Management Summary

According to the provisions of the Swiss Telecommunications Act (TCA), market-dominant providers must offer regulated network access products at cost-based prices. In this context the Telecommunications Services Ordinance specifies the concept of cost-based prices considerably more precisely and more clearly than most statutory regulations in other countries. Generally the forward looking long-run incremental cost (FL-LRIC) standard is applied, in which the costs are determined on a replacement basis.

The legal/economic basis for price regulation in Switzerland is to be reviewed against the background of technical evolution and the development of the market. In almost all major cities FTTH fibre networks are under construction using a point-to-point architecture and are being constructed either by Swisscom alone or by Swisscom in cooperation with a partner. It is expected that after the roll-out of the fibre networks, in a few years the customers of today's copper access network will gradually be migrated to the new fibre network. Only in less densely populated areas of Switzerland is it expected that the existing copper access network will remain in operation for a longer period. The cited development in connection with competition from cable networks also means that in Switzerland the demand for copper subscriber lines is reducing. This trend will become more pronounced over the next few years. In this context the question arises as to whether in these circumstances FL-LRIC still represents an adequate costing standard from the macroeconomic point of view. The question also arises as to whether and to what extent the cost of a fibre line reflects the MEA for a copper loop. Yet another issue is the pricing level for copper lines which results in optimal macroeconomic incentives to invest in fibre networks and the migration of customers to these networks.

In its evaluation of the telecommunications market of September 2010, the Swiss Federal Council already referred to the challenges for the price calculation model for regulated wholesale services which result from developments and changes in the market. Even if the basis for the existing price calculation are still judged in principle to be expedient, the Federal Council points out specific requirements for adaptation and announced corresponding implementation measures. This assessment is confirmed in the March 2012 supplementary report of the Federal Council on the evaluation to the telecommunications market together with announcement of a revision of the Telecommunications Services Ordinance. This report is devoted to the in-depth analysis of the questions which are raised and compiled here.

OFCOM has commissioned us to prepare a study on possible price regulation options for the telecoms market in Switzerland which is being undertaken against the backdrop of technological change which is described above and which is currently profound. The study aims to assemble and develop proven and innovative new methods of price regulation for wholesale products and in conclusion to assess these with regard to the economics of regulation and with a view to decision-making. This evaluation is to be undertaken with regard to the following assessment criteria: consumer benefit, sustainable competition, investment incentives and practicability.

Our study analyses the questions posed by the report against the background of a detailed analysis of the existing situation in Switzerland in terms of telecommunications law and the market, as well as essential regulatory decisions. Major regulatory policy developments and decisions in Europe falling within the context of this study are drawn on in order to demonstrate that the regulatory policy issues which need to be addressed in Switzerland today are posed everywhere in Europe and in some cases have already produced some answers. The theoretical analysis of the economics of regulation, which represents a significant part of our study, is not considered in isolation, but is treated in close conjunction with the specificities of the regulatory issues for the relevant wholesale products. The recommendations of this study are condensed into a total of 40 individual recommendations and assigned to the five most important regulated

wholesale products in Switzerland.

Non-discrimination and price regulation

According to the principle of non-discrimination enshrined in the TCA, the market-dominant provider cannot treat other providers any worse than its own business units or subsidiaries. Unlike what is customary in other European countries, non-discrimination in ComCom's regulatory practice does not, however, constitute a separate requirement in relation to access prices in addition to the cost-based approach. However, cost-based access prices do not exclude (price) discrimination on those demanding access. Discrimination against purchasers of wholesale services in favour of vertically integrated incumbents' retail business is commonly equated with the existence of a margin squeeze on the pricing side. The trend towards margin squeeze becomes more significant as a result of the decline in demand for copper connections. Since the costs of the copper network represent, from the decision-oriented point of view, sunk costs, the incumbent has a margin for independent price-setting up to the amount of its short-run incremental costs (SRIC). Wholesale prices, however, are determined according to a different cost standard. In order to strengthen its position in inter-modal competition, it is rational for it to reduce retail prices, but not to take the competitors along with it in the case of wholesale prices. Unlike for the incumbent, in the case of this market behaviour losses arise for the competitors which threaten their market presence and therefore endanger competition from the macroeconomic viewpoint.

Since discriminatory pricing-policy market behaviour cannot be excluded and becomes rather more likely given a fall in demand, we recommend inclusion of consideration of the principle of non-discrimination directly in the examination of wholesale prices for regulated wholesale services. Precisely when the situation occurs that "excessive" accounting profits arise as a result of wholesale prices which are above the historic costs of the market-dominant provider, it is particularly important for the regulatory authority to make sure that these excessive profits are used not for discriminatory competitive behaviour and hence to distort competition, but in the long-term interests of users. Such a situation, which may arise legitimately, does not in itself constitute abuse, but may become abusive on the basis of a specific type of market behaviour.

End customer pricing which leads to insufficient margins can also be interpreted as the market-dominant provider assigning network equipment a lower value than that expressed in the prevailing wholesale prices.

The principle of non-discrimination enshrined in the Swiss Telecommunications Act should also be taken into account in access price control. To this end, non-discrimination on prices should apply to the determination of access prices as a constraint particularly in the form of margin squeeze. In addition to the cost-based principle, wholesale prices must also meet the conditions that they are free from margin squeeze. The market-dominant provider's freedom to set prices therefore remains intact and becomes even more flexible.

We recommend a retail minus approach for the practical implementation of the margin squeeze test. When it comes to a multiplicity of end user prices produced with a particular wholesale service, we recommend calculation of the retail minus deduction not in relation to the individual end user prices of the incumbent but to a relevant 'basket' of goods. A possible adjustment of the wholesale charges then only occurs when the incumbent changes the average cost of this basket, but not every time individual prices change.

If margin squeeze regulation is directly incorporated into the price regulation of wholesale products as a retail minus option, this increases the flexibility of the incumbent in reducing its

end-user prices in inter-modal competition. This in turn strengthens the competitive position of the incumbent in inter-modal competition. At least in the case of the copper subscriber line, it is not expected that this might be worrying in terms of competition policy.

However, as a result of a retail minus option in price regulation, the position of competitors dependent on regulation is also strengthened. First, they are no longer dependent on a lengthy anti-trust procedure for a review of a margin squeeze situation. Rather, margin squeeze regulation will be implemented simultaneously with the rest of the price regulation and may also generate a third-party effect. Secondly, alternative competitors get a solution which is appropriate to the problem, in the form of a lower wholesale product payment. This strengthens them in competition. In macroeconomic terms, competition becomes more efficient as a result.

Cable ducts

In particular connection with price-setting for cable ducts, intensive regulatory, political and legal discussions have been conducted in Switzerland regarding the appropriateness of basing wholesale prices on replacement costs. In its evaluation of the telecommunications market dated 17 September 2010, the Federal Council partially took up the criticism on the hitherto customary cost calculation method in relation to network access and announced the need for a change. In relation to cable ducts, an initial distinction must be made between two functions. On the one hand, they represent a wholesale product independently in demand by competitors which have to be provided if spare capacity is still available. On the other hand, cable ducts are an input for the incumbent's (copper and/or fibre) access network.

In the case of cable ducts, the question posed is not one of infrastructure competition, especially with regard to the cooperation models concluded for FTTH roll-out. Moreover, in this case it is a matter of infrastructure elements which have little potential for innovation. As a result, there are less reasons for basing prices on the (current) replacement cost for cable ducts. Therefore, for determining prices, a valuation based on historical acquisition cost and production cost is essentially feasible and viable.

We suggest determining the costs for cable ducts separately depending on (a) whether they should serve as a basis for a price for cable ducts demanded by alternative TSPs, or (b) if they are to be used as an input when determining the FL-LRIC for unbundled copper local loops. In our estimation, there are no problems of consistency if different cost rates are determined, as there are no substitution relationships between the concrete cable ducts to which they respectively apply.

For case (a) we propose the historic costs of the company which is making the cable ducts in demand available. This rate can be regarded as a realistic approximation to the costs, preferable from a conceptual viewpoint, calculated with the (modified) short-term incremental costs (SRIC +) approach. The data procurement effort is kept within limits, because in each specific case only cost accounting data has to be gathered from the company supplying the duct. If a nationwide cost rate had to be determined, cost accounting data would have to be gathered from by all eligible companies. However, since the market dominant provider buys cable duct capacity from the electricity companies within the framework of cooperation models, the corresponding settlement prices can be used between the cooperating partners as an adequate approximation, from a practical viewpoint, of the cable duct costs of other companies.

For case (b), there are two options. The conceptually preferable approach would be the weighted use of FL-LRIC (in case of scarcity and steady state situations) and historical costs as a proxy for SRIC+ (in the case of excess capacity). The implementation of this approach is very

demanding. First, it requires a reliable classification of the area of Switzerland into regions, representing the three different market situations, then a considerable effort to obtain the required information on a regionally differentiated basis.

A less precise approach, but one requiring much less effort, would be to use the historical costs of the company here too. They lie within the relevant area, but would probably turn out to be somewhat lower than if the rate were derived using the stringent approach. The variations can be assumed to be relatively small. The approach has the advantage that, as the evaluation report by the Federal Council explains, Swisscom and its partners themselves carry out the valuation of their respective cable ducts also on the basis of historical cost, so there would be no break at this point. Unlike in case (a), in this case corresponding data would in principle have to be obtained from the cost accounts of all relevant companies. However, the latter can be approximated from the settlement prices agreed in the cooperation agreements for cable ducts, thus in the final analysis it is possible to rely only on data respectively costs from a market-dominant provider.

Access to the unbundled copper local loop

A controversial discussion regarding the appropriate cost standard in relation to the question of access to the local loop has also raged in Switzerland for years. As early as its first decisions on access to the unbundled local loop, ComCom pointed out that fibre would replace the twisted copper pair in the future as the established technology. In its latest (to date) price decision on the unbundled local loop, ComCom announced the system modification to a fibre valuation of the copper local loop as Modern Equivalent Asset (MEA) as of 1 January 2013.

Technical development and the development of the market in Switzerland have meant that the MEA of today's copper access network exists in a fibre access network. Today, no new provider entering the market would construct a copper access network. It follows from the FL-LRIC principle, therefore, that today the valuation of a copper access network should be developed on the basis of the costs of a fibre network. In this context, it is often assumed that the "relevant" costs of the old technology can be compared one-to-one with the costs of the new technology. This is essentially true, provided that the new technology creates the same goods or services as the old technology, but at a lower cost. If this does not apply, the new technology would not be better. However, for the most part new technologies produce not (only) cheaper but in particular a qualitatively better and in any case more desirable output or even new outputs. Then the customary MEA method falls short and it is subject to errors, because it ignores this performance difference. With a fibre connection, however, many more and more efficient services can be provided than with a copper connection.

In this case, therefore, for the correct determination of the MEA, in order to determine the costs of the old technology the costs of the new technology have to be purged of the performance delta between the products of the new technology and those of the old technology. According to the common view, the performance delta can only be determined relatively arbitrarily, because it depends on a diverse possible type of use over a long timeframe and this use must be estimated and evaluated. We do not agree with this view, but think that the performance delta can be determined sufficiently reliably.

For the identification of the performance delta, use is often made of capacity differences in the provision of services or rather the bandwidth or even measurable QoS differences. From our point of view, such methodological approaches, however, significantly overestimate the performance delta. It depends rather on the valuation of users in order to identify the (opportunity) cost differences for various access technologies.

We propose deriving the performance delta largely from market valuations and market observations. According to the MEA approach developed by us, the access charge for copper will be in the economically correct ratio to the relevant FL-LRIC of the FTTH local loop. From the viewpoint of the alternative competitor which is relevant to this question, the performance delta is determined appropriately if the alternative operator is indifferent between the use of the FTTH access at a price a_F = FL-LRIC+$_{FTTH}$ and the use of the copper access at a price a_C = FL-LRIC+$_{FTTH}$ − Δperf. Though the performance delta characterised in this way is highly dependent on the different valuation of the two technologies by end customers, it is nevertheless not identical to the valuation difference. In addition, any existing differences between the downstream costs for copper and fibre products must be taken into account in the costing approach.

To determine the performance delta, prices or revenues for retail products offered over copper and fibre loops should be used. The corresponding values of the incumbent and those of the alternative competitors should be averaged as appropriate. If the price data available in Switzerland in the FTTH market is regarded as provisional and not robust, or if it is not available in sufficient breadth, international benchmarking of the ARPUs for identification of the performance delta is an option. Precisely when the performance delta is determined from an international benchmark, it may be appropriate to rely on the quotient rather than the difference in prices or revenues (ARPUs). This avoids inconsistencies, as well as negative copper access prices.

In order to test the practicality of using market prices and cost differences, we have tested our approach in a quantitative competition model which we had previously developed in a different context. This model is not intended to project the results which are to be expected using the method concretely or even in the case of Switzerland, but it should show in particular how the market-based approach could work in reality and to what extent additional aspects need to be taken into account. Our model analysis suggests that this approach does lead to efficient and robust results.

The starting point of the MEA approach proposed by us is the FL-LRIC of a fibre access network. According to the existing costing approach of ComCom, evidence of costs can be provided by Swisscom for fibre access lines on the basis of its costing model Cosmos. If this does not take place adequately or at all on the part of the market-dominant provider, the cost calculation could be performed on the basis of a costing model of the regulatory authorities themselves. If the access prices of a unbundled copper local loop are also to be uniform across Switzerland, the reference cost of a fibre access network must be determined regardless of the current spatially limited actual roll-out, on the basis of a (hypothetical) roll-out across the whole of Switzerland. In the case of other cost-determining variables such as penetration rate, WACC and in-house cabling, a broad analogy between the copper access cost calculation and the fibre access cost calculation hast o be applied when the FL-LRIC of a fibre access network are determined. The determination of the price of a fibre local loop, possibly regulated in Switzerland in the future, would not be pre-determined by this.

The approach outlined here, of determining the copper local loop prices starts out from a regulator's technology indifference between a copper and a fibre access. If stronger incentives to invest in fibre access networks in Switzerland are to be encouraged, unbundled local loop prices would have to be reduced more. In view of the high investment dynamic in FTTH networks which prevails in Switzerland, however, we see little reason and justification for such target weighting.

Our model analysis suggests for the MEA approach to the copper local loop the setting of both an upper and a lower price limit, which should be considered as additional regulatory restrictions. The upper price limit should be the last price determined in accordance with the FL-LRIC of the

copper access network. Should the MEA approach lead to a higher value, FTTH could no longer serve as an MEA for copper. The lower price limit should be the short-term costs of the copper network, because it would otherwise not be rational to continue to operate the network.

The MEA approach developed by us is in our view in conformity with the system of the current regulatory approach applied in Switzerland. Since the outcome should be lower wholesale prices followed also by a reduction in the prices for FTTH and cable connections, consumer benefit will be increased. Since the price-setting freedom for FTTH would only be slightly restricted for the incumbent, its incentives to innovate would remain.

The MEA approach is designed so that it leads to competitive neutrality between FTTH and copper. Inter-modal competition with cable is in no way distorted or impaired.

The proposed MEA method maintains a proper gap between wholesale prices for the old and the new technology. This ensures that investments in new technology are sufficiently attractive for the incumbent. At the same time, it covers at least the short-term cost of the old technology, including (in our opinion) all maintenance investment which will still be necessary for the old technology. Provided the incumbent only demands cost-covering prices for the FTTH local loop, the alternative competitors are indifferent at the level of profit per customer between copper and FTTH and will continue to invest in the downstream sector of copper if the quantitative prospects there are better than for FTTH and vice versa in the downstream sector of FTTH if there are better prospects for quantity there. Overall, the MEA approach provides a good balance of investment incentives between the technologies and market levels, without giving undue priority to investment in FTTH.

Interconnection

The efficient core network is currently an NGN. The transition to an NGN as the MEA for a new network technology currently established on the market is also in the offing for an efficient network in Switzerland as in other European countries. The determination of the costs of interconnection on the basis of the cost of the NGN does not require a transition to a different cost standard. On the contrary, all the economic conditions for rational use of the FL-LRIC cost standard are given in the NGN. This applies particularly against the background of a rapidly growing volume of traffic. In this context it is completely irrelevant whether voice traffic may tend to be somewhat stagnant or possibly even shrinking. In this connection, only the overall traffic is relevant. This is the relevant cost driver.

The NGN as an MEA does not require IP interconnection exclusively to be offered. Given appropriate protocol conversion by media gateways and media gateway controllers, TDM-based interconnection can continue to be offered if there is a corresponding demand in the market.

We consider it quite possible to determine the costs of interconnection on the basis of the NGN and in principle within the framework of the Cosmos cost model tool used by Swisscom. If Swisscom does not adequately allow or does not allow at all a cost audit for NGN-based interconnection services, we recommend that the regulatory authorities should apply a cost model of its own. We think pricing on the basis of international benchmarking rather inappropriate for the NGN. On the one hand, the NGN implementations of individual network operators exhibit significant differences, with corresponding repercussions on the relevant costs. This applies in particular to the structure of the efficient network, which may be substantially influenced by national factors such as size and volume of traffic. Regulated prices abroad or costs determined abroad may not then be a suitable proxy for the relevant costs in Switzerland. Secondly, with the transition to the NGN, the regulatory authorities of (almost) all EU member

states are migrating to application of the EU Commission recommended (and imposed) pure LRIC cost standard as the basis for determining the relevant costs and prices for termination services. Thus comparable prices for the NGN which are still based on FL-LRIC will hardly be available in the future from European countries. However, no benchmarks for relevant FL-LRIC values can be derived from pure LRIC values.

We cannot recommend for Switzerland a transition from FL-LRIC to the pure LRIC standard for termination services as defined by the EU Commission. Instead, we call for retention of the FL-LRIC cost standard, because otherwise inconsistencies will arise and insufficient consideration will be given to the cost incurring requirements.

The transition to the MEA NGN is not only a cost-price question; the efficient interconnection structure also changes in the NGN. We recommend that the related complex issues be discussed within the framework of an industry working group with the players in the market, in order to find a new solution which is as consensual as possible.

The FL-LRIC standard in conjunction with the MEA approach is based on the competition model of contestable markets and with reference to a network operator newly entering the market. It follows from this perspective that migration costs are not significant for the determination of the relevant costs. This is also justified by the fact that in Switzerland, as in other European countries, the market-dominant provider has also already (predominantly) completed the migration to NGN. In this respect, it has already largely internalised the resulting cost savings also. This is not yet reflected in the current interconnection prices (and its own retail prices). In this respect, migration costs have already been "earned" in the market. A further remuneration on the basis of a delayed transition to the costs of the NGN would then lead to over-compensation. Especially in relation to a new interconnection structure, however, we consider making a gradual transition (a glide path) to the new cost and interconnection structure worth considering, if otherwise fairly major disruptive processes are to be expected, particularly for alternative TSP. This glide path should, however, be short (2 to 3 years), so that the efficient overall solution rapidly prevails in the market.

Since in NGNs the dependence of costs on the employed capacity is even clearer than in the PSTN, we recommend consideration be given to the introduction of capacity-based charges (CBC) in connection with the review of the pricing for interconnection. In view of the trend towards flat rates, which also include voice telephony, this is already sufficiently justifiable in the area of retail tariffs, in terms of pricing policy. This will provide a closer match to the relevant cost structure and further efficiency improvements will arise. Capacity-based charges are even more appropriate in the NGN than in the PSTN.

In the Swiss market there may still be core network operators which in the transition to CBC expect diseconomies of scale for their business model in competition with providers which are stronger in the market. This could be taken into account by not making the transition to CBC mandatory for all interconnection customers, but merely one additional pricing option in addition to minute-based interconnection charges which continue to be offered.

Bitstream access

Today, the NGN also constitutes the relevant MEA for the provision of bitstream services in the concentration and core network. The cost of providing this service can be determined using a bottom up model for the NGN. Since it is a future-oriented technology and since a rising general demand for transport can be expected, the relevant costs can be determined according to the FL-LRIC standard. Bitstream services can be provided via different types of access lines in the

access network. The access network component in bitstream access costs are to be used in each case for the cost standards relevant to the respective access networks.

Leased lines

Leased lines as permanent connections between two locations can be mapped on several technical levels with the introduction of NGN. On the one hand there is the option of implementing leased lines in the traditional manner using the technical components of the transport network, which covers all MPoP sites and links them in a hierarchical structure. This approach provides the highest quality, provides guaranteed bandwidth and a low, constant latency. In particular, low bandwidth "leased lines" ($\leq$ 2 Mbps) with lower transmission quality requirements have already been replaced in the past primarily through internet links via DSL and therefore carried on the Ethernet (and IP) layer, so that they use as part of the IP/Ethernet data stream the underlying transport network. In addition, for some time now there have been Ethernet leased lines or leased lines using the IP protocol, so-called pseudowire connections, in which terminals are linked via the low-cost Ethernet interfaces. In contrast to DSL links, these links typically have a guaranteed bandwidth and in some cases other guaranteed service levels.

When modelling the NGN network, the transport network is modelled with the entirety of the traffic transported on it, i.e. including leased line traffic on the transport network layer, because only in this way can the economies of scale which occur be taken into account. The same applies to Ethernet and IP leased lines. Therefore, a suitably structured NGN cost model can also determine the cost of leased lines on the basis of the FL-LRIC standard.