ITS Europe Symposium 2024
15-16 April 2024, Berlin, Germany

Understanding carved-out Mobile TowerCo asset company related incentives for cost efficient 5G rollout and operation in the EU

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Abstract

EU mobile telco industry faces to lacking economies of scale, asset utilization and efficiency that widen the investment GAP to reach EU Digital Decade 2030 target for full mobile broadband internet coverage. Operators request market consolidation (merger & acquisition) or at least market cooperation (mobile network sharing) to address challenge, however it is not well received by regulators, preferring infrastructure based competition over service based one. Therefore, operators are incentivized to look for efficiency improvement alternatives, like strategic asset reconfiguration, as network carve out into infrastructure, e.g. mobile tower companies (TowerCos).
The *aim of this paper* to contribute to the understanding of TowerCo related incentives for efficiency improvement. The *research question* focused on addressing to what extant does TowerCo carve-out stimulate the cost efficient 5G rollout and operation in the EU. The research draws a theoretical model framework in which cases study scenarios are assessed with qualitative analysis. The *research finding* and the novelty is that TowerCo divestiture under common case concentrated incumbent operator market, limited virtual or new entrant operators, mainly operator-wing captive TowerCos, and matured network rollout stage, is less incentivizing the efficiency driven basestation consolidation, compared to a network sharing. Nevertheless, on competitive markets with viable virtual operators, being incentivized to become full-scale operator, independent neutral host TowerCos and/or growing network rollout stage, TowerCos lowering entry barriers in value-chain and rollout unit costs, therefore positively contribute to more efficient 5G rollout.

Keywords: TowerCo, network sharing, cost efficiency, 5G, open RAN,

Disclaimer: This paper was written by Gábor Földes. Views are the author's own and do not necessarily represent the concluded position of Vodafone on any particular matters. The research received no financial grant.

1. Introduction

One of the most significant current discussions in European mobile telco economics is how to foster 5G rollout and close the coverage GAP towards both EU Digital Decade 2030 target to full population coverage and developed nations, like US, China, South Korea and Japan.

Analysys Mason latest research published in ETNO (European Telecommunications Network Operators' Association) State of Digital Communications 2024 report (ETNO, 2024) showed that still in 2023 Europe had the lowest coverage by at least one 5G mobile operator (80%), compared to peer nations (from China 89% to US 99%). In the share of 5G among mobile connections also Europe has the low-end value by 17% compared to peers (from Japan 33% to China 83%). Service quality, proxied by downlinked speed also lag behind peer nations, as in Europe it is 64 Mbit/s, while in US 97 Mbit/s and in China 172 Mbit/s.

The non-financial performance indicators above do not reflect the financial efforts that operators invest into European market. ETNO report also states that European ETNO member operators' capital intensity (CAPEX/Sales) ratio increased to on pair with China at 20% level, and far higher than the Japan and US levels around 15%. The discrepancy is rooted in inefficient, fragmented market structure in Europe (number of large mobile operators with more than 500 thousand SIMs is 45, compared to 8 in US and 3 in South Korea) that results lack of economies of scale, asset utilization and cost efficiency. In consequence capital markets undervalue operators with low and decreasing EV/BITDA multiplicator and Stoxx Europe 600 Telecommunications Index is slipping back.

Under this framework *International Telecommunications Society (ITS)* organized the *European regional conference in 2024* with the research question to "Our path towards next generation mobile networks in Europe: 5G and beyond". It called attention to transformational nature of 5G, as EU "Digital Decade" program aims by 2030 to transform citizens' digital skills and how citizens and businesses use digital technologies. The precondition of the transformation to reach 100% mobile broadband population coverage in the EU till 2030.

My research contributes to 5G network rollout subtopic, announced in the list of call for papers. I focus on financial strategic point of view, how more efficient investment and operation could close investment GAP to reach EU Digital Decade to full coverage target. Operators propose to improve economies of scale, market consolidation, or at least market cooperation, however due to regulatory limitations the strategic asset reconfiguration, the divestiture of Mobile network basestations into separated Tower asset companies are become common in EU value-chain also. My *research question* focuses on the assessment of TowerCo related incentives and impacts for efficient 5G Rollout.

My paper *methodology* outlines a theoretical model framework to assess TowerCO impacts on cost efficient 5G rollout in comparison to network sharing. The model applies two assessment dimensions. First the market structure analyzed that covers network operators, virtual operators and TowerCos, and the second dimension researched is the network rollout stage, containing growth phase (coverage, greenfield rollout) or matured, efficiency phase (capacity rollout, brownfield optimization).

My *research finding* is that in concentrated markets with just a few incumbent network operators, with limited virtual operators and dominantly captive, operator-wing TowerCos, as well as network in a matured phase, the efficiency impact is less, than the network sharing might have, as TowerCos are not incentivized for further efficiency driving physical site

consolidation. Notwithstanding in the other case with more competitive network operator market, active virtual operators with intention to transform fully-fledges network operator and TowerCos are neutral hosts with a growing network phase, the TowerCos in the value-chain improves cost efficiency by lowered market entry barriers and unit costs.

The *novelty* of the paper that it points TowerCo separation itself does not help the efficient 5G rollout, even there might be partial interests that decrease incentives for further efficiency improvement as network consolidation, standalone 5G and open RAN.

This paper is organized as follows: *Section 2* provides an overview of literature on horizontal mergers, network sharing, infrastructure company TowerCOs. *Section 3* describes the research methodology on qualitative analysis and theoretical model framework. *Section 4* qualitatively explores the emerging TowerCo market in Europe, regulatory aspects and incentives on both network operator and tower company sides. *Finally, section 5* assesses the TowerCo impact for efficient 5G rollout in concentrated and competitive market structures, as well as the growing and matured network phases, and provides recommendations for TowerCos for higher contribution to cost efficient 5G rollout.

2. Literature review

The cost efficient 5G mobile broadband rollout is the precondition of affordable consumer prices and social welfare increase. Operators in the European fragmented national markets therefore request higher economies of scale via market consolidation (horizontal mergers), or at least market cooperations (network sharing horizontal production agreement) or do strategic asset reconfiguration (access network, like basestation separation).

The existing academic literature on these cost efficiency improvement initiatives are descending in that order. A large and growing body of literature has investigated the impact of horizontal mergers in Europe, a mid-size amount is available for mobile network sharing related, but surprisingly small body of *literature* has investigated the roles of TowerCos, as well as the relevant stakeholders' interest and strategy on infrastructure carve-outs.

2.1. Overview on operators' efficiency improving initiatives

Mobile Network Operators (MNO) call for single European market and inland *market consolidations* to benefit from improve company-wide synergies that would allow cost decrease driven price lowering and service quality development. Regulators see risk in decreasing number of independent network infrastructure operators, as they prefer competition between parallel infrastructures, where viable over the service based competition within same infrastructure. The recent question of EU mobile sector is the 4 to 3 horizontal merger and its impact on prices, innovation, investments and service quality. There are large volume of published studies describing the potential impact of 4 to 3 mergers, but I would like to refer an Europe wide empirical quantitative study that states based on comparing 4 player and 3 player markets' ten years actual dataset that on merged 3 player market the prices are similar or slightly higher, the investment level (CAPEX/Sales ratio) higher and therefore the service quality (download speed) is also higher. (Bahia *et al.*, 2023) Furthermore Compass Lexecon recently published a paper on overview and assessment of 25 past merger empirical researches in Europe

(covering mainly cases in Austria, Italy, Netherland) and US related 4 to 3 mobile player mergers. The synthetized main finding was that mergers had either no significant impacts on prices or if had it was just only a time-limited and for some service bundles related effect. The result also indicates that mergers in many cases led to quality improvements. Finally, it introduced the quality-adjusted prices, proxied by the rate of decline in average revenue per GB of data (mobile broadband) consumed and the outcome displayed 4 to 3 merger caused either no change in the rate of decline in quality-adjusted prices or have accelerated the decline. (Wickens *et al.,* 2023)

Despite these facts, competition regulators, mainly EU DG Competition opposes 4 to 3 mergers or they preset such conditions for approval that create the opportunity of a later 3 to 4 market development by requesting asset (eg. spectrum blocks) divestiture or access obligation for new market entrants, as it happened in the latest Spanish Orange-Masmovil merger case, when Romanian based Digi got mid-band spectrum and access option to Masmovil-Orange network to develop its own business.

MNOs who are not allowed to merge or do not accept approval conditions are looking for other options to improve economies of scale, at least in the most costly mobile network production function that accounts for almost 50% of total mobile cost (OPEX - Operational Expenditure) and more than 75% of investment (CAPEX – Capital Expenditure). *Mobile network sharing* is a coopetition between participating operators, which means a parallel cooperation (in network production) to create the saving benefit and competition (in retail business and overhead activities) to divide the benefit between them and other market players. (Brandenburg – Nalebuff, 1997) Motta from competition policy aspects also confirms that mobile network sharing is definitely better for social welfare, than full scale merger as competition in retail service downstream market is preserved (Motta – Tarantino, 2017). There are empirical quantitative researches that with Difference in Difference fixed effect panel model show that price levels decreased after mobile network sharing for participating operators' customer and even for outlayer operators' customer due to umbrella effect, while investment and service quality level increased. One study dealt with the Czech network sharing case that was not cleared but run for more than 5 years (Maier-Rigaud, 2020), while the other published by GSMA and Oxford Martin on whole Europe 20 years actual dataset based research with these findings. (Koutroumpis *et al.,* 2023). Similar case study findings published for Hungary as well (Földes, 2023a).

From the current research point of view an important strategic question of network sharing participating operators, whether they *form a Joint Venture* (JV) from the carved-out existing network and owning further network rollouts. Bourreau pointed that compared to contractual relation, the JV formation represents a higher level, long-term commitment for the shared operation (Bourreau et al., 2020). Furthermore, Joint Venture is a special asset/ infrastructure/ tower company that has at least 2 dedicated customers, the network sharing participating two companies. It has per definition at least 2.0 tenancy ratio, as at least these companies parallel use its network.

Sector regulator BEREC (Body of European Regulators for Electronic Communications) on one hand acknowledge the benefits of mobile network sharing in case of rural areas, where sharing in passive network asset segment is even encouraged. On the other hand BEREC prefers in case of urban areas the parallel infrastructure based competition over the benefit of network sharing and in particular for higher scale sharing, containing not only passive but also active assets (MORAN, MOCN with spectrum). (BEREC, 2019) Thus, in the European telco market neither horizontal mergers, nor horizontal production agreements are supported to take country

wide full advantage of economies of scale, therefore further efficiency improvement alternatives explored by MNOs.

As consequence of lacking economies of scale, operators faced to other financial challenges at that time, due to the level of investment return (RoCE - Return on Capital Employeed) was low, around mid-high one digit percentage level, and even went under the cost of capital (WACC - Weighted Average Cost of Capital), therefore market valuation (EV/EBITDA multiplicator) plummeted as well, resulting a deterioration in stock prices (Stoxx Europe 600 Telecommunications).

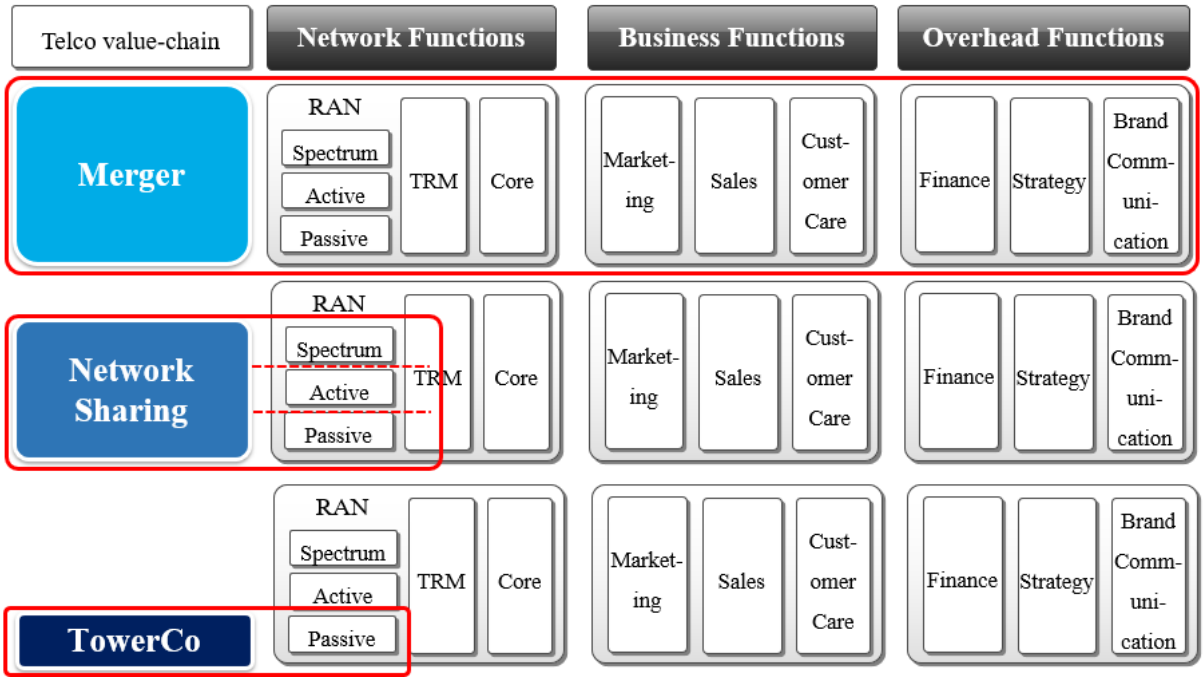
Operators were incentivised to take further action to address efficiency and financial challenges. A strategic asset reconfiguration, a voluntary divestiture of *infrastructure asset* in access network segment and carve-out into separated company followed the worldwide trend in Europe also. The separation addressed both efficiency and financial challenges at the same time, however the more visible and low-hanging benefit was the improved corporate valuation and the second aim become the efficiency resolution. This target setting order also visible form that, mainly passive infrastructure assets were carved-out with longer useful lifetime, less complexity and more visibility for corporate valuation, while active assets with shorter lifetime, more complexity, but additional efficiency potential were mainly descoped from spin-off.

Surprisingly the TowerCo separation in academic telco economics has still not yet been extensively studied. The network sharing assessment empirical quantitative model from Koutroumpis has a preliminary finding also for the impact of TowerCo divestiture. The model showed consistent and statistically significant ARPU reduction in TowerCO case, that finding is similar to passive network sharing case impact on cost reduction, lowered prices and enhances speeds. (Koutroumpis *et al.*, 2023).

2.2. Overview on savings potential of efficiency improving initiatives

There is a compelling need in telecom sector for improving economies of scale, described in introduction, but important to emphasize the *different size of addressable cost base for saving* in each scenario among horizontal merger, network sharing and TowerCo based operation.

Figure 1: Overview on operators' initiatives and addressable cost base



Source: Author's own summary

Horizontal mergers have the highest savings potential unquestionably, as the company's total cost base is addressable. The more important to understand the savings potential size difference in network function related cooperations, as network sharing or TowerCo operation.

Mobile Network sharing related addressable cost base is the Network Tehcnology function, which accounts for approximately almost 50% of total company OPEX and more than 75% of total company CAPEX. The savings potential depends on the scale of the sharing. If only passive assets (eg. site, tower, rooftop, cables, cabinet) shared it is less, compared to additional active elements (eg. radio, antenna) are shared also.

Several academic empirical researches available on determining savings potential. Oughton published a research on cost, coverage implication of 5G rollout covering Britain (Oughton & Frias, 2018). Oughton participated in another study that assessed 5G infrastructure sharing business models in rural areas and identified savings potential as follows: 10-20% for passive sharing, 20-35% for active sharing, and 35-50% for 5G neutral host networks compared to baseline no sharing case (Koratagere Anantha Kumar & Oughton, 2022). Rendon Schneir performed a cost assessment of multi-tenancy for a 5G broadband network in a dense urban area (part of London). The finding was a 13.6% reduction at Total Cost of Ownership (TCO), the CAPEX and OPEX cost reductions were 15.7% and 12.9%. (Rendon Schneir et al., 2019). Telecommunication advisories also published savings potential of network sharing. WIK consultant examined the RAN sharing operational efficiency for the regulator of Switzerland, and identified up to 40% a saving range. (WIK-Consult, 2016). Analysys Mason research data was referred by Telefonica Spanish incumbent operator that MORAN active sharing has 30-40%, while MOCN active sharing has 40-50% savings potential (Telefonica, 2019).

European regulator BEREC also reported that cost-savings from different types of sharing agreements yielded reductions in CAPEX of 16–45%, and OPEX of 16–35%. (BEREC, 2018)

All these data clearly state that blended CAPEX & OPEX savings may exceed one third of the cost baseline, which is a remarkable efficiency improvement.

Summing-up the two main efficiency drivers of network sharing are: (1) physical site consolidation and (2) involved mobile network elements.

The higher the decrease in number of basestation, the higher the saving. The higher of the number of involved network elements, namely additionally active elements top-on passive elements, the higher saving can be realized. Based on literature findings form academic and consultancy studies. if active assets are also shared approximately at least 10%point higher savings can be reached top on passive asset sharing's 20-25% savings level.

In spite of these findings above, *TowerCo asset separations* are vast major limited to passive asset, where the addressable cost base is the lowest and some one third of savings potential scoped out, compared active MORAN network sharing.

Summing-up TowerCo carve-out has potentially the lowest contribution to improve economies of scale. From efficiency improvement point of view this is the last option from operators that would have chosen, but initiatives with higher savings potential often not allowed by the regulators. TowerCo spin-off has an additional significant value for operators as it improves corporate valuation by recognition of infrastructure asset real value.

3. Research methodology and theoretical model framework

This study outlines a theoretical model on the impact of TowerCO carveout, then qualitative case study based assessment applied.

The literature review provided an overview on that TowerCo has controversial contribution to efficiency improvement in 5G rollout. On one hand, passive network asset segment might bring savings, but on the other hand it lags behind to network sharing as majority of TowerCos seems reluctant to go for active asset network layer, therefore they might have partial interests.

The following theoretical framework grabs the two relevant dimensions and subcases that worth to be assessed. Market structure and network rollout stage are the most decisive dimensions to understand TowerCO contribution to efficient 5G rollout.

Table 1.: Theoretical framework for TowerCO impact assessment

TowerCo impact assessment framework			**Mobile Network rollout stage**	
			Matured Phase (Capacity, Brownfield),	Growing Phase (Coverage, Greenfield)
Market Structure	MNO	Concentrated		
		Competitive		
	MVNO	Limited/No		
		Competitive		
	TowerCo	Captive MNO		
		Neutral Host		

Source: Author's own summary

Market structure is the most significant dimension to evaluate TowerCo spin-off impacts. The *mobile network owning MNO market structure* is the starting point. Market concentration measured by HHI (Herfindahl–Hirschman Index) is a sophisticated indictor to assess concentrated or competitive markets. A good proxy for also this problem is the number of MNOs, the 3 player markets have higher HHI, than the 4 player markets, where MNOs might be more incentivized to benefit from wholesale revenues from MVNOs top on their retail service revenues.

he *MVNO market structure* partly rooted into MNO market structure. In certain markets there are absolutely no MVNOs (eg. Hungary), but there are markets, where MNVOs' total market shares (both SIM cards and service revenue) reaches or exceed 10% (eg, Czech republic, despite 3 player MNO market).

The *TowerCo ownership* also may influence the impact of tower companies on a certain market. If there are only MNO-wing captive TowerCos, where MNO still has a controlling stake (50%+1 vote), and only this type of TowerCos are on the market, then the TowerCo separation impact might be limited. In contrast if there are at least one neutral host TowerCo, then it might have favorable impact for market entrance and cost efficiency.

In the limited/no MVNO case even a neutral host TowerCo has limited impact on market and efficiency, while in case of active MVNO market, even an MNO-wing captive TowerCo could help MVNO development or transformation to MNO. This was the case in Germany, when Vodafone owned Vantage TowerCo become the rollout partner of 1&1 Drillish 4th operator, who currently transformed from MVNO (Mobile Virtual Network Operator) to MNO, after winning spectrum earlier and started to rollout its own network.

The *other dimension of assessment framework* is the *mobile network rollout stage*, which may vary dynamically in line with useful life time of mobile network generations (2-3-4-5-6G), as well as related network swaps and modernization cycles. This is valid not only for main network generations, but also in scope other bigger network investment activities like, standalone 5G, openRAN, network virtualization or small/micro cell rollout.

In the *Matured period* (eg after 4G finalized) there are brownfield like, capacity increasing investments, the focus might be on network performance optimization, efficiency improvement, site consolidation, if not yet there. In that case TowerCo with fixed basestation portfolio and long term contracts might not be incentivized for further base station consolidation.

In the *Growing investment heavy periods*, when new greenfield sites are roll-out for coverage increase for an existing player or for new operator, then neutral host TowerCos might deliver substantial efficiency improvement both in the rollout and later operation.

The aim of this paper to apply qualitative analysis on this theoretical framework to assess TowerCO contribution to efficient 5G rollout towards Digital Decade 2030 targets. The qualitive assessment in following discussion part will cover the drivers of TowerCo market development, the regulatory approaches and summing up incentives of MNOs and TowerCos related to tower company operation.

4. TowerCo market development, regulation and incentives on the market

This section covers the analysis part of the TowerCo assessment related elements. It contributes to understand the drivers of emerging market developments, regulatory standpoints and incentives influencing further market development opportunities.

4.1. Drivers of emerging TowerCO market in EU

The European TowerCo market development started later than in other continents, where earlier came the compelling need for financial benefits.

The first driver of MNO incentives to carve out asset companies were the low and decreasing *corporate valuation of their total operation* that not reflected real value and future opportunities may evolve from significant network investments. Analysys Mason pointed out in ETNO State of Digital Communications study that corporate valuation of MNOs is one of the lowest among other industries, in particular for European based operators. The *EV/EBITDA multiplicator* (how many years EBITDA profit willing the buyer pay in advance to get the ownership) is mainly around 4-6 times range. (ETNO, 2024). Arthur D. Little consultancy meantime called attention that the mobile network sharing JVs (eg. INWIT) EV/EBITDA multiplicator values are much higher, in 15-20 times range already. (Arthur D. Little, 2021). This means that network sharing Joint Ventures before mass carve-out of asset companies in Europe justified the direction. Investors evaluated higher level the JVs with 10-20 years long term contract to 2 MNOs that represented sufficient economies of scale, asset utilization and cost efficiency. Later on TowerCo carve-outs and sales justified the 20-25 times EV/EBITDA range for TowerCos as well.

The other driver is the high and increasing *leverage ratio* of their operation. The *Debt/EBITDA ratio* typical value for a European telco reached 2-4 times ranges, which means the debt value reached 2-4 years EBITDA profit level. (Arthur D. Little, 2023) This level become a high burden for MNOs and in recent years unfavorable macroeconomic environment with higher inflation and higher interest rate incentives them to actively downsize debts. A good opportunity became in form of asset carve-out and monetization on good price, so enter into a sale and lease back construction.

Summing up the corporate valuation improvement for later sales option to fund debt reduction, become the main driver of strategic asset reconfiguration and asset monetization that resulted TowerCo carve-outs. Efficiency improvement ranked into the second place, behind short-term financial interest as low-hanging fruit.

4.2 Overview on TowerCo types and main players in EU

TowerCos has large number of variants, based on strategic expectation of their original MNOs (mother companies). I identified 4 main dimensions that drives TowerCo conduct on market, as follows: ownership, network element scope, network sharing relation and tenancy ratio.

Table 2.: Overview on TowerCO types

Dimension	Variant	Characteristics
Ownership	Not carved out	MNO not yet decided to carve-out (eg. Magyar Telekom)
	captive MNO wing, w 50+%part	Carved-out, but majority stake still kept (eg. Vantage, Totem)
	captive MNO wing, w 50-% part	Carved-out and only minority stake kept (eg. GD Towers - DTelekom)
	Neutral Host owned after sold	carved -out and sold 100% at that time (eg. Telefonica)
Network scope	Passive assets only	Only passive RAN carved-out (vast major of TowerCos)
	Passive + Active assets	Passive and active RAN assets carved-out (eg. CETIN, Cellnex PL)
Network sharing relation	Involved as JV	JV set-up was earlier than named as TowerCo (eg. INWIT, Cornerstone)
	Involved	Operating network sharing elements were moved to TowerCo (eg. CETIN HU)
	Not involved	Neither before, nor after carve-out involved in sharing (eg. Vantage HU)
Tenancy ratio	Closer to 1.0 (pure MNO like)	Many in Network sharing not involved TowerCos (eg. Vantage DE)
	Closer to 2.0 (JV like)	Many in Network sharing involved TowerCos (eg. Vantage RO)

Source: Author's own summary

The main dimension that may influence TowerCO strategic ambitions is the *ownership*. Nevertheless majority of TowerCos emphasize its independent market behavior, but when controlling stake is in hands of the MNO Group, from which was carved out, unlikely to do such agreements that jeopardies group retail mobile downstream service market interests, or at least the net balance is negative for the Group. Neutral host TowerCos are more likely to follow their own strategic approach, independently its potential impact on retail service market, eg. more intensive competition, promote new market entrant starting price erosion.

Majority of *TowerCo separation scoped only to the passive infrastructure*. There are several reasons for this low-end scope. On one hand these elements have the longest lifecycle, mainly over 20 years, therefore lease contracts are also 20+ year long w inflationary indexation, which is the most attractive for investors either on stock exchange floated papers or direct buyouts. Compared to active asset elements that has mainly 10 years swap cycle, so complete network modernization may take place together with each and every introduction of new mobile network generation (eg. 4G, 5G). The halved contract cycle might be less attractive for investors. Managing Active network elements are more complex activity, requires more technology expertise. Some MNOs considered easier the passive elements to be shared by the TowerCo, delivering higher tenancy ratio benefits for itself also. Some MNOs did not want to loose full control of its RAN (Radio Access Network) by craving-out both passive and active Network elements.

On the other hand, some MNOs take bigger step by carving-out passive and active RAN altogether. This might be even a competition advantage for the TowerCos to offer more complex service from one hand. TowerCo and MNO cooperation might be more harmonized, as there are no partial interests on passive asset focused, the ownership and the responsibility of network services are higher by the TowerCo even in strategic questions. The efficiency driven optimization and the savings potential identification based on complete passive and active addressable cost base also in one hand on TowerCo side. The key example is CETIN Group.

Despite Cellnex Capital Market Day long term strategy plan contains just a sub-opportunity to move active RAN segment, there is a trial in the Polish Cellnex company. Cellnex takes on active RAN elements alongside passive infrastructure, as a basis for a “RAN-as-a-service” offering, launched 2023, potentially with a view to expansion into other European markets and full, network-as-a-service play.

The *network sharing involvement* is also crucial dimension to assess TowerCo incentives. If TowerCo inherently part of any network sharing agreement that is more advantageous for itself as per definition meets the high level 2.0 tenancy ratio. However, if not part of any network sharing that not incentivized to do large scale network sharing deals that would decrease its physical basestation footprint, therefore long term contracts, revenues and corporate valuation.

In Europe almost every bigger MNO groups has a TowerCo relation in one of the forms previously listed. The following table summarize the biggest selected TowerCos’ non-financial and financial data.

Table 3.: Overview on biggest selected TowerCos

TowerCO (data for 2022)	Ownership	Presence	Number of Basestation, thousands	Revenue, bn €	EV/ EBITDA, times	RoCE, %
Cellnex	Spanish Stock Exchange	AT, DEN, IRE (sell), IT, POL (active trial), PT, SP, SCH, SW, UK,	111	3.5	20.5	0.9
Vantage Tower (w/o INWIT, Corner-stone)	Vodafone 60%, (decreasing) GIP/KKR 40%	IRE, PT, SP, DE, CZ, HU RO, GR	46	1.1	26 (2022 sell)	6.1
GD Tower	Deutsche Telekom 49%, Brookfield/ Databridge 51%	DE, AT	41	1.1	27 (2022 sell)	na
American Tower	Real Instate Investment	FR, DE, SP (Telefonica O2 based)	224 (worldwide), 31 (EU)	10 (world-wide)	24	4.0%
TOTEM	Orange 100%	FR, SP	27	0.7	na	na
INWIT	Vantage Towers: 33%/ Telecom Italy: 10%/ Ardian 30%	IT	23	0.9	20.0	4,7%
Corner-stone	Vantage Towers 50%, Liberty/ Telefonica 33%/GLIL 17%	UK	20	0.4	na	na
CETIN	PPF, 70% (thereof e& 50%+1 will be), GIC 30%	CZ, SK, HU SRB, BG (active assets incorp.)	13	0.9 (incl. active)	na	na

Source: Author's own summary on operators data

Table 3 shows different MNO strategies on ownership for corporate valuation improvement. It is also visible that in bigger EU national markets more TowerCos are operating, many cases dominantly MNO-wing captive TowerCos, however there are independent or close to neutral host TowerCos as well. The TowerCo market structure also highly impact the TowerCo incentives and contribution to efficiency.

4.3 Regulatory aspects related to TowerCos

In the European *sector regulation* the BEREC latest deregulation guidance does not request mandatory mobile (wholesale) market definition and regulation. Termination and roaming fees are set at a decreasing glide path at EU level, independently from the national level market analysis process. As a consequence, no market defined, no official market analysis and no access obligations are imposed, including any kind of asset divestiture. MNOs based on pure business driven decision started voluntary asset separations and on commercial base provided access dominantly to their wholesale partners.

BEREC identified the new market trend of TowerCo separations and classified TowerCos, as wholesale-only operators (dominantly). On BEREC request WIK-Consult prepared a study on infrastructure companies, incorporating national regulatory, commercial interviews and workshop based inputs (BEREC, 2023). The WIK study has one relevant finding for regulatory and one for commercial incentive aspects.

From *regulation point of view*, it states that TowerCos generally supports investments and do not pose a competition challenge. In some cases, debates might be risen on contracting terms and condition for access to its infrastructure and the ownership structure might add concerns around potential discrimination. In that case local sector regulator (NRA - National Regulatory Authority) might consider a market analysis process, define a separate market for towers to examine context of concentrations or ex-ante market regulation needs, like imposing SMP identification or symmetric regulation with geographic differentiations.

From *commercial point of view* its finding was that, TowerCos are principally are not the driving force of 5G deployment (rather the constructors of MNO demands), as decisions and obligations related to coverage and network densification remained with the MNOs. On the other hand, MNOs might be cautious of new passive infrastructure building requests, as TowerCO hosted MNO's rival operators might get an access also, decreasing the coverage and quality advantage of the MNO over competitors.

The *competition regulatory* (NCA - National Competition Authority) aspects are visible in case of horizontal mergers, like when Cellnex neutral host player wanted to merge Hutchinson 3K mobile operator's carved-out tower asset portfolio in Austria, Denmark, Ireland, Italy, Sweden, and the UK. Competition regulators defined relevant markets for national hosting services on passive infrastructure (macro sites and micro sites) to assess potential competition impacts on prices, investments and quality. The merger request in the whole Europe were cleared, however country level different way. In Austria it was quite smooth process, but in the UK the competition regulator launched even a second phase investigation before finally cleared the case. In an another case, in Portugal Cellnex - NOS merge the regulator concluded that the merger despite entails a major concentration in market for macro sites (passive large telecoms

infrastructure), the "deverticalisation" of the market and the emergence of independent, open networks might bring competitive benefits. (Cullen International, 2020) It showed that besides market structure difference at national level, the regulators approach and assessment might bring further difference into the assessment.

4.5 TowerCo related incentives related from MNO side

The short term, carve-out related incentives of MNOs are discussed already at the beginning of this chapter. It covered the improvement of corporate valuation, monetization of more realistic asset value, selling stake in TowerCo and deleverage Balance Sheet by decreasing debts from the realized asset value. Efficiency improvement and cost savings was only the second priority among short term goals.

The mid and long term goals on one hand focusing on efficiency improving and on other hand for growing initiatives.

The *efficiency improvement expectations* have two elements: *(1) on BAU (Business as Usual)* level TowerCO expected to increase tenancy ratio, which may lead to unit price decrease for the existing customer MNO, and *(2) transformation element* that relates to network sharing led site consolidation, where the decrease of number of physical location is the main driver. However this goal might be in contrast with TowerCO interest. If the passive asset level consolidation can not be performed, the MNO side kept active asset optimalisation also can not be realized efficiently.

The *growing activities* at MNO technology agenda are the introduction of *standalone 5G* network, *virtualized network functions* and *open RAN* architecture. Open RAN multivendor concept with disaggregation of hardware and software layers might enable further hardware level consolidation in active element layer (if it has not yet been shared), on which different operators' different software vendors can run parallel (Földes, 2023b). However, as TowerCos scope mainly limited to passive assets, are less incentivized to be a supportive partner in active network layer related initiatives or consolidation.

Summing up in long term operation it is less clear how MNOs incentives for efficiency improvement or growing activities could become a driver of TowerCos.

4.4 TowerCo related incentives related from TowerCo side

TowerCos after carve-outs have their own interests for revenue growth and preserving high level of unlocked corporate values. TowerCos are incentivized to *(1) grow or at least keep existing base station locations* with long term contracts including inflationary indexation, *(2) improve asset utilization by increasing tenancy ratio* and *(3) keep simplicity in running business* with focus on only long useful lifetime passive assets.

Growing site number from coverage extension and increasing tenancy ratio are common MNO - TowerCo interest, but TowerCo partial interest to avoid network sharing or M&A driven site consolidation and keep out of scope more complex active asset layers with lower useful lifetime, despite of bring-in additional one third savings potential.

WIK consult in BEREC report also found the TowerCOs rather in follower roles on MNO demands, as being the driver of real efficiency brining actions (BEREC, 2023).

Cellnex, Europe largest neutral host TowerCO held in 2024 a Capital Market Day (CMD) for investors. For the long term strategy outlook part it was interesting to see that, (1) none of the MNOs' transform or grow initiatives were on its agenda, like higher level network sharing involvement, go large scale for active asset segment, assessment of standalone 5G rollout, network virtualization or open RAN. Secondly (2) it was explicit stated their MNOs mergers or network sharing activities are fortunately not pose a threat to keep stable the number of basestation (Cellnex, 2024), which excludes delivering the highest savings potential of new network sharing deals if any occurs.

It shows that TowerCos and MNOs are becoming disconnected, the disaggregation passive assets from other network elements does not help efficiency improvement, even might hinder it.

5. Conclusion and recommendation

The European fragmented national markets call for action to improve economies of scale, asset utilization and cost efficiency. By operators preferred higher savings potential from horizontal mergers or horizontal production agreements (network sharing) are not or just only rural areas supported by the regulators. Operators seek for further initiatives, like asset strategic reconfiguration and TowerCo carve-out, however the dominantly passive asset focused operational business models have the lowest savings potential. Furthermore, MNOs short term interest is not the efficiency improvement, but the realization of unlocked corporate value to decrease debts. Mid - and long term incentives of TowerCos and MNOs some certain cases are becoming partial and disconnected that limits or even hamper efficiency improvement of 5G rollout.

The following assessment is drawn as conclusion in the theoretical model framework outlined in section 3., taking into respect the qualitative descriptive analysis in previous section 4.

Table 4.: TowerCO impact assessment in methodology framework

TowerCo impact assessment framework			**Mobile Network rollout stage**	
			Matured Phase (Capacity, Brownfield),	Growing Phase (Coverage, Greenfield)
Market Structure	MNO	Concentrated		
		Competitive		
	MVNO	Limited/No		
		Competitive		
	TowerCo	Captive MNO		
		Neutral Host		

Source: Author's own summary

The coloring shows the assessment of TowerCo operation's impact of efficiency improvement for 5G rollout. The darker color refers to higher impact, the lighter for slighter impact, and light red represents a potential negative impact for cost efficient improvement in rollout.

The *main and novelty finding* is that under certain market structure the TowerCo, as a new element in the mobile service providing value chain, has neutral or even slightly negative impact for significant efficiency improvement, due to TowerCo and MNO interest might be disconnected, as TowerCo not incentivized for some of the MNOs' cost efficiency goals. In case market structure in MNO level highly concentrated, therefore there are no or limited MVNOs / new entrants and the TowerCo market is dominated by captive MNO-wing operators in a matured mobile network stage, then TowerCos are not incentivized to enter into bigger scale efficiency transformation, as physical site consolidation. Furthermore, as TowerCos mainly only passive asset focused, active asset consolidation benefits are also scoped-out by them.

These incentives are partially or fully offset in growing network phase with new greenfield basestations, when TowerCos are incentivized in shared rollout as long as it increases its physical locations with higher tenancy ratio. TowerCo brings a new value-chain element, the

radio access network as a service that creates additional value in case of competitive and active MVNO and Neutral Host TowerCos markets. Additional value created for all stakeholders, as TowerCos increase their revenue by the new tenant, who therefore in return experience lower entry barrier to the market as getting access to the most costly mobile radio access network as a service and even existing MNOs might get lower prices, due to fixed costs are shared among one more tenants. This approach is valid for any kind of new rollouts, like macro cells, micro cells, or any kind of other rollout activities.

However to assess from starting point of view to reach EU Digital Decade 2030 target for full mobile broadband population coverage, the supplementary contribution of TowerCOs to increase coverage is limited. New market entrants mainly first offer its services in lucrative, highly populated urban areas, which are already covered, however the service distinguish could be improved. New greenfield rollouts in current 5G phases are going towards rural areas, where mobile network sharing itself are acknowledged or even encouraged by regulators, even in larger scale form with passive and active asset sharing, so a TowerCo operation as workaround has limited supplementary value-add increasing 5G coverage to close the GAP towards Digital Decade 2030 targets.

Based on my research *the recommendation* for TowerCos is to be more connected to MNOs in delivering common efficiency improvement goals and needed to reconsider their active asset related real approach. Despite many years and lots of plans how TowerCos might expand their operation for active assets, in reality no actions has been taken with a few exemptions, like CETIN, who has been operating passive and active asset since the carve out. Open RAN with hardware and software disaggregation, as well as multivendor concept offers a window of opportunity to expand TowerCO operation for active asset hardware segment at least with COTS (Commercial off the Shelf) assets, where MNOs can run their own software. This might be beneficiary both for TowerCos and MNOs, as TowerCos can deliver further savings expanding its operation into active hardware segment, while MNOs still preserve its own control and differentiation via keeping software layer with themselves.

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