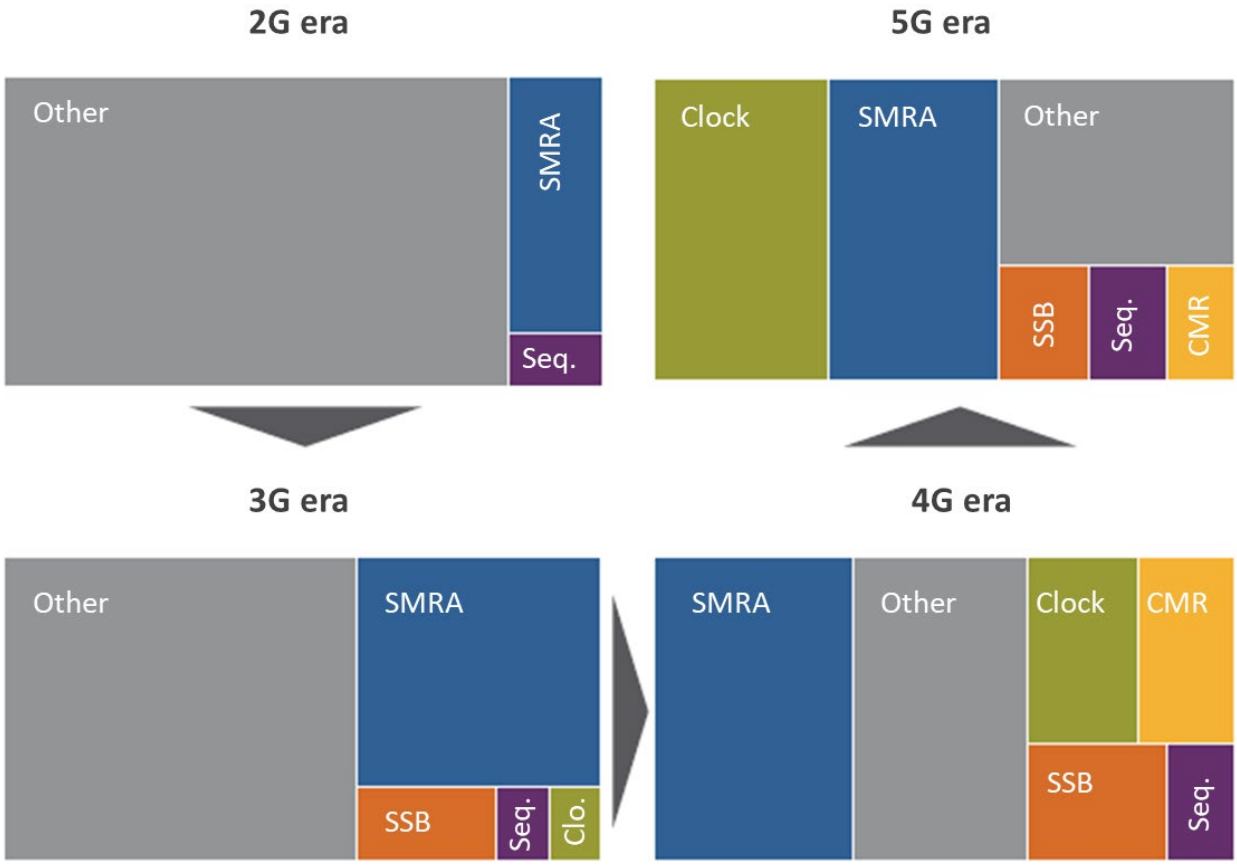
We recommend simple clock designs over combinatorial bidding

In the 5G era, as illustrated in Figure 20, the Clock auction has supplanted the SMRA and CCA as the leading format for spectrum auction designers. We think that the Clock auction is an excellent candidate for this award. The format offers a 'sweet spot' with respect to managing risk, speed, and complexity. With well-designed rules, a Clock auction can typically be relied on to deliver allocations and prices that are acceptable from both an economic efficiency and fairness perspective.

The Clock auction has been associated with 5G spectrum awards that produced predictable, intuitive outcomes, and concluded reasonably quickly. The format is popular with bidders, who like the price discovery and symmetric pricing, and welcome the reduced scope for gaming options versus the SMRA. In an era of low industry profitability, incumbent MNOs are understandably keen to minimize the risk that a spectrum auction could produce a nasty surprise, such as very high prices or an inferior allocation that must be compensated for by higher network spend. Sunrise

advise us that they are very opposed to any combinatorial designs for allocation, given their poor experience with the 2012 Swiss CCA.

Figure 19: Spectrum auction formats adopted worldwide in different allocation eras



Notes: *Survey of 545 mobile spectrum award formats across 65 countries, 1990-2023.*
Source: *Marsden, R. (2024), Round-by-Round: Learnings from the First 35 Years of Spectrum Auctions, p.60.*

For the 2019 auction, Switzerland adopted a Clock auction format but without lot retention. This approach gives bidders great flexibility to switch demand but also can result in unsold lots. For a Stage 2 auction, a clock format with retention of demand may be preferable. This will require study and industry consultation.

In the context of a two-stage auction, we are not aware of any precedent for using an auction format in Stage 1. Prior implementations, as described in Table 7, did not require an auction because there was no excess demand. If an auction is proposed for Stage 1 in Switzerland, then this will require further study and industry consultation. Our preliminary thinking is that a Clock auction can also be used, with appropriate bidding restrictions to respect the package structure.

An auction may not be required for the assignment round

All the spectrum in this award is previously allocated spectrum. As such, operators already have equipment tuned to specific frequencies. In bands where operators win back the same spectrum, it makes sense to keep assignments unchanged.

Even in a band where there is a change in allocation the sensible approach may be to assign contiguous spectrum blocks in the same order in which spectrum is currently allocated to the individual MNOs. This will maximise overlap between legacy and new assignments, ensuring minimal change to deployments.

If these rules are followed and only the three MNOs win spectrum, there should not be any contention over frequency position in FDD bands. Accordingly, a bidding process to resolve conflicts over assignment will not be required. There could be provision for a standard sealed bid combinatorial auction to be used to resolve the assignment for any bands where the identity of the incumbent operators changes, for example because there is an entrant winner or, in the case of 2500 MHz TDD, if the spectrum is allocated to more than one operator.

6.4. Spectrum caps, activity rules and information policy

The bands available in this auction form a continuous chain of substitutes and are also strong complements. Accordingly, we have recommended a simultaneous process, most likely a Clock auction. This will need to complemented by appropriate rules on spectrum caps, bid activity and information policy both to promote price discovery and close off undesirable bidding behaviour, such as a bidder pursuing an unduly large share of spectrum in some or all bands.

Spectrum caps are required even if a two-stage auction is adopted

As discussed in Section 4.3, we do not consider that spectrum caps are a sufficient measure to ensure a pro-competitive auction outcome. Nevertheless, they still have a role in precluding obviously undesirable allocation outcomes. In Switzerland, given the bidder asymmetries, the prime concern here is preventing Swisscom from demanding too much spectrum, which in turn might result in a rival MNO winning too little spectrum.

In Stage 1 of a two-stage auction, spectrum caps are not required, as bidders are constrained instead by the package sizes. If first stage packages are large enough for all bidders, then the need for caps in Stage 2 is much reduced, as there may no longer be any likelihood of foreclosure. Nevertheless, caps should be retained as a safeguard against very asymmetric outcomes.

We recommend the following spectrum caps:

- Low band: 2x40 MHz (700, 800 and 900 MHz);
- Lower mid band: 2x35 at 1800 MHz and 2x30 at 2100 MHz;
- Mid band FDD: 2x95 MHz across the 1800, 2100, 2600 MHz bands; and
- Total spectrum: 455 MHz (all mobile spectrum).

These caps are unlikely to place any relevant constraints on Salt or Sunrise, given their very modest spectrum portfolios versus Swisscom. These caps would allow Swisscom to win back its existing portfolio and also give it some flexibility to shift spectrum across bands. However, the total spectrum cap would preclude Swisscom from expanding its total spectrum holdings. And the other caps would place constraints on Swisscom's flexibility to expand its holdings in specific FDD bands, so as to ensure it cannot foreclose competitors. We think these measures are prudent given our observation that spectrum asymmetries in Switzerland are more pronounced than in any other European three-player market.

Activity rules should allow for flexibility to switch between bands in auction

Activity rules in auctions are designed to ensure bidders actively participate, discourage strategic play (i.e. deviations from value-based bidding) and promote quicker price discovery. They act as constraints on bidding behavior, forcing bidders to make meaningful bids in each round based on their past bids. All previous auctions in Switzerland have featured reasonably orthodox activity rules, and some variation on the same will be needed for this process if a multi-round auction is adopted.

We consider Stage 2 first, as this is a more typical setup for a spectrum auction. If a Clock auction is adopted, then to a significant extent the rules used for the 2019 spectrum auction can be repeated. These used an eligibility points regime to weight the available lots and measure activity. A bidder's eligibility to bid in each round was based on its activity in the prior round. This ensured that as prices increased from round-to-round, a bidder's activity would either stay the same or decrease, and could never increase.

We recommend that BAKOM explore the following changes from the 2019 rules:

1. It should enforce lot retention. The 2019 rules allowed bidders to freely switch between bands, meaning that – as long as the auction was open – a bidder could drop demand from any category even if this led to valuable spectrum going unsold (as happened in the 1400 MHz category). Given the critical importance of much of this spectrum in existing networks, we do not think it appropriate to risk spectrum going unsold and would be concerned that allowing this could create opportunity for undesirable gaming.
2. It should revisit the eligibility weightings. In 2019, the 700 MHz FDD category was given a weighting of 2 points per 10 MHz, whereas all other bands had a weighting of 1 point per 10 MHz. Differentiating between low band and mid band spectrum using this same ratio is an option for this auction. However, when implementing lot retention in a clock auction, the design is simpler if a common 1 point rating is used for all lots. Given the categories in this auction are a closer chain of substitutes than in 2019, this merits analysis.
3. It should consider additional bid restrictions that mitigate the risk of a bidder winning an unwanted subset of lots, especially if lot retention to prevent unsold lots is enforced. We discussed such rules under spectrum packaging in Section 6.1.

If the packages for Stage 1 are designed in a way that there is potential for competition for the lots at the band level, then a similar activity rule will be required for this stage too. We reserve our judgement on the best approach pending identification of the Stage 1 package options.

Information rules should favor price discovery but not strategic play

The information rules are a very important complement to the activity rules. In general, more information before the auction and after bid processing for each clock round contributes to price discovery. However, information can also sometimes be exploited by bidders to facilitate strategic play, such as bids designed to drive the price or draw concessions from a specific rival with known weaknesses. As these factors conflict, many regulators adopt an intermediate approach, releasing information about the number of bidders and aggregated demand, but not the specific bids of individual bidders. This was the approach taken for the 2019 spectrum auction and we anticipate that the same approach could work for this award.

If a two-stage auction is adopted, a new consideration is what information to release about the outcome of the first stage before the second stage. Releasing full information about allocations and pricing would be helpful for bidders in the second stage in interpreting bidding data and responding to price discovery. However, depending on the package structure in Stage 1, it may be possible that such information can be exploited for gaming purposes. Therefore, it is not possible to come to a conclusion on the best approach without more information about other rules. We recommend that BAKOM consult with the industry after providing guidance on Stage 1 packages.

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Appendix A. Analysis of Stage 1 packages for two-stage auction

In this appendix, we explore a broad range of possible package structures for Stage 1 of a two-stage auction (our Option 2 in Section 5.2). Each scenario is designed to explore the impact on bidders of varying the quantity of spectrum, including the composition of low band and mid band spectrum, and symmetry and asymmetry in package structure across bidders. We find that the packages most likely to support an efficient pro-competitive allocation are those with operator-specific packages linked to low band holdings. Reasonably large packages are also important to reduce risk for Salt and Sunrise and incentivize them to compete with Swisscom for marginal spectrum in Stage 2.

We analyse ten scenarios for Stage 1 packages. For ease of discussion, these are set out in three groupings:

- Section A1: Symmetric packages, open to all bidders.
- Section A2: Asymmetric packages, open to all bidders.
- Section A3: Operator-specific packages, linked to existing low band holdings.

We identify Scenario 10 in Section A3, with larger operator specific packages of spectrum, as the most attractive approach. It is particularly effective in precluding inefficient, less competitive allocation outcomes while promoting in-auction price competition for marginal spectrum.

A1 Symmetric open packages

We explore four scenarios each with three symmetric Stage 1 packages open to any bidder. The scenarios vary the quantity of spectrum available in the packages. Scenarios 1, 2 and 3 assume fixed MHz allocations by frequency band. In Scenario 4, we explore the possibility of letting bidders express preferences for symmetric quantities of spectrum across related bands, with bid competition to resolve any excess demand in a specific band.

Scenario 1: Smaller symmetric package (focused on 4G spectrum)

Description

There are three Stage 1 packages, each consisting of 2x10 at 800 MHz and 2x20 at 1800 MHz. This is illustrated in Table 10. The three 60 MHz packages (180 MHz in total) are sufficient only to support continuity in 4G network provision. Unless there is a fourth bidder, there is no competition in Stage 1. Operators must compete in Stage 2 for the remaining 400 MHz to provide 5G capacity and additional urban 4G capacity.

Table 10: Scenario 1: Small symmetric package

Open to any bidder						
Band	**Available spectrum (MHz)**	**Package 1**	**Package 2**	**Package 3**	**Spectrum in 1st stage (MHz)**	**Remaining spectrum in 2nd stage**
800 FDD	60	20	20	20	60	0
900 FDD	70	0	0	0	0	70
1800 FDD	150	40	40	40	120	30
2100 FDD	120	0	0	0	0	120
2600 FDD	140	0	0	0	0	140
2600 TDD	40	0	0	0	0	40
TOTAL		60	60	60	180	400

Analysis

This approach provides some certainty to bidders over their ability to monetize legacy investment in 4G networks and avoid 4G capacity shortfalls. However, it requires every operator to win back a large quantity of spectrum in Stage 2 to maintain 5G capacity. This would [... ✂ ...].

Our assessment is that this approach cannot be expected to reliably deliver an efficient, pro-competitive allocation, and could deliver outcomes that are worse than the status quo. This is because the Stage 1 package is not large enough to incentivise value-based bidding by smaller MNOs nor offset Swisscom's financial advantage.

Scenario 2: Smaller symmetric package (footholds in key 4G and 5G bands)

Description

The three Stage 1 packages of 60 MHz are the same size as the previous scenario, but the spectrum is spread across four bands suitable for 4G and 5G. In each band, a 'foothold' quantity is reserved: 2x5 MHz in the low bands and 2x10 in the mid bands. Operators would presumably look to build on these quantities in Stage 2 to assemble larger blocks for 4G and 5G deployment. Absent a fourth bidder, there is no competition in Stage 1.

Table 11: Scenario 2: Small symmetric packages – footholds in key bands

		Open to any bidder				
Band	**Available spectrum (MHz)**	**Package 1**	**Package 2**	**Package 3**	**Spectrum in 1st stage (MHz)**	**Remaining spectrum in 2nd stage**
800 FDD	60	10	10	10	30	30
900 FDD	70	10	10	10	30	40
1800 FDD	150	20	20	20	60	90
2100 FDD	120	20	20	20	60	60
2600 FDD	140	0	0	0	0	140
2600 TDD	40	0	0	0	0	40
TOTAL	580	60	60	60	180	400

Analysis

This approach is unambiguously worse than Option 1. It has the same drawbacks and, in addition, it fails to provide certainty over 4G continuity. In particular, bringing the 800 MHz and 1800 MHz bands into play could encourage strategic behaviour in an auction, as bidders seek to exploit each other's known vulnerabilities. This increases the likelihood of an inefficient allocation outcome.

Scenario 3: Larger symmetric flexible packages

Description

The three Stage 1 packages are significantly larger than the two previous scenarios, consisting of 110 MHz across five bands. In the 800 and 1800 MHz bands, sufficient spectrum is reserved to ensure continuity of 4G networks. At 900 MHz (2x5), 2100 MHz (2x10) and 2600 MHz (2x10), which are more likely to be targeted for 5G, a 'foothold' quantity is reserved. Operators would presumably look to build on these quantities in Stage 2 to assemble larger blocks for 5G deployment. Absent a fourth bidder, there is no competition in Stage 1.

Table 12: Scenario 3: Larger symmetric packages across FDD bands

Open to any bidder						
Band	**Available spectrum (MHz)**	**Package 1**	**Package 2**	**Package 3**	**Spectrum in 1st stage (MHz)**	**Remaining spectrum in 2nd stage**
800 FDD	60	20	20	20	60	0
900 FDD	70	10	10	10	30	40
1800 FDD	150	40	40	40	120	30
2100 FDD	120	20	20	20	60	60
2600 FDD	140	20	20	20	60	80
2600 TDD	40	0	0	0	0	40
TOTAL	580	110	110	110	330	250

Analysis

This approach is a significant improvement on the two previous options. It ensures 4G continuity and provides each operator with substantial quantities of spectrum in other bands from which they could build viable 5G portfolios.

However, there are drawbacks:

- The portfolio is not large enough to guarantee that each operator secures sufficient capacity to be a fully competitive wholesaler. There remains some risk of a bad outcome if Swisscom is very aggressive in Stage 2 and/or the smaller MNOs economise too much.
- From a strategic perspective, [... ✂ ...].
- This approach is not very flexible. This approach effectively forces the three operators to compete in every FDD band, thereby precluding exploration of outcomes where an operator eschews one band and focuses on a large block in another band. A reservation across five bands is arguably excessive.

Scenario 4: Larger flexible packages

Description

The three Stage 1 packages of 110 MHz each are the same size as Scenario 3 but there is flexibility for bidders to select the bands where this spectrum is located. Specifically, each operator must select 30 MHz from across the 800 and 900 MHz bands, and 80 MHz from the 1800, 2100 and 2600 MHz FDD bands. As aggregate demand in individual bands could exceed supply, there would need to be a bid mechanism in Stage 1 to resolve conflicts while preserving total package sizes. This approach ensures that each operator will secure a minimum level of capacity in the low and mid band ranges but (absent additional bid restrictions) this does not ensure they win back spectrum necessary to maintain their 4G networks.

Table 13: Scenario 4: Larger symmetric packages, pick your own

Open to any bidder						
Band	**Available spectrum (MHz)**	**Package 1**	**Package 2**	**Package 3**	**Spectrum in 1st stage (MHz)**	**Remaining spectrum in 2nd stage**
800 FDD	60	30	30	30	90	40
900 FDD	70					
1800 FDD	150	80	80	80	240	170
2100 FDD	120					
2600 FDD	140					
2600 TDD	40	0	0	0	0	40
TOTAL	580	110	110	110	330	250

Analysis

This approach has strengths and weaknesses relative to Option 3. On the one hand, it offers the same overall quantity of spectrum and it provides more flexibility for bidders to explore different configurations of spectrum across bands. On the other hand, there is a risk that [... ✂ ...]. It also provides no guarantee that individual bidders will win back enough 800 MHz and 1800 MHz to preserve their 4G networks. The attractiveness of this format could be improved by adding bid restrictions that guarantee an option to take critical 800 MHz and 1800 MHz at reserve price, with any Stage 1 competition focused on remaining spectrum.

Like Option 3, the portfolio is not large enough to guarantee that each operator secures sufficient capacity to be a fully competitive wholesaler. And [... ✂ ...].

A2 Asymmetric open packages

We explore three further scenarios with asymmetric Stage 1 packages open to any bidder. The scenarios all feature medium/larger package sizes but vary in the scope of asymmetry. Scenarios 5 and 6 offer asymmetric packages with fixed MHz allocations by frequency band. These include sufficient provision for 4G, as this was identified as an important attribute in prior scenarios. In Scenario 7, we explore giving bidders more flexibility to decide the composition of their Stage 1 package, with bid competition to resolve any excess demand in a specific band.

Scenario 5: Asymmetric packages (two identical, one different)

Description

Three Stage 1 packages are available. Bidders can choose either package A with 90 MHz or package B with 100 MHz. All packages include 2x10 at 800 MHz and 2x20 at 1800 MHz for 4G continuity. Package A includes 2x5 at 900 MHz and 2x10 at 2100 MHz, whereas Package B has no 900 MHz but offers 2x20 at 2100 MHz. There is no competition in Stage 1, as any combination of package demand can be accommodated in the supply.

Table 14: Scenario 5: Asymmetric open packages, choice of two

Open to any bidder					
Band	**Available spectrum (MHz)**	**Package A**	**Package B**	**Spectrum in 1st stage (MHz)**	**Remaining spectrum in 2nd stage**
800 FDD	60	20	20	60	0
900 FDD	70	10	0	20	50
1800 FDD	150	40	40	60	90
2100 FDD	120	20	40	80	40
2600 FDD	140	0	0	0	140
2600 TDD	40	0	0	0	40
TOTAL	580	90	100	220	360

Analysis

This approach allows for some differentiation in the Stage 1 packages that each operator pursues. For example, [... ✂ ...].

As with previous scenarios, the portfolio is not large enough to guarantee that each operator secures sufficient capacity to be a fully competitive wholesaler. Therefore, there remains some risk of a bad outcome if [... ✂ ...]. A concern with this approach is that it [... ✂ ...].

Scenario 6: Asymmetric packages (all different)

Description

Three Stage 1 packages are available. Bidders can choose either package A (100 MHz), Package B (90 MHz) or Package C (100 MHz). All packages include 2x10 at 800 MHz and 2x20 at 1800 MHz for 4G continuity. Package A includes 2x5 at 900 MHz and 2x15 at 2600 MHz. Package B includes 2x5 at 900 MHz and 2x10 at 2100 MHz. Package C has no 900 MHz but offers 2x20 at 2100 MHz. There is no competition in Stage 1, as any combination of package demand can be accommodated in the supply.

Table 15: Scenario 6: Asymmetric open packages, all three different

Open to any bidder						
Band	**Available spectrum (MHz)**	**Package A**	**Package B**	**Package C**	**Spectrum in 1st stage (MHz)**	**Remaining spectrum in 2nd stage**
800 FDD	60	20	20	20	60	0
900 FDD	70	10	10	0	20	50
1800 FDD	150	40	40	40	80	70
2100 FDD	120	0	20	40	20	100
2600 FDD	140	30	0	0	40	100
2600 TDD	40	0	0	0	0	40
TOTAL	580	100	90	100	220	360

Analysis

This approach provides additional flexibility to bidders relative to Scenario 5. It has broadly the same strengths and weaknesses as the previous option. However, [... ✂ ...].

Scenario 7: Flexible asymmetric packages (all different)

Description

Three Stage 1 packages are available. Bidders have three options, each one increasing in size (100, 110 and 120 MHz), but with progressively less low band and more mid band. There is no competition in Stage 1, as any combination of package demand can be accommodated in the supply. As with Scenario 4, aggregate demand in individual bands could exceed supply, so there would need to be a bid mechanism in Stage 1 to resolve conflicts while preserving total package sizes. This approach ensures that each operator will secure a minimum level of capacity in the low band and mid band ranges but (absent additional bid restrictions) does not ensure they win back spectrum necessary to maintain their 4G networks.

Table 16: Scenario 7: Asymmetric open packages, pick your own

		Open to any bidder				
Band	**Available spectrum (MHz)**	**Package A**	**Package B**	**Package C**	**Spectrum in 1st stage (MHz)**	**Remaining spectrum in 2nd stage**
800 FDD	60	40	30	20	90	40
900 FDD	70					
1800 FDD	150	60	80	100	240	170
2100 FDD	120					
2600 FDD	140					
2600 TDD	40	0	0	0	0	40
TOTAL	580	100	110	120	330	250

Analysis

This approach provides a lot of flexibility to explore alternative allocation outcomes, but this might be exploited for strategic purposes. Notably, [... ✂ ...]

This approach also provides no guarantee that individual bidders will win back enough 800 MHz and 1800 MHz to preserve their 4G networks. The attractiveness of this format could be improved by adding bid restrictions that guarantee an option to take critical 800 MHz and 1800 MHz at reserve price, with any Stage 1 competition focused on remaining spectrum.

A3 Operator specific packages

We explore three further Stage 1 packages that are tailored to the existing operators, considering their non-expiring spectrum holdings. In Scenario 8, we explore implementing small differences in fixed frequencies between the operators based on their existing holdings. In Scenario 9, we maintain small differences between operators while increasing the size of the packages and allowing flexibility in selection of frequencies. In Scenario 10, we further increase the package size, maintain flexibility and limit the package asymmetry to low band spectrum.

Scenario 8: Operator specific fixed frequency packages

Description

Three Stage 1 packages are available. Each MNO is offered a tailored frequency package in Stage 1 that considers their existing holdings (a tailored package could also be designed for an entrant if necessary). All packages include 2x10 at 800 MHz, at least 2x10 at 1800 MHz and 2x10 at 2100 MHz. In addition: Sunrise is offered 2x5 at 900 MHz and Salt is offered an extra 2x5 at 1800 MHz. These small differences are designed to partially offset Sunrise's relative weakness in 700 MHz and Salt's relative weakness in 3500 MHz going into the auction.

Table 17: Scenario 8: Operator specific packages (small)

		Sunrise	Salt	Swisscom		
Band	**Available spectrum (MHz)**	**Package 1**	**Package 2**	**Package 3**	**Spectrum in 1st stage (MHz)**	**Remaining spectrum in 2nd stage**
800 FDD	60	20	20	20	60	0
900 FDD	70	10	0	0	10	60
1800 FDD	150	20	30	20	60	90
2100 FDD	120	20	20	20	70	50
2600 FDD	140	0	0	0	0	140
2600 TDD	40	0	0	0	0	40
TOTAL	580	70	70	60	200	380

Analysis

This approach has the effect of [... ✂ ...]. This makes very adverse allocation outcomes less likely. And it [... ✂ ...]. However, the overall portfolio is not large enough to guarantee that each operator secures sufficient capacity to be a fully competitive wholesaler. This is true both generally from a capacity perspective and specifically for 4G capacity at 1800 MHz. There remains some risk of a bad outcome if [... ✂ ...].

Scenario 9: Operator specific flexible packages (medium)

Description

Three Stage 1 packages are available. Each MNO is offered a flexible frequency package in Stage 1 that considers their existing holdings. All packages include a base level of low band (2x20 MHz) and mid band (2x80 MHz). In addition: Sunrise is offered an extra 2x5 MHz of low band and Salt is offered an extra 2x5 of mid band. These small differences are designed to partially offset Sunrise's relative weakness in 700 MHz and Salt's relative weakness in 3500 MHz going into the auction.

As with Scenarios 4 & 7, aggregate demand in individual bands may exceed supply, so there would need to be a bid mechanism in Stage 1 to resolve conflicts while preserving total package sizes.

Table 18: Scenario 9: Operator specific packages (small)

		Sunrise	Salt	Swisscom		
Band	**Available spectrum (MHz)**	**Package 1**	**Package 2**	**Package 3**	**Spectrum in 1st stage (MHz)**	**Remaining spectrum in 2nd stage**
800 FDD	60	30	20	20	70	60
900 FDD	70					
1800 FDD	150	80	90	80	250	160
2100 FDD	120					
2600 FDD	140					
2600 TDD	40	0	0	0	0	40
TOTAL	580	110	110	100	320	260

Analysis

Like Scenario 8, this approach has the effect of [… ✂ …]. The larger package size gives further protection against undesirable allocation outcomes. However, absent bidder restrictions, [… ✂ …]. Arguably, the asymmetry in package size is not enough to address the strategic weakness of the smaller bidders.

Scenario 10: Operator specific flexible packages (larger)

Description

Three Stage 1 packages are available. Each MNO is offered a flexible frequency package in Stage 1 that considers their existing low band holdings. All packages include a base level of low band (2x20 MHz) and mid band (2x100 MHz). In addition: Sunrise is offered an extra 2x10 MHz of low band and Salt is offered an extra 2x5 MHz of low band. This ensures that every operator will have a critical mass of 2x25 MHz low band, considering existing 700 MHz holdings. No accommodation is made for differences in 3500 MHz on the basis that all operators already have strong portfolios in this band (but a variation of this scenario might consider an extra 2x5 MHz of mid band for Salt).

As with Scenarios 4 & 7, aggregate demand in individual bands may exceed supply, so there would need to be a bid mechanism in Stage 1 to resolve conflicts while preserving total package sizes.

Table 19: Scenario 10: Operator specific packages (large)

		Sunrise	Salt	Swisscom		
Band	**Available spectrum (MHz)**	**Package 1**	**Package 2**	**Package 3**	**Spectrum in 1st stage (MHz)**	**Remaining spectrum in 2nd stage**
800 FDD	60	40	30	20	90	40
900 FDD	70					
1800 FDD	150	100	100	100	300	110
2100 FDD	120					
2600 FDD	140					
2600 TDD	40	0	0	0	0	40
TOTAL	580	140	130	120	390	190

Analysis

This approach is exceptionally effective at [... ✂ ...].

As with Scenario 9. the larger package size gives further protection against undesirable allocation outcomes. To prevent Swisscom bidding too aggressively for the lower mid bands, it would be prudent to add bidder restrictions to ensure that Salt and Sunrise each secure at least 2x20 at 1800 MHz and 2x10 at 2100 MHz. With these rules, [... ✂ ...].

Overall, this scenario looks very attractive as a way of precluding inefficient, less competitive allocation outcomes while promoting in-auction price competition for marginal spectrum.

NERA

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