Re-visiting the financial benefits of Managed Services and Infrastructure Sharing for Telcos

Pierre Lurin, Partner, INVESTAURA Management Consultants, Munich, Germany
Loys Legrand, Partner, ATX Consulting, Aix en Provence, France

Email: pierre.lurin@investaura.de, loys.legrand@atx-consulting.fr

Abstract:

Communications service providers (CSPs) in developed markets are facing considerable challenges. While voice markets are saturated in most countries, 3G/4G network rollouts require large investments, which are not always commensurately compensated by increases in revenues; data traffic is exploding but revenue per Mbyte is often decreasing faster than cost per Mbyte. The overall impact is that both EBIDTA and EBIT margins are decreasing. In short, the economics of telcos, whether mobile or fixed, are getting less and less favourable, and this has been reflected on European stock markets with CSP share prices that have been taking a beating for most of the last 10 years.

There is no easy solution to these problems. When the potential to increase revenues is limited in the short term, the easiest approach is to reduce costs. There has been considerable interest in Managed Services / Outsourcing, as well as in Infrastructure Sharing since the 2000–2002 dot-com crisis. Both have in common the idea of *sharing*, whether this includes network operations only or assets (passive, active) as well, with a view to improve efficiency and reduce costs. Another characteristic that Managed Services and Infrastructure Sharing have in common is that in most cases, though not all, they will require working with a *third party*, so that success will also depend on the quality of the operational model and partnering agreement that CSPs put in place.

As per the 'Hype cycle' concept coined by Gartner: following the initial excitement encouraged by equipment suppliers, many markets have seen a peak of interest in Managed Services in the years 2006-2008, followed by some disillusionment. In practice, few large-scale projects have been implemented in a manner that turned out to be successful for all parties. Suppliers have often struggled to make a profit out of network operations outsourcing projects, leading some of them to terminate unprofitable managed services contracts at the earliest opportunity. In addition, infrastructure sharing – whether passive only or including active equipment – has been full of operational traps and regulatory barriers.

In developing countries, the drivers for managed services and network sharing have been somewhat different. A (relatively small) number of countries, including India, Nigeria, Ghana and Tanzania, have implemented infrastructure sharing in grand style, under the driver of operators such as Bharti Airtel, Millicom and Vodafone, to name a few. Managed services also made sense in the context of newly-licensed operators needing to build networks and launch operations quickly: the lack of skills to operate complex multi-technology networks (2G, 3G), and the scale disadvantage that they faced against incumbent players, has often made managed services an attractive proposition. Typically these projects have been more profitable to infrastructure suppliers, the issue being less about cutting costs compared to a non-existent mode of operations at the CSP, and more about getting

started as fast as possible and catching up with incumbents, leading to a usually higher pricing power for suppliers.

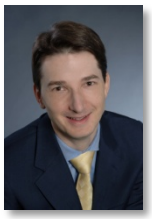
More than 10 years after Managed Services / Outsourcing and Sharing started in telecoms, we have reasons to believe that the industry has now reached its 'plateau of maturity'. Sharing is once again a hot topic, this time in the context of 4G network build-outs. So we see it as opportune to take a fresh view on the financial benefits of Managed Services and Infrastructure Sharing, and re-visit, with the benefit of hindsight, whether and how they can help CSPs reverse the trend of falling profit margins. In addition, we discuss the additional benefits of vendor financing and leasing, both finance lease and operating lease (e.g. Sale & Leaseback of Towers), which are also important topics in the context of large managed services and infrastructure-sharing deals.

This white paper is not purely qualitative. After an initial discussion and review of Managed Services and Infrastructure Sharing, we present a top-down financial simulation model that we have developed to analyse and quantify the benefits of alternative options available to CSPs. The model has been calibrated on the basis of our own experience with both Managed Services and Infrastructure Sharing, and presents a realistic view of what is achievable. We conclude by presenting key numerical results and a couple of lessons learned, for our readers to brood upon.

Keywords:

- **Managed Services / Outsourcing**
- **Infrastructure Sharing (Passive, Active) / TowerCo business**
- **Vendor financing, Leasing (Finance lease, Operating lease), Sale & Leaseback**
- **Financial Simulation, Top-Down Modelling**
- **Telecom Economics, OPEX reduction, CAPEX reduction, Value creation**

About the authors



Pierre Lurin is a Partner at INVESTAURA Management Consultants, a consultancy specialising in telecommunications strategy, business planning, budgeting, data mining and performance management. He brings 20 years of experience in the telecoms industry, having worked with Analysys Mason, Siemens and Nokia before founding INVESTAURA. Pierre has worked in the Managed Services and Outsourcing space since 2005. He is the author of "Business Planning for Managers: how to use powerful techniques to write better business plans" (ISBN 3-9813734-3-1, available on Amazon, see also www.business-planning-for-managers.com).

Loys Legrand is a Partner at ATX Consulting, a consultancy specialising in telecommunications business processes, network operations and operating tools. He is a veteran of the Managed Services industry, having worked on some of the very first Managed Services projects for Backbone Service Providers at Alcatel in the mid-1990s and on some important outsourcing deals for fixed and mobile operators before founding ATX Consulting in 2008.

I. INTRODUCTION

In the classical telco business model, CSPs take full responsibility for network operations as well and ownership of network assets, both passive and active. When 2G mobile networks were set up 20 years ago, and mobile technologies were still at an early stage, mobile CSPs started building up large technical organisation – as incumbents already had for their fixed line business. Telcos saw network coverage and network quality as a source of differentiation. Site and/or tower ownership was almost always perceived as a source of competitive advantage, and an effective way to build barriers to keep potential new entrants at bay.

In addition, no external partner was usually available or willing to take over the role of network operations, as equipment suppliers focused on R&D and manufacturing an increasingly bewildering range of telecom technologies, and CSPs focused on operating them and selling services to end-users. Finally, regulators were keen to encourage coverage of less populated areas, and avoid collusion among telcos within each country, as mobile CSPs were regularly in the spotlight for allegedly trying to prevent competitive entry and maintain the status quo. So, in effect, mobile network sharing in the 1990s, although available in limited forms, was not actively pursued or encouraged (at best), or fought against or even prohibited (at worst).

For fixed networks, one of the main triggering events for Managed Services was the endeavour of a number of international telcos, mainly from the US and the UK, to set up multi-country backbone networks between 1997 and 2002 (e.g. Global Crossing, Interoute, IDT, Colt, Level 3, Telia etc.). These telcos often had very limited human resources in the countries where they wanted to operate and obviously did not want to rely on the incumbent operators against whom they were competing. Thus, telecom vendors such as Alcatel, Ericsson and Siemens were good candidates to support these newcomers, as these vendors were already established in most of the relevant countries with the right level of skilled technical resources.

The state of the industry has come a long way since then. As the market has matured, the traditional value chain has evolved and new business models have emerged. Further catalysts for change have been the 2000–2002 dot-com crisis and the UMTS licensing in Europe, leaving many CSPs with mountains of debt and rock-bottom share prices. The business of CSPs is very capital intensive, and they started seeing less value in owning towers/sites once mobile operators essentially all had the same footprint. In addition, equipment suppliers were keen to compensate for falling equipment sales with service business, and new players (e.g. IT companies) emerged ready to take on activities traditionally under the responsibility of telcos. With IT equipment increasing become omnipresent in CSP networks, network operations outsourcing was also perceived as a natural prolongation of IT outsourcing, an already mature industry.

II. TAXONOMY OF MANAGED SERVICES & OUTSOURCING

There is some disagreement in the industry concerning what 'Managed Services' and 'Outsourcing' really mean, and the terms are often used interchangeably. 'Managed Services' are Telecom / IT Services provided to a client by a third party in a managed manner, but they might also include staff transfer to the partner (also called MSP: Managed Service Provider), in which case the term 'Outsourcing' might be used instead. In all cases, Managed Services / Outsourcing include a range of business models and come in many shapes, from limited 'out-tasking' of selected CSP activities at one end of the spectrum, all the way to complete network operations outsourcing at the other end. Managed Services can also vary greatly in scope, including network domains, technologies, and geographical areas, as well as delivery models.

Historically, fixed networks were much more diverse that mobile networks, and the first Managed Services projects were segmented according to the various types of networks (mobile networks, fixed networks, backbone networks, submarine networks). However, with IP convergence and exponential growth of data traffic in mobile networks, as well as fixed-mobile convergence, we see more and more similarities between fixed and mobile networks managed services, and more projects deployed on combined networks (e.g. a greenfield CSP outsourcing its mobile operations first, then including the operations of the fixed network as well).

Scope

At the top-level, in terms of scope, network operation processes can be broken down as shown in Exhibit 1. In a Managed Services project though, the activities below would be broken down in more detail and with much more precision. For example, 'Spares & Logistics' could be broken down into 'Warehouse Management'; 'Spare Management'; '3rd party Spares Management'; 'Return & Repair'; 'Transportation' etc. In addition, various network layers (e.g. Access, Transmission, Core, Applications & VAS) might be in scope or out of scope, and the same applies to technologies (e.g. 2G, 3G, 4G, xDSL, FTTx etc.).

Processes	Activities
Plan & Design	Network Planning
Plan & Design	Network Engineering
Plan & Design	Network Optimisation
Build	Network Build Project Management
Build	Site Acquisiton
Build	Site Construction / Civil Works
Build	NW Equipment Installation & Acceptance
Operate & Maintain	NOC Operations
Operate & Maintain	Field Maintenance
Operate & Maintain	Site Infrastructure Management & Maintenance
Operate & Maintain	Spares & Logistics (incl. Mgt)
Operate & Maintain	Test Bed
Operate & Maintain	Site Lease Mgt (incl. Lease)
Operate & Maintain	Transmission Lease Mgt (incl. Lease)
Operate & Maintain	3rd Party Care Contracts Mgt (incl. Care contracts)
Operate & Maintain	Power Mgt (incl. Power)
Operate & Maintain	IT Infrastructure & Application Mgt

Exhibit 1: Network Operations processes and activities used in the simulation model (eTOM model)

Note that rather than using an 'eTOM' approach, it is very common today to use an enhanced framework using the ITIL model adapted to the telecom world. In any case, our simulation model is flexible enough to cope with both an eTOM-based and an ITIL-based breakdown of activities.

When they emerged, Managed Services were perceived as a win–win opportunity for both CSPs and their suppliers. The expectation of CSPs has been that the costs would be lower if selected non-differentiating activities were outsourced, as suppliers were expected to have economies of scale that the CSP did not have. Indeed, in 2013, the largest MSPs can have service organization as large as 50,000 headcounts, many times more than the size of the network operations organisation of a mid-size European CSP. In addition, the CSP's expectation is that the quality of service will be higher. Both lower costs and quality level are guaranteed by contract (SLAs), and with penalties incurred if KPIs are not achieved, MSPs have a strong incentive to perform (at least in theory).

From the supplier point of view, the key benefits of Managed Services were to increase intimacy with their telco customers, via multi-year contracts cementing long-term relationships, and to create new, recurrent, predictable revenue streams, thereby mitigating the volatility of the product business. In addition, network operations activities were seen as an extension of maintenance / care contracts, with the expectation that the fat margins of the latter would equally translate into comfortable margins in managed services (which often turned out to be wrong).

Today, Managed Services deals tend to fall into one of three categories:

1. Full Commitment with a single interface: the MSP has end-to-end responsibility for part or all of the business processes with a strong commitment on SLA. The MSP often subcontracts field activities further, to local partners who have a cost structure more adapted for this type of activity.
2. Focus on 'high-level' activities: the CSP subcontracts the activities to a global vendor, as the latter's strength in advanced telecoms solutions is perceived as key to ensure network innovation and retain technology leadership.
3. Focus on 'low level' activities: the CSP subcontracts its field maintenance (infrastructure, utilities, telco equipment etc.) to a local market player, which often comes from a different industry, and has specialised and become very efficient in the outsourced areas.

Also, in terms of delivery, there are three main approaches for MSPs to implement managed service activities:

- 'Customer Dedicated': in this approach, the activities are undertaken by staff that is dedicated to the CSP. Typically this approach will greatly limit economies of scale and scope with other CSPs, so suppliers try to limit the scope of the activities concerned as much as possible
- 'Shared' locally, with another customer in the same region or country; for example, common field service staff and Local Network Operations Centres (NOC) undertake activities remotely for multiple CSPs
- 'Global' sharing, typically via Global NOC, where the supplier can leverage further synergies with CSP customers from other countries.

Success factors

In practice, experience has shown that the potential benefits of managed services for the CSPs might not be fully realised, as there is a lack of standardisation in processes and tools, which limits the MSPs' ability to undertake network operations with high synergy levels across multiple telcos.

Also, Managed Service projects are almost always long-term partnering agreements, and they can only be successful if they are structured as win–win from the start, with realistic expectations on both sides, a strong governance model, and the ability and flexibility to evolve over time. To be successful, CSPs need to let their Managed Services partner act as an agent of change. Unfortunately, and sometimes unwillingly, CSPs have limited the supplier's ability to make money out of managed service deals, by imposing constraints that might have been unnecessary, and thereby reducing the ability for the supplier to transform the current mode of operation of the CSP to a more efficient and lower-cost mode of operation.

However, the single most important factor in outsourcing projects is the HR component, as many deals involves headcount transfer, re-allocation of resources to other projects / customers and redundancy. Often large resistance is met from telcos network operations staff, who fear that they will lose more than they can win, and in any case will go through transition and transformation phases that might not be as well managed and communicated as they could be.

In the rest of this White Paper, the focus of the discussion lies primarily in mobile networks. However, the framework presented below could be adjusted to take a fixed network perspective as well.

III. ALTERNATIVE APPROACHES TO INFRASTRUCTURE SHARING (PASSIVE, ACTIVE)

Infrastructure sharing, in the narrow sense of site / tower sharing, is not really a new concept. But in most countries – apart from the USA historically – sharing has not been a natural behaviour or strength of CSPs, simply because it puts them in a state of 'co-operation' that they have limited experience with, in an environment dominated by cutthroat competition. As is the case with Managed Services, and although infrastructure sharing arrangements have been implemented in limited forms in many countries, comparatively few large scale sharing projects have been undertaken world-wide (at least much fewer that was expected 5–7 years ago)

Conceptually and technically, there are two main types of network sharing in mobile networks:

- Passive infrastructure sharing: this is the traditional and narrow form of sharing, typically involving site (co-location), towers, and site maintenance, as well as security and power / utilities management in developing countries, and potentially including transmission / backhauling as well
- Active infrastructure sharing: in this form of sharing, active equipment is shared as well, especially BTSs. Technically, this can be implemented with MORAN (Multi-Operator RAN),

using dedicated frequencies or with 3GPP MOCN (Multi-Operator Core Network, Release 6 and later), using shared (pooled) frequencies (frowned upon by regulators).

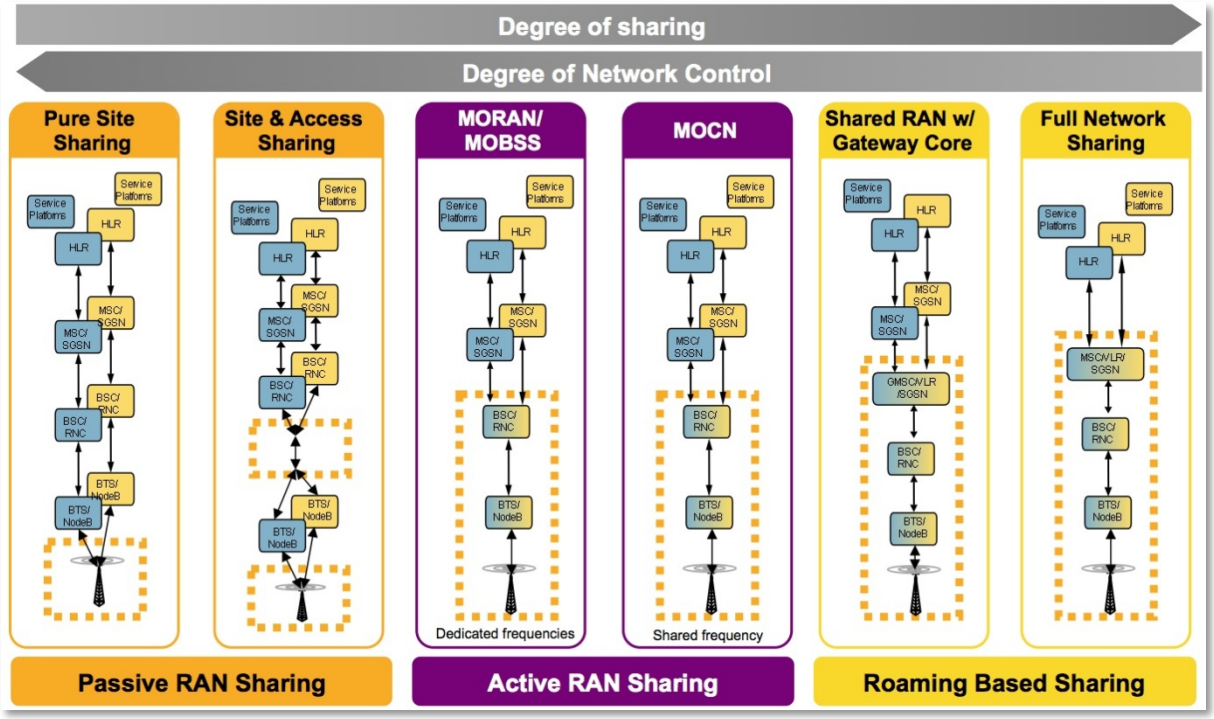


Exhibit 2: Alternative technical approaches for RAN sharing [Source: Nokia Siemens Networks]

The extreme forms of active sharing are national roaming where RAN is 'shared' in full but CSPs have their own core network; and Mobile Virtual Network Operators (MVNOs), which rarely have their own core network but service platforms only, and where the 'guest' operator (the MVNO) rents capacity and network services from an incumbent 'host' MNO.

Furthermore, in mobile networks, RAN sharing might involve the transfer of existing sites (whether owned or leased), contracts, towers and staff to a subsidiary or a third party, with the CSP(s) sometimes keeping a minority shareholding interest in the new venture.

Historically, many CSP managers have been opposed to sharing, on the grounds that these are complex projects and that eventually most of the benefits of sharing would be passed on to end-customers in the form of lower prices. So why go through the pain of consolidating two networks and 'fix them when they are not broken'? This mindset often resulted in decisions made against sharing; or delays in decision-making until the market renders sharing unavoidable, for example when other CSPs in the same country have gone ahead and gained a clear cost advantage with sharing (first mover advantage).

Truth be told, beyond technical issues, there are regulatory, and above all organisational challenges with sharing. In many cases, CSPs have tried to share infrastructure 'on their own', i.e. without involving a third party, but have set up a joint venture belonging to two or more parties, staffing it with their own staff and hoping for the best. In our opinion, this has often been a mistake, as a third party brings much-needed neutrality, experience, speed, focus and management skills that the CSPs might not necessarily have. For incumbents with large networks, sharing existing assets requires a

large network consolidation exercise, which is best undertaken with the support of an external entity. A neutral partner, as well as facilitating the engagement and solving conflicts of interest, can also bring value with additional managed services / outsourcing. Obviously the partner has a cost, as the value created is not only shared between two CSPs, but with the partner as well; but experience has shown that, as in the outsourcing case, most of the benefits land with the CSPs, i.e. the cost of the external partner is small compared to the value that they create for the CSPs, at least in the short and medium term.

Regulators' positioning on sharing differs by country but has largely evolved in the last 10 years, also as result of the intense lobbying of (some) operators in favour of sharing:

- Since the launch of 3G networks in the year 2003, site sharing has been encouraged due to environmental issues, in most countries.
- Active RAN sharing has often been permitted by regulators in low density / rural areas that no CSP was willing to cover on its own, due to the limited traffic volume and negative business case.
- Operators that want to combine their sites on a large scale in joint entity (e.g. JV) and share them almost always require regulatory approval, as regulators will be concerned that they disrupt the market and reduce competition. But with the right set-up in place, this model has been accepted and implemented in a number of countries e.g. Sweden, Australia, the UK and India. Large scale sharing across thousands of sites also has met with higher acceptance when there was a third party involved.
- In fixed networks, where the incumbent usually has a dominant position, accounting separation between the retail and wholesale business has not been always enough. For example, BT in the UK had to be split into multiple entities in 2006, with the access network becoming a separate entity (BT openreach) providing equal access to BT's retail competitors. However, few regulators have gone so far and this remains the exception rather than the rule.

With 4G networks now being deployed worldwide, RAN sharing is going through a revival, with regulators and competition bodies being more permissive towards large scale active RAN sharing projects, including in suburban areas that might have been 'off-limit' with 2G/3G so far. One example of such projects is under discussion in France in the summer 2013, as SFR and Bouygues Telecom have announced that they plan to share their 2G, 3G and 4G networks, in order to better compete against the national roaming 'alliance' that the 4th MNO in the country, Free, has had with France Telecom since January 2012.

IV. ADDITIONAL BENEFITS OF VENDOR FINANCING AND LEASING

Vendor Financing and Leasing (whether 'Finance' or 'Operating' lease) are often discussed in infrastructure sharing negotiations. They can be seen as the 'cherry on the cake', and are in some cases critical to a deal taking place between the CSP and its vendor. The vendor might act as a finance company, or a third entity might take on this role (a leasing or finance company), so that

more than two parties are often involved in a vendor financing or lease agreement, as shown in the following exhibit.

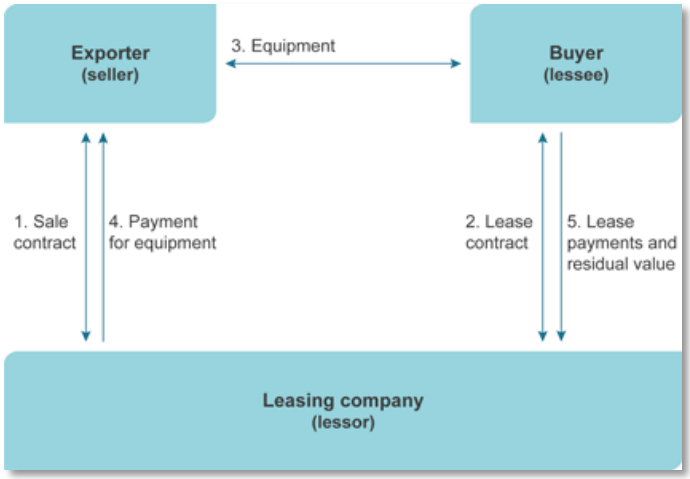


Exhibit 3: Three-party relationship with CSP (buyer), leasing company (lessor) and equipment supplier (seller) [Source: Export Finance Australia]

Financing and leasing typically arise when a large capital outflow from the CSP to the supplier has to take place, and the CSP has limited alternative financing options. Typical cases are:

- For a new entrant: network roll-out with large vendor financing arrangement, combined with BOT (Build–Operate–Transfer) services
- For incumbents: site / tower sale and lease back (S&LB), with one or multiple CSPs transferring the ownership of passive (and occasionally active) assets to a partner
- For incumbents: network expansion with new RAN sites to improve coverage and add capacity, with financing being structured as finance lease or operating lease
- For both incumbent and new entrants: managed capacity arrangement whereby the CSP pays for the network on a capacity basis (Erlang, BH Mbps), as has happened in India.

Although vendor financing can take place without leasing, their structure and economics are close in practice. The legal and accounting treatment of leases differs from country to country, but as a general rule:

- In a vendor financing arrangement, the CSP is the legal owner of the asset financed, whereas in a finance lease, the finance company (the lessor) is the legal owner. However, in a finance lease, the CSP (the lessee) has control over the assets, including its economic benefits and risks, so accounting-wise the CSP has to capitalise the asset on its balance sheet.
- Typically vendor financing and finance leases are of fairly short duration (e.g. 3–7 years), and concern assets that have a short lifetime and limited secondary market value. At the end of the finance lease, the CSP usually has the option to acquire the asset at a price determined in advance, and become the legal owner as well.
- Unlike finance leases, operating leases remain off the balance sheet for the CSP, and cover assets that have a long useful lifetime (e.g. 20–50 years), so that the lease duration (e.g. 10 years) is short compared to the asset lifetime. This includes towers in particular.

Both finance lease and capital lease solve a financing issue for the CSP, but they change the economics, accounting and financial KPIs in different ways:

- In a finance lease, the CSP capitalises the assets and depreciates them through the P&L. In terms of cashflow, payment is similar to a rent, and includes a fee equivalent to interest expenses. In some cases, vendor financing or finance lease are provided with very attractive terms e.g. a long grace period (e.g. 3 years) and very low interest rates. In fact this has been one of the pillars of Huawei's strategy to conquer customers in developing countries. Broadly speaking, the economics of the CSP are unchanged, but the interest expenses might be lower and its cost of capital might decrease.
- Operating lease is off-balance sheet i.e. CAPEX / Depreciation are turned into OPEX. This reduces the Capital Employed on the balance sheet. Also cash can be returned to shareholders if assets are sold and leased back e.g. Towers. Accounting-wise, both the EBITDA and EBIT margin of the CSP decrease, but ROCE and ROI improve. The economics of the CSP are fundamentally changed, turning fixed costs into variable costs and reducing the capital intensity of the business.

Vendor financing and leasing create various sources of value for the CSP, in particular:

- If the cost of the financing / lease is lower than the current cost of capital of the CSP
- If the classical sources of financing (equity, debt) are not available in the short term e.g. additional shareholder capital injection is not possible or the cost of debt is prohibitive
- If the assets leased can be shared with others i.e. the TowerCo company has on average 1–3 tenants per site; (some of) the benefits of sharing are passed back to the CSP
- Some of the business risk associated with ownership of the asset is transferred to the finance company, as is the case in an operating lease. This creates business flexibility to react to a changing / volatile market environment.

V. ECONOMIC CONSIDERATIONS

A large number of factors drive the financial benefits of Managed Services and Infrastructure Sharing projects. However, at the holistic level, and based on our experience, the key drivers can be summarised as follows:

Scope issues

1. Scope of Managed Services activities (large improvement in performance and cost are possible for some activities, whereas they are more limited for others).
2. Scope of networks (e.g. 2G, 3G etc.) and network layers (e.g. access, transport, core, Applications, VAS).
3. Geographical scope (part of a country; nationwide; multiple countries).
4. Scope of Infrastructure Sharing (none, passive infrastructure, active infrastructure).
5. Brownfield or greenfield case.

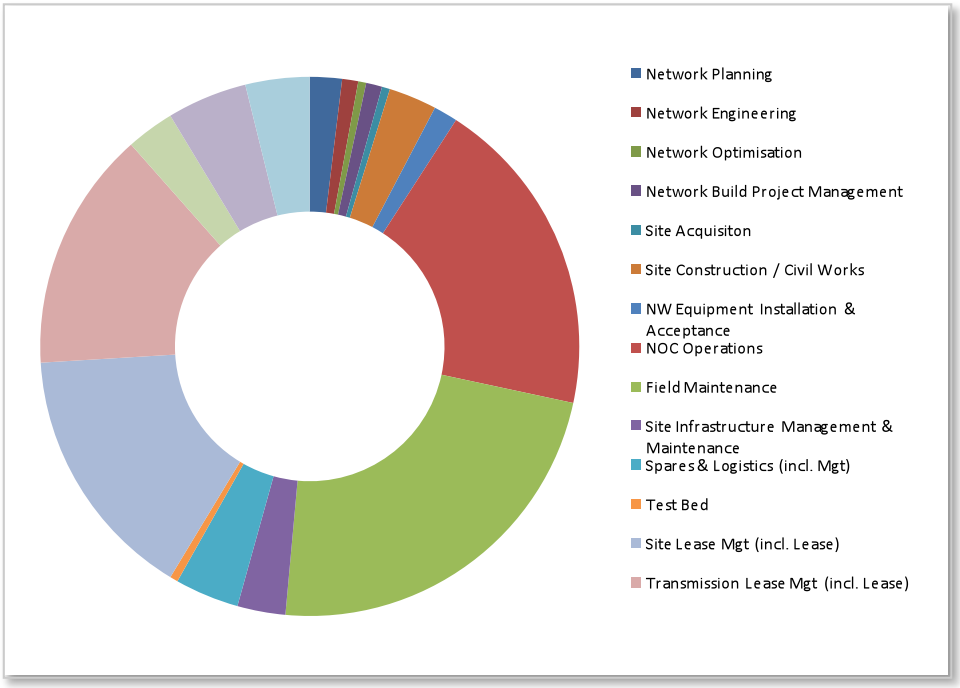


Exhibit 4: Indicative Network OPEX breakdown for a mobile CSP in a developed market

CSP specific aspects

6. Current level of maturity / efficiency of the CSP, for each managed service process in scope (this can be assed via operations benchmarking, or in a qualitative manner).
7. Cost level of the CSP for network operations activities, and their respective importance (OPEX breakdown as shown in Exhibit 4), also depending on the number of years the CSP has been in operations in the country and the extent of its current network 'build' activities.
8. Location in a developed or developing country. This usually has an influence on the cost level of the operator, its level of maturity and its QoS expectations. Activities such as Security and Power Management (including power costs) are huge cost drivers of network OPEX in developing countries, often relying on Diesel Generators and expensive fuel supply, but are a lower pain point in developed markets (with comparatively low cost per kWh).
9. Transfer of staff or not (usually positive economic impact for CSP but negative for the supplier, the overall value creation for both parties combined being lower when staff transfer is involved).

Supplier-specific aspects

10. Current footprint of the Managed Service partner (local, regional, global) and mode of delivery that is implemented for the project (dedicated, local shared, local and global shared).
11. Resource availability and quality of these resources for planning and executing the managed service projects (due diligence; migration; transformation).
12. Sharing of value creation between the CSP and its supplier, which depends on the negotiating power of both parties and the hungriness of the supplier to win the project against its competitors.

All of this boils down to a large number of parameters influencing the project, as illustrated in the following exhibit. In our simulation model, more than 100 parameters are stored in the system and influence the calculation. These parameters are a mix of quantitative benchmarks and qualitative rules of experience.

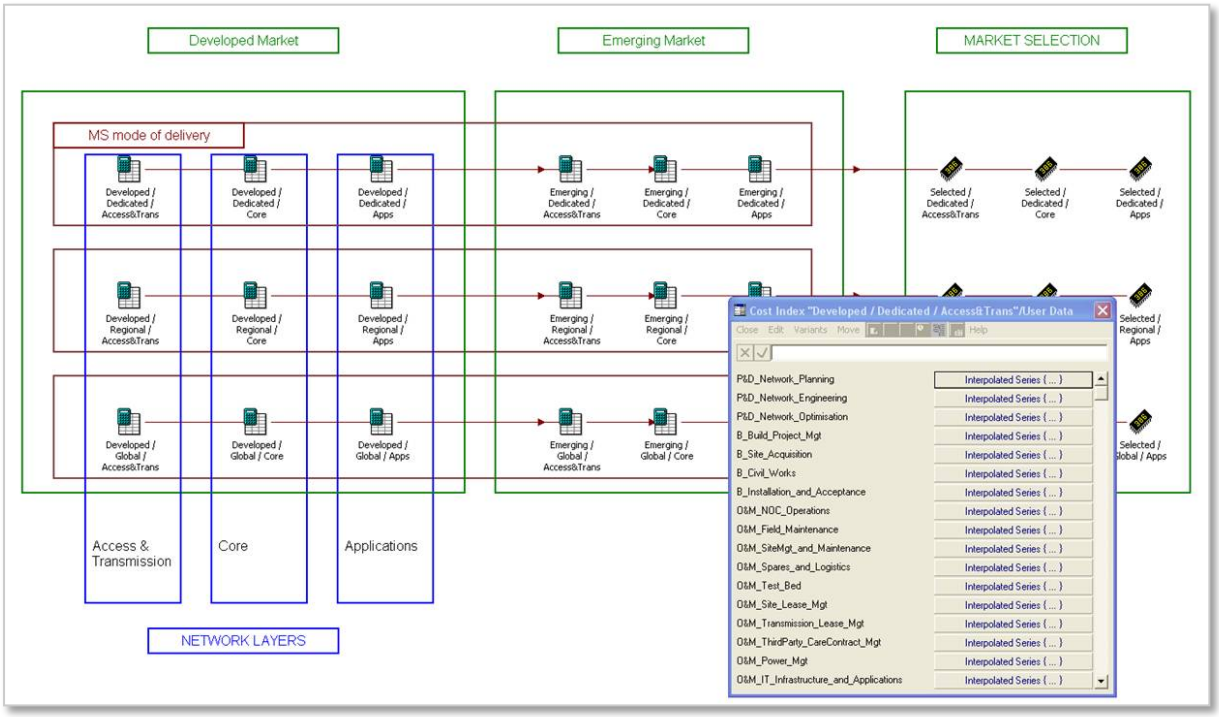


Exhibit 5: Structure of the Managed Services savings parameters in the simulation model

Beyond 'best-case' OPEX and CAPEX savings from Managed Services and Infrastructure Sharing, there are also ‘negative’ drivers of project performance, such as:

- Transfer / migration costs, in particular when duplication of people and processes happens between the CSP and the MSP
- Network transformation costs such as network consolidation (network re-design, equipment re-deployment etc.)
- Redundancy costs, as well as overall HR challenges and lower costs of performance when the headcount transfer is not going smoothly
- Limited scope of outsourced processes, or outsourced processes where the managed service partner can add few economies of scale / scope, limited process improvement and standardisation
- Limited regional scope, with the CSP outsourcing some regions but not others (too much cherry picking?), and keeping its own network operations staff in-house, creating duplication with the supplier
- Limited network technology and network layer scope (e.g. 2G only).

VI. FINANCIAL BENEFITS SIMULATION MODEL: IMPLEMENTATION IN IMPLIED LOGIC 'STEM'

We have implemented the financial simulation model using the STEM software platform from Implied Logic Ltd (www.impliedlogic.com). We are experts at using STEM and have been using the software solution for almost 20 years now.

STEM is a generic modelling tool used for strategic planning of telecoms and IT networks. As a techno-economic planning tool, it looks into the future and generates short-term (6–24 months), medium-term (2–5 years) or long-term (5–10 years) forecasts: financial items such as revenues, costs (OPEX, CAPEX), profitability (e.g. EBITDA, EBIT), and also non-financial items (dimensioning rules, volume of equipment, number of staff, utilisation etc.). STEM is demand-driven, i.e. resources (networks, human resources etc.) are driven by demand (end-customers, services, traffic, revenues), as well as network deployment requirements.

The key strengths of STEM include:

- Graphical interface with object-oriented modelling, making it easy to communicate even large and complex models, their assumptions and their results
- Ability to handle both greenfield and brownfield networks and capture the status of the CSP at the start of the simulation (initial Bill of Material for assets; Balance Sheet / Profit and Loss etc.)
- Hundreds of pre-defined results, as well as an interface to define new results for various types of elements in the model (total business; customer segment; services; resources etc.)
- Shorter time periods (months, quarters, years) with flexible granularity over time and automatic results consolidation
- Scenario management and sensitivity analysis, making it very easy to handle alternative cases and compare their respective benefits
- Models can be exported to the web for multi-user access, enabling a large number of internal staff and external partners with no knowledge of STEM to run their own simulations.

Note that both bottom-up and top-down models can be implemented in STEM. Bottom-up models are usually very detailed and run the risk of becoming not only very complex over time, but also difficult to maintain. Furthermore, they tend to suffer from 'precision fallacy', and many aspects included in bottom-up models might only have a small impact on the overall results, while key but difficult-to-quantify issues might be forgotten.

Top-down models, on the other hand, follow the 20% / 80% rule. They are much simpler to handle, and generate results that are 'approximately right', rather than 'precisely wrong'. In addition, they are comparatively easier to evolve, as new aspects need to be included in the analysis over time.

In fact, both approaches are complementary, with top-down calculations being more valuable at the early stage of projects (e.g. feasibility stage), while bottom-up business plans become essential at the implementation planning stage.

An overview of the simulation model and its architecture is shown in the following exhibit.

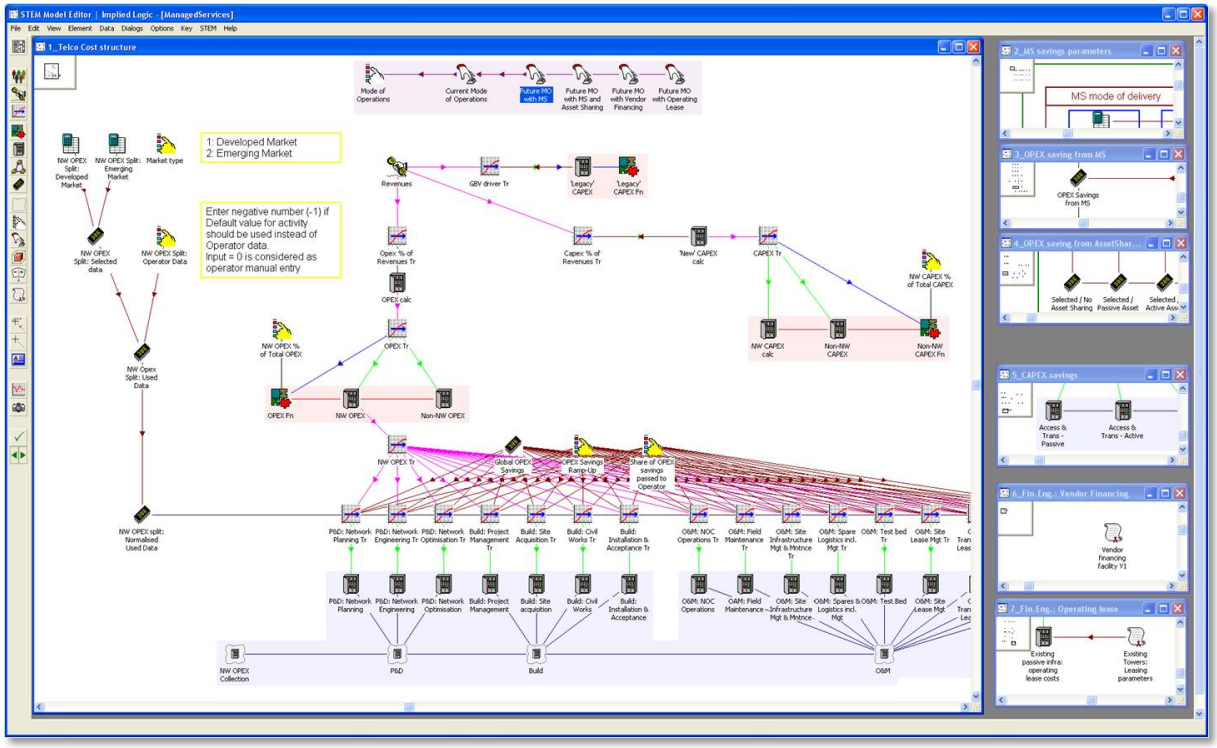


Exhibit 6: Overview of the financial benefits simulation model in STEM

The model that we have set up here follows a top-down approach. The model focuses on the overall economics of the telco and has the advantage of working with very few end-user inputs, as it can use default values and percentages derived from experience, such as:

- OPEX as % of Revenues, with further break-down between Network OPEX and Non-network OPEX
- CAPEX as % of Revenues, with further break-down between Network CAPEX and Non-network CAPEX
- Net Book Value of assets on the balance sheet at time zero (the start of the simulation), which can also be expressed as % of Revenues
- Network OPEX breakdown by network operations activity. This can include the cost of site rental, leased line, power, etc., or exclude them
- Achievable saving percentages from Managed Services on one hand, and Infrastructure Sharing on the other hand, as a function of the scope (processes, geographical scope, technology scope) and other factors (mode of delivery, maturity of the CSP etc.), as highlighted in Section V above.
- Additional inclusion of Vendor Financing and Operating Lease (e.g. TowerCo business with Sale & Leaseback of existing sites and construction of new sites).

Note that this top-down model uses 100+ elements only (the icons on the previous exhibit), and is still very easy to evolve, whereas a large bottom-up model would typically use 500–3000 elements.

The model will be available for users to run their own simulation on the web site of Implied Logic from October 2013 onwards, in two versions:

- In the simplified version, available to all, few parameters are exposed to users. In particular, users can not enter their own OPEX breakdown, and vendor financing / sale & leaseback is also hidden
- A more comprehensive on-line version of the model will be available to those who have registered on the Implied Logic web site. In that version, a larger range of parameters will be exposed to run more comprehensive simulations. In particular, users will be able to enter their own savings assumption for managed services, sharing and financing.

VII. KEY RESULTS

We have defined five scenarios in the simulation model, so as to compare the incremental benefits of various cost reduction initiatives one by one. The simulation runs over a period of 6 years, and depicts a *brownfield mobile* CSP in a developed country. The scenarios are as follows:

1. The current mode of operation where the CSP continues operating its networks in a 'business-as-usual' approach (Base case).
2. A future mode of operations, with maximal scope of managed services (MS) including outsourcing.
3. A future mode of operation with MS and large-scale RAN passive sharing (AS).
4. A future model of operation with large vendor financing only (€1bn at 4%, 6-year term, no grace period; whereas alternative forms of debt have an average pre-tax cost of 6%), to analyse the benefits of vendor financing, and better contrast them with the following scenario.
5. Finally, a future mode of operations with TowerCo business (Sale & Leaseback of existing towers, 8% implicit interest rate; as well as development of new towers), including Managed Services (Site lease management, Site maintenance only, excluding Power and Security management) and Site Sharing (passive infrastructure; tenancy ratio increasing over time from 1.0 to 1.7 for existing towers, and 1.0 to 2.0 for new towers).

We have assumed that the mobile CSP generates €12bn of revenues annually and has EBITDA and EBIT margins of 30% and 15%, respectively. In addition, 15% of revenues are invested in CAPEX every year (80% of which are network-related CAPEX). Also, network-related OPEX represents 15% of total OPEX.

A couple of charts generated by STEM are depicted below, and key results are summarised in the next table.

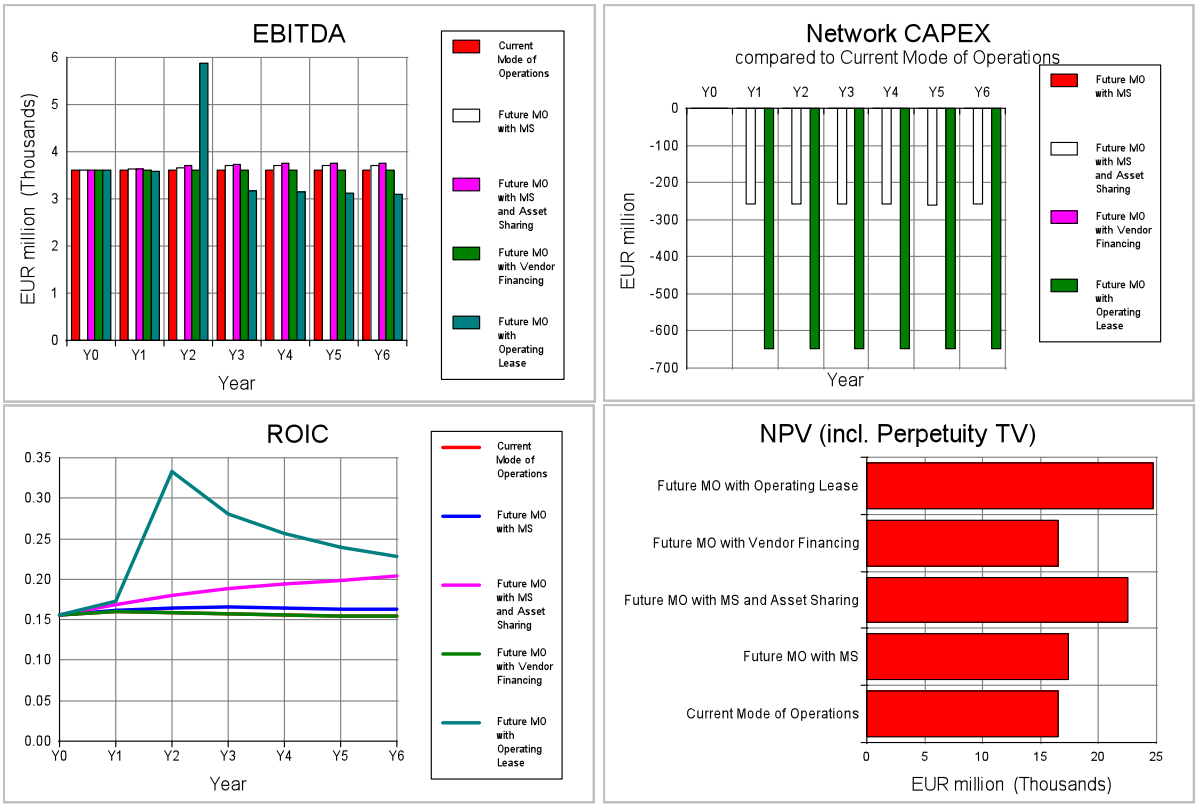


Exhibit 7: EBITDA, Network CAPEX, ROIC and NPV results for the 5 simulations

		Current Mode of Operations (CMO)	Future Mode of Operations (FMO)			
		Base case	with full-scope Managed Services (MS)	with MS and large-scale passive asset sharing (AS)	with large vendor financing only	with TowerCo (S&LB), incl. passive AS and some MS
P&L	EBITDA margin	30%	up 1 point	up 1.5 point	unchanged	down 5-6 points
	EBIT margin	15%	up 1 point	up 2 points	unchanged	initially up 3 points, then down 3 points
	Interest expenses	€200-400 per annum	unchanged	about €250m lower (over 6 years)	about €60m lower (over 6 years)	about 40% lower (reduced IC)
Balance Sheet	Balance sheet total (Invested Capital)	€8-10bn	unchanged	down by 15%	unchanged	down by 40%
	ROIC (Return on Invested Capital)	about 15%	up 1 point	up 5 points	unchanged	up 7 points
	Capital Turnover	about 1.5	unchanged	about 1.7	unchanged	about 2.5
Valuation	Free Cashflow	about €1.2bn	up about 5%	up about 25%	unchanged	up about 15%
	6-year cumulative FCF (NPV at 0%)	about €7.5bn	€7.8bn	€9.4bn	unchanged	€11.5bn
	WACC (Weighted Average Cost of Capital)	9%	unchanged	down a little e.g. 8.5%	maybe down a little, but temporarily	down more (increased leverage) e.g. 8%
	NPV (adjusted WACC) with TV (2% growth)	about €16.5bn	up about 5%	up about 35%	marginally up	up about 50%

Exhibit 8: Summary of financial results

The results shown in the previous exhibit are indicative only and should be interpreted with caution, in particular because they depend on the exact scope assumed in the scenarios, as well as the maturity and cost-efficiency of the CSP under consideration. With that in mind, the key results of the simulation are the following:

- The EBITDA and EBIT margin improvements in the Managed Services scenario are limited, whereas they can be much more significant with Infrastructure Sharing.
- Also, infrastructure sharing, by reducing the invested capital in the business, can massively improve the ROIC (+5% points in the MS & AS scenario; +7% points in the TowerCo scenario).
- Vendor financing has a limited impact on the financial performance of the business, in particular because it is limited in time (5–7 year contracts). Also, vendor financing might not always be cheaper than alternative forms of debt.
- The economics of the CSP business are completely changed in a TowerCo approach (large scale Sale & Leaseback of passive network assets). As a large amount of assets is taken off the balance sheet, the capital intensity of the CSP is greatly reduced. Although the EBITDA and EBIT margins are lower, the value creation might be great (+50% increase in the NPV above). As cash can be returned to shareholders following the asset sale (or re-invested in 3G/4G networks and services), FCF improves and leverage increases, resulting in a lower cost of capital.

Beyond their role as 'facilitator', a further benefit of Tower Companies is that they can help the management of CSPs get full management attention on what their core business should be (i.e. develop a better understanding of customers and their needs, improve quality of service as perceived by the end-users, product and service innovation, as well as financial performance), rather than managing a large pool of towers that can be better managed by a neutral party with total focus on the tower leasing / facility management business.

VIII. CONCLUSIONS AND LESSONS LEARNED

As we have seen, Managed Services / Outsourcing and Infrastructure Sharing are complex projects covering many different situations. Their benefits can vary tremendously according to particular circumstances and need to be analysed on a case-by-case basis. However, in general, and with hindsight, we believe that:

- the expectation of CSPs concerning the benefits of Managed Services / Outsourcing have been exaggerated, maybe because CSPs were fed with overly optimistic assumptions by suppliers
- CSPs have benefited more than MSPs from Managed services / Outsourcing, capturing 60%–100% of the value created by these projects
- unlike IT outsourcing, the synergies achieved in network operations outsourcing have been lower than expected, due to
    - the limited number of CSPs in each country
    - the challenge of creating synergies across national borders
    - the limited standardisation in network operations processes and tools
    - insufficient multi-vendor skills on the Managed Services partner side
    - limitations imposed by CSPs in their contracts with suppliers
    - high complexity of technologies, networks and projects
    - widely different Quality of Service requirements between developed and developing markets
- apart from the USA, India, selected countries in Africa, and selected countries in developed markets (e.g. Sweden, Australia, UK), relatively few CSPs have engaged in large scale network sharing or TowerCo business (so far). As CSPs in developed markets are under tremendous pressure to build out their 4G networks and improve their financial performance, and as regulators are getting more open towards sharing, CSPs would do well to engage in infrastructure sharing much more systematically, also relying on external partners (suppliers, tower companies) in a sale and leaseback approach, rather than trying to 'do it all on their own'.

REFERENCES

Attached is a list of recent (or less recent but still relevant) documents on Managed Services and Infrastructure Sharing.

Public domain documents on Managed Services and Outsourcing:

- “Building a winning outsourcing relationship: key factors for success, in a time of rapid change”, Alcatel-Lucent White Paper, 2012
- “Outsourcing options and approaches for communications service providers”, Nokia Siemens Networks White Paper, 2007
- “Excel in operation transformation – Managed Services for Total Value of Ownership”, Huawei, 2013
- “Why partnering strategies matter: how sourcing of business and IT services impacts financial performance”, IBM White Paper, 2013
- "Pushing the limits of outsourcing: innovators reinvent the services relationship", IBM, 2012
- “The lure of network outsourcing: promise and pitfalls for telecom operators”, Oliver Wyman, 2007

Public domain documents on Infrastructure Sharing:

- “Successful network sharing", Ericsson White Paper, 2010
- “Wholesale Network Sharing: evolving the model”, Ericsson White Paper, 2012
- "Network Sharing in LTE: Opportunity & Solutions", Alcatel-Lucent White Paper, 2010
- "Operational efficiency benchmarking: Network sharing JVs enable efficiency transformation", Nokia Siemens Networks, 2011
- "Avis N° 13-A-08 du 11 mars 2013 relatif aux conditions de mutualisation d'itinérance sur les réseaux mobiles", Autorité de la concurrence, France, 2013
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- “Infrastructure sharing and shared operations for Mobile Network Operators, from a deployment and operations view”, IEEE Network Operations and Management Symposium (NOMS) 2008, Dr. Thomas Frisanco, Dr. Paul Tafertshofer, Pierre Lurin