

Mobile network sharing

A structured approach for evaluating and
executing network sharing

February 2021

Mobile network sharing has, in the right circumstances, the option of providing operational efficiency gains that are impossible to achieve by other means within networks of mobile operators. The gains are a combination of lower cost and improved network quality.

Sharing the network comes at a cost: the long term binding and loss of full control. This must be well understood and accepted as well as balanced against the gains.

This document presents a structured approach to the various phases of mobile network sharing from initiation and partner selection through contract development to implementation with deep dives into a number of key issues.

1 Overall approach

This first section presents an overview of the approach and the content of the document.

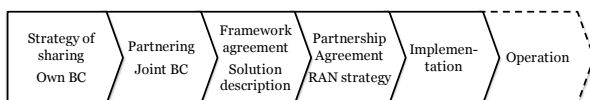
Implementing mobile network sharing can clearly be done in a number of ways. From working with a number of cases where relatively few proceed to signature, a pattern of what works and what does not work has emerged and the phased approach presented here embodies that experience.

The structure of the document is as follows:

1. This introduction.
2. More detailed description of the phases.
3. Discussion of topics that go across the phases: barriers and caveats, scope, operating model, business case, exit, shares, charging, staffing, vendor management, governance and technologies.

1.1 The main phases

The suggested phases are as follows:



Each phase has a distinct purpose and target. In the first phases, the target consists of levels of progress of agreement, whereas in the latter phases the targets are more tangible changes in the network.

Strategy of sharing and own business case. In this phase, the network sharing is subject to initial evaluation. It includes building an initial business case to understand the gains and evaluating the competitors to see if any of them are viable as long-term strategic partners.

Partnering and joint BC. Assuming the initial evaluation is positive, discussions should take place with the other operators to understand the interest. Once the discussion focuses down to a single partner, a LOI should be signed ensuring confidentiality, exclusivity etc.

Framework agreement and solution description.

The next step is to ensure that the potential partners agree on the key terms. To this end a framework agreement with term sheet annexes describing the key terms can be used. It can be developed in a small group, preferably 20 individuals or fewer, and will permit clarification of whether agreement is possible. The signature of the framework agreement will also permit communication to stakeholders, including stock market if relevant.

The solution description is a necessary part of the framework agreement as it describes what the shared RAN will look like initially and in the near future.

Partnership agreement and RAN strategy. From the term sheets, a full legal agreement is developed. A prerequisite is to develop the RAN strategy and business case further. This phase concludes with executing the transaction.

Implementation. In this phase the actual implementation of the RAN sharing is done. In addition to the physical consolidation, there is quite a lot of preparation, i.e. IOT and NNI connections, as well as implementation of the agreement in process integration, financial settlement, KPI reporting etc.

Operations. Following the implementation, the network needs to be maintained, developed etc.

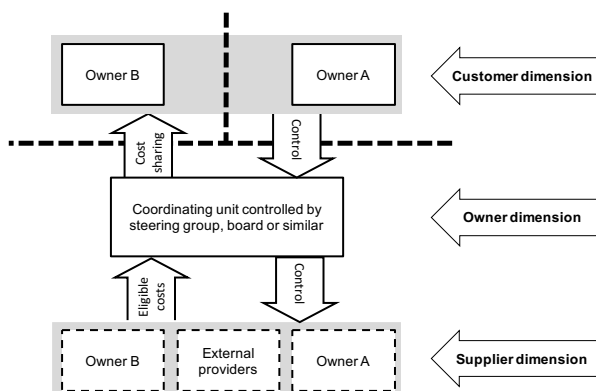
The timeline varies significantly, depending upon the maturity of thinking, regulatory environment, complexity of consolidation and desired rollout. Unless there are special circumstances, three to five years from initiation of discussions must be expected as a realistic timeline.

The sections below in chapter 2 “Approach description” follow the structure of the approach and the subjects pertinent to each phase are discussed in that context.

1.2 Network sharing model

Network sharing implies a restructuring of the technical organisation, including introduction of

formal interfaces in what is often a very integrated organisation. The following model illustrates the change and can be used to structure the discussion of agreements, payments and meeting places:



The model assumes that some sort of joint entity is formed. As will be argued later, that is necessary even if it can be as light-weight as an external company conducting the required co-ordination and management of confidential information.

At the top is shown the customer dimension. This is the interface where the parties procure services from the joint entity (or from each other with the joint entity functioning as proxy). The dotted lines illustrate that information sharing on the customer side should be limited to the minimal required. Even if the parties find it acceptable to share information, this will in most countries not be permitted for competition law reasons. The owners as customers control the direction of the joint entity and pay for use of the RAN services.

In the middle is shown the owner dimension. This is where the formal control of the joint entity is exercised through a board or executive committee. For an asset owning entity, the owners also provide funding and take out profits.

At the bottom is the supplier dimension. This can be the parties operating the RAN or supplying transmission services. Or it can be third party managed services. The dotted lines indicate that this is optional; it is quite possible for the joint entity to handle this internally.

Depending on how spectrum is handled, it may be subject to separate agreements, e.g. between the parties, as commitment or as lending agreements.

2 Approach description

This section presents more details on the approach outlined initially.

2.1 Strategy of network sharing

There is no single initiative in the technology space that has the potential efficiency gains that, in the right circumstances, can be obtained from participating in network sharing. It does, however, come at the cost of lessened strategic flexibility and control of the network. It is important to internalise this trade-off as part of the initial considerations; one way of expressing it is that network sharing is a “second best” option. The best is to have such a dominant position in the market that the network cost is less important and investments can still be seen as a way to differentiation.

Prior to entering into negotiations, it is therefore important to evaluate the two sides of the coin:

- 1) Reviewing the potential gains and strategic advantages of an improved cost position.
- 2) Review the strategic binding from entering into partnership with a competitor in the market.

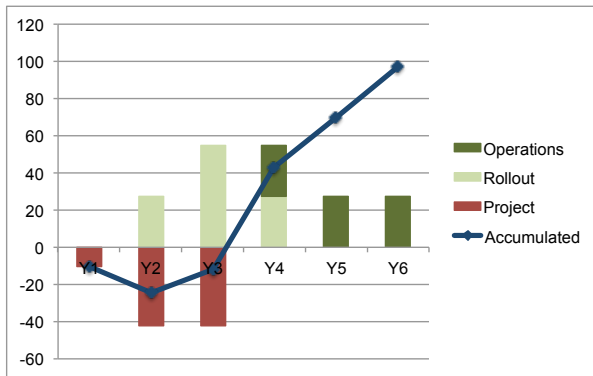
When evaluating the potential benefits at this stage, there is no need to spend huge effort on building a detailed case. Such a case will not, at this point, provide information that a high-level case cannot give. A high-level case can be produced quickly and with a few sensitivity parameters it will usually give sufficient basis for evaluating the balance of gains versus sacrifices. It is not, of course, a business plan, but that is the subject of later work. At this stage the decision is whether to investigate network sharing.

In this initial phase, the focus should be on the cash benefits; the legal structure of the co-operation will determine how financial KPIs are affected, and targets for that must of course be discussed at the appropriate time.

There are two important pre-requisites that goes into the business case, also the initial one:

- 1) Target of consolidation: to save investments, to improve the network or a balance.
- 2) Regulatory position on spectrum sharing, coverage obligations and

Building a high-level case will also start managing expectations with respect to the investment required in the initial phases of the sharing project. A sample high-level case of 4.000 sites for consolidation per operator with joint 4G rollout of 2.000 base stations can be seen below (USD m).



As will be seen from the above, there is a major contribution to the case from the savings of joint 4G rollout. Obviously, 4G is just one type of investment that has this effect, but it serves here only to illustrate the point. Any type of investment avoidance will have the same impact on the business case.

Even in cost-focused approaches, a very substantial gain in coverage can be obtained by pooling spectrum. For instance, two operators may individually be able to offer 2G and 3G on 900 only, but through combining spectrum 4G on 900 can also be offered.

More details on business case is discussed in a separate section below.

When evaluating the downsides, it is important to look at the alternatives to sharing, in particular of course whether a competitive network can be achieved within the financial targets set for the company.

Cases where agreement is reached, are, in addition to top-down execution, generally characterised by three factors:

- 1) Clear recognition that the required network footprint for competing in the market cannot be obtained stand-alone while meeting the financial targets.
- 2) There is a suitable match with a competitor with a similar strategic outlook and persistent presence in the market.
- 3) Accept of the required loss of full control.

In case one can actually afford building a superior network, and the competition will be strained to follow, entering a sharing agreement is less obvious. This goes both for the financial perspective as for the control perspective.

In this particular situation of dominant position, there are two considerations one should make prior to concluding not to proceed with any discussions:

- 1) What does the position in the market look like in case two other operators enter into a sharing agreement?

- 2) Is it an option to utilise national roaming as a more “one-sided” sharing?

National roaming can be used for sharing, leaving most of the control with the owner of the network and can therefore be attractive in a “#1+#4” co-operation, whereas other active sharing technologies are more prevalent in a “#2+#3” co-operation.

2.2 Partnering

When one reaches the point where network sharing is seen as an attractive option, the important next step is to partner with the right competitor. As the options obviously are limited, this discussion is normally intertwined with the discussion of the business case.

Not infrequently, there really is only one good option. However, that recognition may not be universal, and it is therefore important to stay on top of the process of consolidation. Having discussions with all competitors is, therefore, normally a good idea, even if the target is relatively obvious.

This activity depends on the relationships between the CEOs of the local market and their ability to discuss the opportunity openly and with a reasonable level of mutual trust. The CEOs must see the overall value of a consolidation and joint investment and act upon it.

Once initial understanding has been made, this should be reflected in a letter of intent where basic stuff like confidentiality, exclusivity, term, governance etc. are outlined.

With this, a small team can be set up and tasked with writing the framework agreement that is the topic of the next section.

2.3 Framework agreement

The role of the framework agreement is to put down sufficient details in writing that the parties can get approval internally, communicate to stock markets and other external stakeholders as well as to employees. The framework agreement is an interim document that becomes obsolete once the final agreement is executed.

The framework agreement in itself is normally not very controversial as it regulates the business until the partnership is formed and in that sense is very similar to other M&A activities. However, the annexes of the framework agreement constitute the high-level agreements of the key topics. This can be structured in many ways, of which the following is a suggestion.

- 1) The future co-operation agreement (the Partnership Agreement), containing key legal clauses like purpose, corporate governance, operating model, term, termination etc.
- 2) Handling of assets. This includes the lease or transfer of assets to a JV, lease or transfer of spectrum, procuring of transmission, settlement of imbalance etc.
- 3) Network and business plan, covering expected network development, investment governance, high-level plans.
- 4) Supply agreement, covering the supply of RAN services to the operators as well as the charging model/cost sharing model.
- 5) Supply of operations services, including SLAs for RAN and transmission etc. For geo-split models, this also covers costs of the operation delivered by the parties.
- 6) Vendor management, in particular the RAN vendor, but also other areas in scope, e.g. transmission and towers.
- 7) Project implementation, including the initial forming of the co-operation, rollout and consolidation.

The annexes of the framework agreement should be kept at a fairly high level, focusing on the key issues. The senior management involvement should be kept through this phase in order to ensure pragmatic focus on the key business objectives, although the preparatory work can be done by a working group.

As the structure of the annexes and ancillary documents of the framework agreement is very similar to those of the partnership agreement, details of each document is shown below under the Partnership Agreement.

In this phase, a joint business case must also be developed. It will come out of the network and business plan and also help structuring it.

Once the framework agreement is signed, the direction should be so clear that senior management oversight, not involvement, will suffice.

2.4 Partnership Agreement

This section discusses the phase of entering into the Partnership Agreement, including the agreements and ancillary documents, the process of closing and the required prerequisites.

2.4.1 The agreements

The Partnership Agreement itself is really a shareholder's agreement in case a joint venture is created. Otherwise, it is more accurate to call it a "co-operation agreement". However, as will be argued for later, even the least committed form of network

sharing has the need of some joint entity. So the term "partnership" will be used in this document.

The Partnership Agreement regulates the key legal issues like:

- Scope
- Overall governance
- Term and termination
- Change of control
- Breach
- Spectrum; the specific treatment of spectrum and where it is placed in the agreements vary widely with the local regulatory arrangement.
- Rules governing the shares of a JV
- Warranties
- Guarantees
- Notices
- Choice of law and venue
- Funding

Most of these terms are similar to other joint ventures. However, the nature of network sharing is such that exit is extremely expensive and something that has not at the time of writing been executed in practice. The section below on exit discusses this particular issue.

The partnership agreement has a number of annexes and/or ancillary agreements, covering the same topics as the annexes of the framework agreement. However, in the partnership agreement version the annexes and/or ancillary agreements are in full legal text and more detailed; for instance, the network and business plan, comprising the RAN strategy, must progress to a basis for a business plan, not just a business case.

The following sections provide a bit more detail on each of the annexes and ancillary agreements. It follows the structure presented with the framework agreement.

2.4.1.1 Handling of assets

For asset-heavy joint ventures, this is the asset transfer agreement listing the value (for contribution in kind) or cost (for cash injection following sale of assets). Also, the assets are specified and settlement of imbalance is contained in the documents. Rules governing valuation of additional assets implemented following closing should also be put in place.

In order to balance out write-offs, an option is to transfer both assets that are to be used as well as assets that are dismantled to the JV.

When putting value on assets, it is important to start with agreeing a target of value before going into the accounting stuff. In most countries, a formal valuation of assets needs to take place by

people authorized to do so. On the other hand, the parties will, in this case, have differing interests so it should normally be possible to achieve the desired result.

In case infrastructure like towers, transmission etc. remain with the parties, this needs to be balanced out also, e.g. through transferring items that are to be demolished to the JV.

Warranties and duration of same are also typical subjects.

For an asset light JV, the relevant document is an asset lease agreement under which the parties lease access to each others assets. The balance issues are somewhat different here, but the model should ensure that network is selected for the long-term benefit and that imbalances of e.g. demolition is compensated for.

Asset types typically include RAN, towers, shelters, installations, transmission. It sometimes includes spectrum and it does not include core.

2.4.1.2 Network and business plan

The network and business plan covers the governance of investments and its use on the network.

In order to ensure a stable operation of the sharing co-operation, a rolling plan with sufficient investments for the on-going operation of the company, handling capacity investments, minimum rollout etc. should be put in place. The investment level should be sufficient for a continued maintenance of the network to a reasonable quality and should be perpetual for the term of the agreement. Absent of such a commitment, the parties will have to approve investments every time, and as investment willingness is likely to differ over time and be out of sync, this can lead to a situation where the network becomes starved.

In the initial plans, sufficient funds for the consolidation and agreed rollouts should be included. Decision needs to be made on target and permitted overrun for the initial consolidation project, as well as the consequence of overrun beyond the permitted level.

Finally, there are larger investments not part of day to day business. This includes spectrum acquisition (assuming that this is handled within the JV), network swaps, further rollout, new technologies etc. Such decisions are breakpoints in the co-operation since it requires the parties to agree anew. They should therefore be as few as possible and the baseline investments should suffice for regular business.

The business plan also regulates individual investments.

The network plan includes plans for the use of the investments. This includes:

- 1) Clear priorities, e.g. capacity first.
- 2) Target rollout/service classes
- 3) Targeted projects

The network and business plan should contain a governance part that is contract material and cannot be changed without agreement between the parties and a practical implementation part as annexes, reflecting the priorities etc. at any given time, and which can be approved by the board of the JV or corresponding executive board.

In case of constructs with asset light JV with a joint management of investments, the mechanism are essentially the same, even if the assets are on the books of the parties. In case each party managing its own assets, a different approach is required as the investment decisions are more unilateral. This is a challenging model, and discussions contemplating it often fails as the parties are not really interested in sacrificing the control.

Whatever the model, it needs to reflect a balance between allowing own investments and controlling cost of access to the assets of the other party without disrupting service.

In addition to the short-term rolling network and business plan, the JV should at regular periods produce a strategy plan. This can be updated yearly, but the full process of revising it is probably not necessary every year.

2.4.1.3 RAN supply agreements

In order to gain access to the joint RAN, a supply agreement must be entered into between each of the parties as customers and the JV.

One important part of the RAN supply agreement is the charge back mechanism that naturally resides here in the customer contract. See further below on discussions on charging.

In addition, the RAN supply agreements regulate things like forecasts, input on priorities etc.

In case of asset-light JV, the main part of the cost sharing will be in the form of lease of assets from the other party. Many of the principles are the same, but the RAN supply agreements will be governing the interaction as well as sharing costs that are within the JV, whereas the asset lease agreements will contain the cost items pertinent to the assets themselves.

2.4.1.4 Operations supply services

The operations supply services regulate the supplies provided by the parties, e.g. transmission

services, geo-split operations or from a third party, e.g. managed services.

In addition, an asset-heavy JV typically also has contracts with the RAN vendors.

The content of these agreements are highly dependent upon the model chosen for operations. For a geo-split operation, it will be formal, almost managed services agreements, between the JV and each of the parties (irrespective of who owns the assets).

For the “virtual team” approach, it will probably not be a separate agreement, but mere an annex to the partnership agreement, specifying resources to be supplied and governance of those.

See below for further discussion on potential models for operation, including the “virtual team” model.

2.4.1.5 Vendor management

Different companies have very different approaches to managing vendors in terms of process, interaction, formality etc.

In order to address vendors effectively, it is important to show a common front and have up-front agreement on how and on which basis decisions are made. Regulating this is the role of the vendor management agreement.

A couple of examples illustrate this. When entering into a sharing agreement with an asset-heavy JV, the RAN and other vendors may have change of control clauses that precludes this, and it can become particularly interesting if this is the case for only one of the parties. In the vendor selection process, it will therefore be important to understand what credible threat can be made against such a vendor, e.g. whether a swap is viable.

Another example relates to the conduct against landlords or tower companies: is the JV willing to invest in alternative positions in order to break the cost curve for site rental.

2.4.1.6 Project implementation

Project implementation should contain a general part that defines the governance of projects: how are they decided and by whom, funding within/outside the regular business etc.

Important annexes to the project implementation are projects that are decided as part of the network sharing agreement, i.e. considered approved as part of the agreement itself. This will typically include:

- 1) Implementing the JV itself (processes, tools, housing, interfaces, meeting places, recruitments, ...)

- 2) Sourcing for RAN contracts for the JV (asset heavy).
- 3) Sourcing for managed services if applicable.
- 4) Implementing the initial consolidation.
- 5) Implementing the initial rollout.

2.4.2 Closing or executing

Once the partnership agreement is in place, it must be signed. In case of a co-operation without any transfer of assets or rights, the contracts can be executed.

In case of some sort of transfer of assets, staff or otherwise to a joint company, a process of closing the deal needs to take place. For this it is typical that a joint team of M&A lawyers are employed who will design and ensure execution of the process.

2.4.3 RAN strategy

In order to develop a proper network and business plan, a quite precise understanding of the direction for the development of the RAN is required.

The end result should be an overview of

- 1) Principles for selecting target grid and hypothesis for what it looks like.
- 2) Agreed rollout based on what the grid actually looks like.
- 3) Capacity model that based on assumed traffic development estimates required upgrades and densification.
- 4) Assumptions on spectrum availability and use.

Selecting the target grid will differ depending on the primary objective. If the objective is improving the network, a “best grid” approach can be taken where each site is evaluated equally and care is taken not to loose coverage. If the objective is reducing cost, a “primary grid” approach can be taken, where one of the networks is used as the starting point and augmented with individual sites from the other network. To balance out the detriment of customer experience, the choice of primary grid can shift regionally.

All of this results in an overall cost estimate that, together with the target RAN, constitute the RAN strategy and the key input to the network and business plan.

2.5 Implementation

The actual implementation project obviously depends a lot on the scope of the sharing. However, it will normally include at least the following items:

- 1) Testing the interoperability between the various core and RAN platforms involved.

- 2) Implementing the actual physical sharing as contemplated in the network and business plan.
- 3) Implementing the processes, organisation, meeting places etc. of the co-operation.

Each of these are discussed in a bit more detail below.

2.5.1 Preparation

A general preparation like for any project is, of course, required. In addition, a number of specifics for network sharing implementation must be considered.

The interoperability test is required to ensure that the RAN, including the chosen sharing technology, functions with the core networks across the interconnect points of the parties.

With more network sharing agreements in place, this is less of an issue than in early implementations. However, all combinations of RAN and core networks still needs to be tested.

In order to ensure completeness and repeatability of tests, a formal test model should be developed, verified as being sufficiently comprehensive and executed in a structured manner with formal follow-up and issue reporting.

A particular item that should be tested for MOCN is that terminals that do not recognize the MOCN frame are routed to the correct core network and that rejection from the core networks are “soft” so the terminals do not risk falling off the network permanently.

In case of transmission sharing, and dependent upon the specific model chosen, another important preparation is to ensure that the transmission are connected via (redundant) NNIs so that the traffic can connect to both core networks.

In case the operating model is based on outsourced operations, the outsourcing needs to be executed also. This will typically increase the timeline somewhat.

2.5.2 Physical RAN implementation

The actual physical implementation is at the plan level quite similar to a network swap. The implementation is done initially in one or two “golden clusters”, following which a more general rollout that gradually increases in speed. It is furthermore similar in its required focus on customer experience, “first time right” etc.

Some differences against a swap do exist, including considerations when activating sharing technologies, e.g.:

- 1) Frequency plans needs to be put in place for the revised grid.
- 2) Excessive interference needs to be avoided and some physical changes may be required prior to activating sharing.
- 3) Thorough checklist should be used when activating sharing as incorrect configuration may cause customers to fall off the network.

Following initial adjustments, sharing technology is activated following which redundant sites are dismantled.

When a cluster is activated, it may need to have installed extra capacity to handle the traffic of dismantled sites. If the new site grid provides better coverage, the absolute amount of traffic is also likely to increase. Once sites are dismantled, equipment is released. It is therefore important to have flexible agreements with the vendors in order to be able to reuse the equipment and licenses that are freed up.

2.5.3 Process and organisation

In addition to the actual physical network implementation, the co-operation needs to be set up with processes, staff and governance.

Even with the lightest versions of the co-operation it is difficult to avoid a joint entity that handles coordination of plans, settlement, securing uniformity of reporting, ensuring that confidential information is not shared between the parties etc. The entity can be an external company or it can be a small unit set up for the purpose of handling the co-operation.

For competition law reasons, the unit may need to be headed by person(s) who is not dependent upon either party. Care must be taken when selecting the management, including considering “two to hire, one to fire” approach and also recognizing that the skills required in the built-up phase are more project and entrepreneurial whereas the skills required for on-going operation are more a traditional line manager role.

Irrespective of the model, a process framework needs to be set up. This includes trouble ticketing, fault management and change management interfaces, preferably automated, and manual interfaces for other processes.

For SLA reporting a common definition, including core network settings, and a “common truth” of network status and KPIs must be defined. This is particularly relevant for a geo-split model where the parties may have different ways of measure the same KPIs.

3 Specific discussions

This section contains more detailed discussions of specific items that go across the different phases.

The items discussed are the following:

- 1) Barriers and caveats
- 2) Scope, including technology, geography and spectrum.
- 3) Operating model, including asset ownership and operations
- 4) Governance
- 5) Business case
- 6) Binding and exit
- 7) Charging mechanism
- 8) Trading shares
- 9) Staffing and HR
- 10) Vendor management
- 11) Sharing technologies

3.1 Barriers and caveats

Starting a network sharing co-operation faces a number of barriers, which requires focused attention to overcome. As a number of initiatives being started do not get beyond initial talks or letter of intent, this section focuses on the typical barriers and how to avoid them.

Typical issues include the following:

- 1) Inability to find a partner or to persuade potential partner of the value creation opportunity.
- 2) Resistance to relinquish control.
- 3) Regulatory barriers.
- 4) Internal resistance.
- 5) Too detailed approach.
- 6) Not enough top-management push.

These issues are discussed individually below.

3.1.1 Inability to find partner

Finding potential partners to discuss with is typically not an issue as most operators face the same financial challenges. However, not infrequently, the discussion stops before real progress can be made. There may be several reasons for this, but one very important one is alignment of objectives.

The partners may have quite different starting points, and the value of sharing may be a lot higher for one party than another. The process of taking this discussion depends on culture and personal style, but at some point it will be required to be open about the relative advantages and disadvantages of the potential partnership. This also goes if your potential partner has the upper hand. Rest assured that he will find out, even if you do not tell him. If the imbalance is significant, up-front or

on-going payments may be needed to achieve balance.

The next important step is to ensure focus on the long-term restructuring of the production cost of the industry. If this focus is lost, the discussion becomes tactical with both parties looking for more short-term gains, and no business is likely to result.

With the restructuring mindset, a business case may be made that illustrates the various options and the value for the parties. Ideally, the initial business case should not be restricted in any way, but include a full RAN sharing with maximum scope. The parties may then choose to take only parts of the co-operation or phase it.

The reason it is so important to start with a broad scope is that often the advantages for the parties are not equally distributed across technologies. And in developing a business case with reasonable quality, this logic will become clear as will the basis for discussion of the appropriate scope.

3.1.2 Resistance to relinquish control

All mobile network operators have started with full control of the network: investment levels, SLA targets, vendor selection, technology prioritisation etc. Network sharing entails a real and significant loss of control. This is uncomfortable and carries a real business risk since market priorities may not be fully supported by the network. On the other hand, the coverage, quality and cost level of a shared network cannot be achieved on a stand-alone basis.

This is the basic dilemma outlined initially in this document, and the reason why network sharing is “the second best option”.

Looking at this from the perspective of a barrier, it is important that the balance of improved performance vs. loss of control is made at the right management level and communicated clearly. Many stakeholders, having legitimate concerns over the loss of control, have the ability to disrupt the process. This may cause delays and even failure to complete the agreement, which obviously should be avoided once the decision is made. Like for any change project, clear communication of purpose, plan etc. and management of progress is required.

3.1.3 Regulatory barriers

Even in the most transparent countries, the regulator can be quite unpredictable in general, and in particular when it comes to network sharing. In addition, many spectrum licenses contains limits on use of technology, sharing of spectrum, coverage obligations etc. There is no simple formula for

dealing with this and is always a key risk item for network sharing projects.

Some items of processes that have worked in different settings are:

- 1) Map out the relevant government bodies influencing the decision to permit network sharing and try to get a feel for the general view of these bodies. If possible, also influence it.
- 2) Agree on the overall approach and scope with the partner before being very explicit towards the regulator.
- 3) Make a joint effort to influence the regulator to permit network sharing and try to understand the conditions under which it may be permitted.
- 4) Be patient and keep on working towards the goal while being in dialogue with the regulator.
- 5) Use experiences from other countries to influence the regulator.

3.1.4 Internal resistance

There are few places where people will go openly against a management decision to attempt network sharing. However, overcoming the other barriers listed in this section requires a strong drive from a cross-functional team. And in case one group in the company is negative towards the effort, it can easily ruin the efforts to drive an objective business case.

Typically, but not always, the resistance comes from the technical department, for good or bad reasons. Building a solid business case between the parties requires active participation and commitment. To prevent progress or make the case look bad, it is not even necessary to resist, since the business case is extremely dependent upon getting the right technical assumptions put into the model.

To ensure against this it is important to have a cross-functional team that is dedicated to the idea and with enough competence to challenge the assumptions put forward by various participants and stakeholders. This team must, together with management, articulate and communicate a compelling “why” of network sharing in the specific situation.

3.1.5 Too detailed approach

It is very important to ensure consistent focus on the industry production cost perspective. Such perspective will easily be lost if a bottom-up approach to valuation or design is permitted. For the best of motives, to protect the interests of their employer, the technicians will argue that their technology is better in whatever dimension. And the accountants will for the same reasons start making very detailed inventories and evaluation models.

None of this will work. The main lines of the co-operation, including value of assets and overall operating model, must be decided top down.

This is not to say that the detailed work is irrelevant. The joint network needs to be defined and developed, which requires detailed technical work. The asset valuation (if relevant), charging models etc. needs to be detailed out to become operational. But all this work comes after the overall deal structure, not defining it.

3.1.6 Not enough management push

Most of the pitfalls described here can be avoided if senior management is sufficiently involved in pushing the work forward and ensuring focus on the industry production cost perspective. The drive is necessary due to the complexity and impact of the effort and to overcome resistance.

Senior management push must be applied within each organisation through a steering group structure, but preferably also through the active involvement of a member of the senior management team.

In addition to an internal structure, a steering group structure across the parties is necessary to ensure progress. Such structure will help ensure:

- 1) Overall progress for the joint project, including sufficient number and quality of staff.
- 2) Ability to discuss concerns directly between the management groups of the parties.
- 3) Pushing forward when one party has trouble from internal resistance.
- 4) A working relationship on management level that will be beneficial when more difficult issues need to be discussed.

3.2 Scope

The scope of a network sharing co-operation has several dimensions, which are outlined at a very high level below.

- Active vs. passive sharing, i.e. the sharing of physical infrastructure vs. sharing of base stations.
- Technologies (2G, 3G, 4G, 5G, future technologies, micro cells etc.).
- Geography, e.g. country wide or rural only.
- Spectrum, current and future.
- Transmission.

Typically, the parties keep their own core networks to permit differentiation on services, interconnect, roaming etc.

In general, the more sharing, the higher the value potential. But the value creation on different variants of the scope may differ between the parties.

For this reason, the work should start with a comprehensive scope and find the value creation points. Afterwards it will be possible to reduce scope, but it will not be possible for the project to push beyond the initial scope set by management as the basis for such push will not have been produced if an initial limited scope is chosen.

3.2.1 Technologies

Technologies comprise 2G, 3G, 4G and 5G, each available on multiple frequencies.

With the introduction of 5G, where all operators have to build “greenfield”, this appears an obvious choice for starting the co-operation. However, it can be challenging to build a business case around 5G rollout as the co-operation can diminish some of the advantages one or both parties have from preparing 5G rollout. Examples of such unilateral advantages include:

- 1) Existing grid well suited as basis for 5G rollout, perhaps even prepared in terms of antenna permissions etc.
- 2) 4G basis coverage advantage.
- 3) Existing antennas, RF units etc. may be used for building 5G on selected frequencies.

5G only sharing in an extensive rollout may provide a good starting point; whether it is viable as a longer-term model is more questionable. The full utilisation of assets will not be possible, e.g. reuse of antennas, use of single RAN hardware solutions etc. Also, as 5G is the future technology, it would normally make sense to consolidate the “legacy” technologies. Finally, with growing importance of 5G, the downside of strategic binding is mostly present already with 5G sharing.

For these reasons, the optimal approach is arguably to implement sharing across technologies and consolidate the grid. This represents by far the greatest value creation potential and makes joint planning and traffic steering a lot easier.

3.2.2 Geography

The highest effect of active sharing is in rural areas, where the capacity utilization is lower and all equipment can be shared.

In city areas, the difference between passive sharing with grid consolidation and active sharing is smaller, as extra RF and/or baseband units may be required to handle the capacity needs. Advantages that remain include the ability to pool spectrum, providing for better product offering and easier planning in boundary areas.

3.2.3 Spectrum

In many cases, the handling of spectrum is determined by the regulatory requirements. But in case there are a number of options, the parties need to agree on the management of spectrum.

With the general unpredictability and often limited understanding present with regulatory bodies, spectrum remains one of the real challenges of network sharing and significant effort should be focused in order to achieve as robust an agreement as possible under the pertinent regulatory regime. As these differ widely, the approach must be adjusted similarly.

As noted previously, embarking on network sharing discussions implies an acceptance that the financial benefits of sharing exceed the downside of reduced control. In spite of this, spectrum is generally viewed as something which an operator must own. Assuming a rational regulatory regime where spectrum can be traded, it can be procured jointly and split up in case of an exit, making it a trivial problem compared to splitting up the RAN. Capping spectrum purchase levels and other regulatory rulings may mandate individual spectrum purchase, but from a control perspective there is no good reason for not procuring spectrum jointly. In situations where the spectrum cannot be split up in case of an exit, the procurement of spectrum needs to be individual.

In a lightweight co-operation, e.g. only 4G or 5G sharing on one frequency, the parties have implicitly kept a back door open. Such co-operation is for short-term gain, potentially with a view of finding out whether it makes sense to move further or to withdraw. It is challenging to maintain for the long term. In this situation, spectrum clearly must remain with the parties, both current and future.

For a more extensive co-operation, involving grid consolidation and all technologies, it is very difficult to see how the parties can utilize widely different spectrum holdings effectively. Imagine the tension that would result in case of a consolidated grid and one party having access to 900 MHz spectrum permitting an additional carrier from an auction or a beauty contest. The parties would have to agree on the value of getting the spectrum into the co-operation, and given that the result of an auction gives the parties different allocations, their views of the value are likely to differ correspondingly.

Therefore, a full consolidation involves agreement on all current spectrum as well as joint bidding for new spectrum if possible. If this is not possible for regulatory reasons, a mechanism as close as possible to this should be put in place.

3.2.4 Transmission

Transmission may be shared quite independently of other options. Obviously, the more overlap of the grids, the better the opportunity. But both in active and passive sharing cases, the sharing of transmission can make good sense.

Transmission sharing has the additional advantage that the strategic binding is less extensive than for active RAN sharing.

With 5G, control over transmission becomes more important since latency requirements for some use cases are more stringent. Over time, exchanging traffic at a few network interface points is unlikely to be viable.

3.3 Operating model

There are two main dimensions of operating model for a network share. These are the level of joint asset ownership and whether operation is done jointly or split between the parties. The two dimensions are discussed below, with joint venture, “JV”, being used for describing the joint body running the co-operation, whatever form it might have.

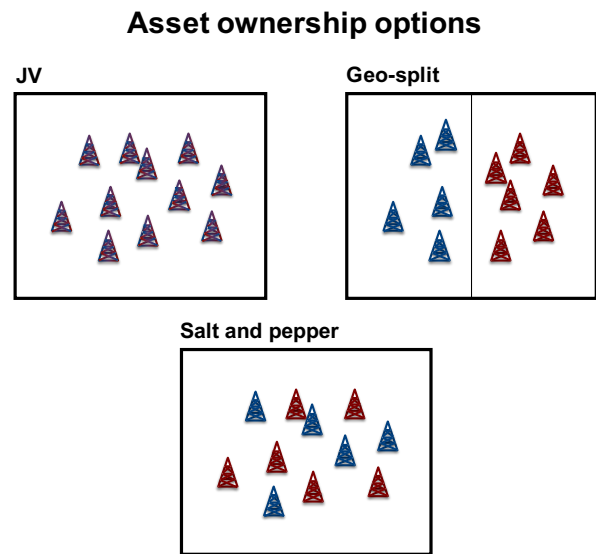
Generally, since one depends on all assets functioning well, it is a lot better to have joint control over all assets and operational capabilities you depend on than have full control over half and no control over the rest.

3.3.1 Asset ownership

The ownership of RAN assets is a tactical financial question, not a strategic one. As for spectrum, the important thing is to have access to the RAN assets on ownership terms, in particular including scale advantages. In a sharing situation, the control is shared irrespective of who owns the assets.

The issues related to asset ownership, therefore, are the impact on the financial KPIs, cost balance and governance. However, most of the issues, apart from financial KPIs are related to the operating model, less to the asset ownership.

The main options for asset ownership is illustrated first:



In the JV ownership model assets are transferred to a joint company. This model implies:

- 1) Assets need to be valued initially and a potential cash compensation paid. Following that, asset balance is automatic.
- 2) Write-off and demolition costs are taken in the JV and are therefore balanced automatically.
- 3) A governance of joint investments needs to be put in place.
- 4) Depending upon the accounting method, the model can imply reduction on the balance sheet (improving ROCE) and a shift from CAPEX to OPEX (degrading EBITDA margin).
- 5) The selection of the grid is quite independent of previous ownership.

The characteristics are mostly advantageous and the model most accurately reflects the actual commitments made. The latter point is mainly a psychological one, but resistance to full asset sharing is often based on resistance to the commitment and compromises required to successfully execute on network sharing.

The need to set a joint investment governance is a key strength as it, properly constructed, defines a set of ground rules that ensures a continuity of the co-operation.

In the geo-split ownership model, each party owns a part of the country. This model implies:

- 1) An asset balance needs to be made, but not necessarily with an initial cash balance.
- 2) Write-off costs are difficult to balance as they follow accounting rules.
- 3) Demolition costs can be balanced through the consolidation project.
- 4) Investments can be governed largely independently.

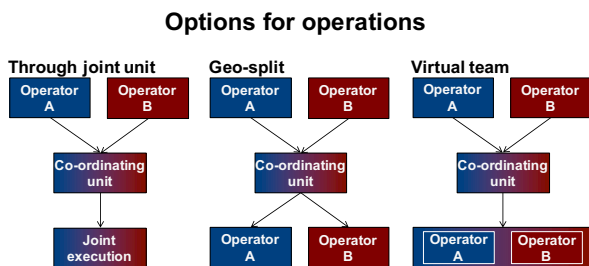
- 5) Apart from the reduction in cost, there is no impact on financial KPIs.

In particular when combined with operating own assets, the characteristics are mostly disadvantageous. For instance, the lack of investment governance that is often present in these models, implies that agreement needs to be made from case to case. And as requirements will shift, this makes a shaky foundation. And for a co-operation where exit is extremely painful, a shaky foundation is not desirable.

In the “salt and pepper” model, the parties own sites and equipment interspersed with each other. The model is similar to geo-split ownership. In case of joint operation, it can be a model for asset-light company since the asset balance can be assured independently of a geographical border. In case of operation of own sites, the model is more challenging since it will require strong co-ordination to avoid the networks to diverge. And typically, the model of separate ownership and operation is selected to maintain individual control.

3.3.2 Operations

The mode of operating the network can be distributed in a number of ways. Three main types are illustrated below.



In the joint unit model, the operation is executed either in-house in the JV or via a managed services partner. Particularly in the situation where the assets are not owned jointly, this is the most robust model. It has the advantage of ensuring uniform development of the network, vendor management etc. The main caveat is that the JV can become too dominant and that customer centricity can suffer. Another consideration is that it can be quite time-consuming to set up a joint operation and that in a managed services setup, there will be three layers of the organisation.

In the geo-split model, the parties operate one part of the country each. This has the advantage of being comparatively fast to set up and that it can be accommodated in existing or future cross-border operations. The model has conflict potential from the fact that a competitor is providing service to ones own customers. In addition, the operation,

maintenance, rollout etc. of the network continues based on different standards unless a significant effort is spend on alignment.

In particular, it is not a good model if the geo-split is used for both operations and asset ownership. In case a joint unit manages assets, the ownership is less important as the governance is under joint control. With geo-split ownership, the investment governance will often reside with the parties as this is part of the point for desiring the model. That control remains an illusion and a lack of acceptance of the loss of control that is the price for a better and cheaper network. Discussions taking this path also mostly fail to materialise to an agreement.

In the virtual team model, the parties operate the network as one group but are still employed with each party. The model is similar to the joint unit model and, if it works, has the advantage of developing and managing the network in a uniform way as well as removing one layer of organisation. A key disadvantage is that accountability is quite unclear and governance within the unit can be challenging.

Irrespective of the model, its setup entails a significant amount of process work. Essentially, all the operations processes need to be reviewed and for quite some of them new interfaces are required. Some interfaces can be manual, but volume processes like incident and change are likely to require automation. For geo-split operations, tools for monitoring KPIs in a uniform manner is also beneficial.

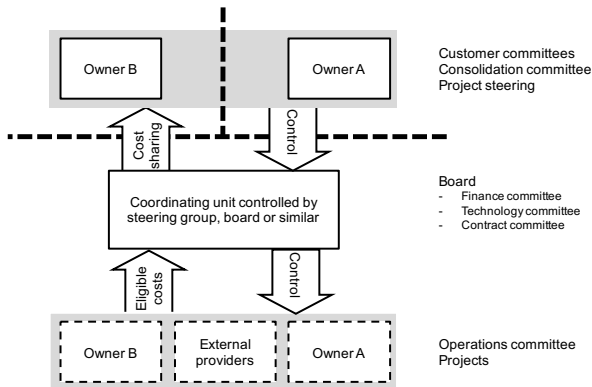
3.4 Governance

This section outlines potential governing bodies that can manage the agreement as well as discussing investment governance.

As network sharing must be for long durations to make sense and the partners continue to be competitors with differing views initially and subsequently of what is required of the network, it is important in setting up the governance that you agree to disagree and manage the disagreements rather than attempting to solve them.

3.4.1 Governing bodies

Clearly, many structures are possible, so the list here is just one way of covering the required topics. The governing bodies suggested here follow the general structure presented:



The bodies are as follows:

The customer committees are meetings where the requirements of each party as customer to the coordinating entity are discussed. As business sensitive information may be presented, each party should have its own meeting.

The project steering groups are for projects that have sufficient size and importance to be governed with owner participation.

The consolidation committee is a specific steering group for the initial consolidation and implementation project. It is one instance of a project steering, but a very prominent one.

The board (not management board but owners board) is the regular corporate board where final approvals are made, including the investment governance. For agreements without a JV company, it is, of course, not mandatory from a corporate perspective, but a similar meeting place to govern the overall development of the co-operation.

Under the board and subject to its approval, a couple of sub-committees are suggested.

The finance committee for discussing subjects related to implementation of reporting, verification of settlement etc.

The technology committee for discussion the overall technical development and direction of the co-operation.

The contract committee for ensuring implementation of the agreed governance and maintaining the contracts as the co-operation develops.

In case of a geo-split operation, operational co-ordination is required in the operations committee. This needs to be joint and for that reason not containing discussions on market or customer facing issues apart from those relating directly to the operations. In addition, development of the RAN requires a number of projects, some of which must be

joint. These may or may not be governed by the project steering groups.

As network sharing is a co-operation between competitors, special care needs to be taken to respect competition law. One contribution to this is to be very explicit on the permitted meeting places and the subjects allowed to be discussed in those.

3.4.2 Investment governance

All mobile networks require a level of on-going investments that for network sharing needs to be managed jointly, in particular when MOCN is used as the sharing technology.

Almost all other expenses in a network sharing co-operation is given from investments. Site rental, power, operations and transmission are all materially direct consequences of the investments made, be it in new capacity or rollout, or in operational efficiency projects.

For this reason, financial governance in a network sharing co-operation is very much about the investments.

The investment types can be grouped as follows:

- 1) Capacity and basic rollout investments, e.g. in case of new roads, railroads, malls or termination of existing leases.
- 2) Basic level of additional rollout.
- 3) Major new rollout, e.g. new technologies, modernisations, new areas to be covered etc.
- 4) Extraordinary investments like network swaps, spectrum acquisition and the like.

Items (1) and (2) are on-going, requiring continued funding. Item (3) is more varying, but also tends to be continuous. Item (4) is ad hoc, depending upon spectrum auctions, major technology shifts in the offered equipment and the like.

Following initial implementation, the network sharing partners can, for a large number of reasons, have very different investment willingness. In case of investment governance requiring approval from both parties, the network will tend to be starved of investments.

Ways of minimizing this include:

- 1) Use of pre-agreed upgrade criteria for capacity and basic expansion and commit to related funding. Alternatively, find technologies and a governance method where the parties can have different capacity thresholds and are charged differently.
- 2) Agreeing to a specific level of investments over time, not necessarily constant per year or quarter, but committed over time.

- 3) Attempting to get “all inclusive” contracts with vendors to avoid detailed discussions on feature costs and the like.
- 4) Agreeing to a process on extraordinary investments, including in particular the handling of spectrum as discussed above.

3.5 Business case

Developing the initial business case can be done at a fairly aggregate level initially. With the framework agreement, a more detailed case reflecting the actual network information will be required.

The examples shown here are from a fictive network sharing with fictive cost levels, but for illustration an estimate is made from an average of experiences, and the resulting numbers in million USD.

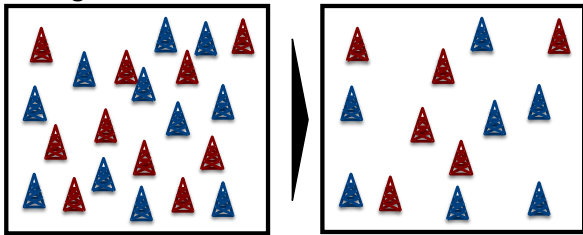
3.5.1 High-level business case

The high-level business case has a few main parameters:

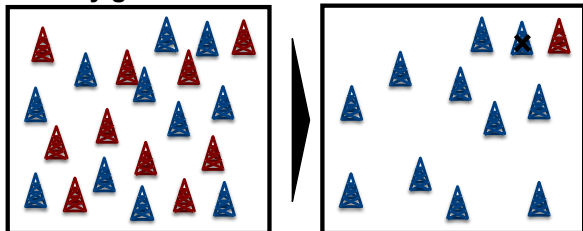
- 1) The baseline assumption in terms of required investments to be competitive.
- 2) The improvement assumption for a sharing case expressed in terms of level of densification.
- 3) The choice of grid.

All of these choices are fundamentally a question of whether the primary focus is cost savings or if it is improvement of coverage. One of the key choices that this impacts is the choice on whether the anchorage of the grid is a “best grid”, i.e. the best from a coverage perspective and individual site cost, or “primary grid”, i.e. taking the existing grid from one of the operators. The principle is illustrated below:

Best grid



Primary grid

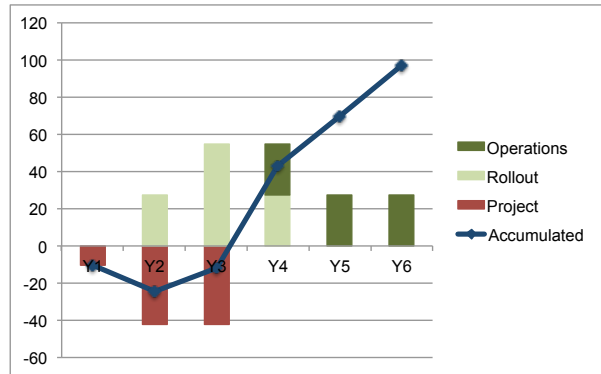


In the “best grid”, the best individual site is selected based on the coverage, cost, lease conditions etc. Typically, this implies that more sites are chosen than either of the parties had prior to consolidation.

In the “primary grid”, the best existing grid is chosen, potentially selected regionally, and (slightly) augmented using the grid that was deselected.

The business case, based on these key assumptions, should at the initial point in time show such positive results that it is obvious to proceed. If it is dubious, it is not likely to be worth it.

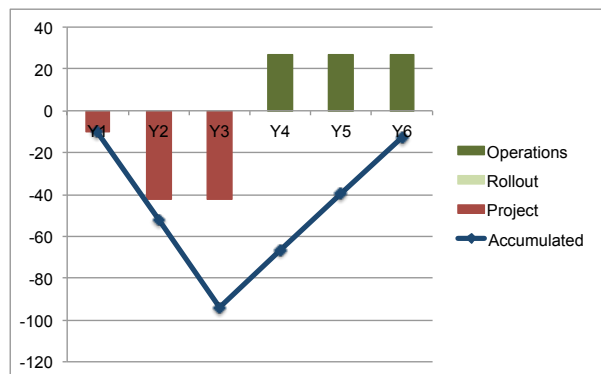
In the situation where required investments can be shared, the business case is typically very attractive as the savings on shared investments pays for the consolidation project. This is illustrated in the following sample high-level business case (the same as initially presented):



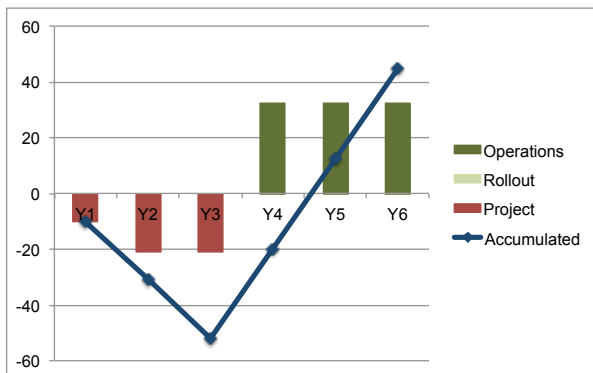
The assumptions here are:

- 1) Two operators each have 4.000 sites and plan for another 200.
- 2) Both operators need to rollout 4G on 2.000 sites initially.
- 3) The joint “best grid” is 5.000 sites plus additional 50 sites.
- 4) The cost of shared 4G rollout is 25% higher than individual rollout due to sharing features and capacity requirements.

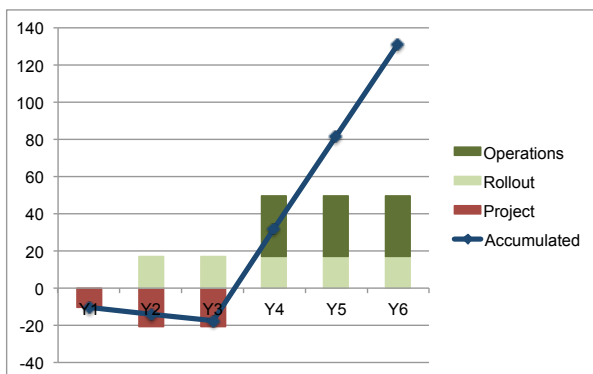
If the assumption of a joint investment in 4G is removed, the case worsens significantly:



The operating costs are still significantly lower, but the payback time is problematic. If a “primary grid” approach is selected where the 4.000 sites becomes a total of 4.400 and the implementation costs reflect the much simpler approach of a primary grid, the case becomes more attractive again:



Taking this and assuming a low realistic level of on-going investment comparable to the operations costs, and a 25% saving on that (much will be capacity), the picture looks as this:



As will be seen, the high-level assumptions will shift the case very significantly and a sensitivity analysis can be made at this level. Getting these high-level sensitivities right is a lot more important than doing detailed modelling initially.

Checks needs to be made on key issues like support of spectrum, ability to fulfil spectrum license requirements and the like.

3.5.2 Detailed business case

The step to a more accurate business case, one that can form the basis of a business plan in the form of a network and business plan, is quite big. A full plan includes:

- 1) The actual future grid with a reasonable certainty. Not necessarily a radio plan, but estimates that are at the granularity of the individual site.
- 2) The types, ages and capabilities of individual base station.

- 3) Spectrum support by the base stations.
- 4) Transmission support and requirements.

3.6 Binding and exit

Active RAN sharing requires the networks to be consolidated. This is the basis of much of the saving in site rental, power and equipment. The implication is that if the co-operation is terminated and two networks must be re-established, it requires installing extra base station(s) on each physical location. This is not quite equivalent of building a new nationwide network, but not far off either.

It may be attempted to ensure ability to build a new network on the sites of the joint network, e.g. by ensuring that leases permit extra antennas etc. While being specific for each individual market and operator, normally there are locations like rooftops, where such options are not readily available or very expensive. So while potentially mitigating the impact, there is no mechanism by which re-establishing the situation prior to sharing is viable without quite massive investments.

Looking at general historical evidence, most joint ventures have comparatively short lifetime, particularly relative to the original intend. For network sharing, few have existed for over a decade, and to date no substantial 3GPP based sharing venture has been terminated through an active decision.

For these reasons, it is important to understand the bindings and options, as well as to reflect them accurately into the contract. These are the topics of “intended binding” and “contractual binding” of the next two subsections. Furthermore, it is important to understand the relationship to clauses relating to change of control and the charging model.

Intended binding

Different companies have different philosophies in the respect. The information on the contract in existing agreement at this level of detail is not readily available, but a number of models have been employed, including:

- 1) For co-operations based on a single spectrum license, the term can be corresponding to the duration of the license. This does not really solve anything but leaves the issue open until the expiration of the license. For spectrum that is migrated to other technologies, it can be partly resolved, but not for the physical sites.
- 2) Perpetual co-operation leaving it up to negotiation in case one party wishes to terminate but allowing veto against termination.
- 3) Perpetual co-operation as (2) but with the right to terminate following an arbitration.

- 4) Perpetual co-operation with a model where the exiting party shall design an “A” and “B” case and the other party can choose to become “A” or “B” or reverse the roles and do an “A” and “B” case himself.
- 5) As (3) but attempting to design the separation solution up front.

Fundamentally the question is whether the parties have the right to exit. With some exceptions, this is generally considered the most robust model.

Given that, the question becomes how to exit. Designing the solution up-front appears nice, but looking at the last 10-15 years of development of the telecom industry should induce a healthy respect for the challenge of predicting what a good process will look like at the end of the co-operation.

That leaves options (3) and (4). Option (3) has the advantage of having a third party balance the considerations. The risk of this is that the arbitration may not be optimal in value preservation. Option (4) avoids this, but carries the risk that one of the parties can be in a superior tactical position that makes the process fundamentally unfair.

Contractual binding

Having agreed on how the binding should be, these must be reflected in the contract. There are a few pitfalls in that. Some examples are listed here:

- 1) Mother company guarantees.
- 2) Change of control.
- 3) Commonality of contracting and operational company.
- 4) Relationship to charging model.

A contract for network sharing has a lot of commitments in terms of duration, consolidation project, investments, payment of running fees etc. Such commitments are only valuable if the company entering into the commitments have the ability to honour them. Therefore, depending on the contractual structure, mother companies frequently provide guarantees for the commitments.

Similarly, one wishes to make sure that the mutual commitments are kept, even if the ownership structure of the contracting company changes. Change of control needs to be permitted at relevant levels; of course at the mother group level, but also at the national level.

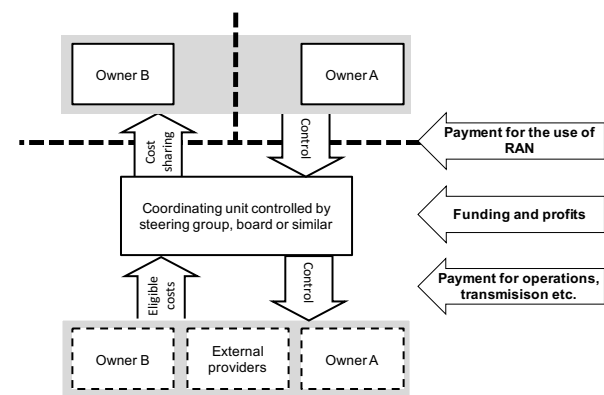
For network sharing it is a typical practical “guarantee” for the beneficial on-going co-operation that the parties have similar interests in running a mobile network. To this end it makes sense to ensure that the contracts tie the contracting company with the company that interfaces with the customers. Situations that should be avoided are that one of

the party sells of its customers without the network or procures a different network and moves the customers to that.

Finally, a charging model with all variable cost is an implicit exit option for a party that wishes to churn out its customer base. For someone ready to quit the market, or accept a significantly lower market share, it could be a way to reduce network costs at the expense of a partner.

3.7 Charging mechanism

The money flows follow the general structure introduced in chapter 1:



In a geo-split operation, the payment for operations etc. goes from the owners to the joint entity (potentially only as a proxy for the invoicing between the parties in very light models). In an operation within the joint entity, the cost is embedded there or comes from an external party. This part should include all cost items.

In case of a geo-split, a form of competition based costing or alternatively fixed pricing should be used wherever possible. Competition is particularly relevant when work can be tendered, e.g. new rollout, large upgrades, transmission etc. This permits an on-going competition for lower prices. However, it does require a high level of maturity in the processes as each party will need the ability to work towards the other or externals via interfaces in the process.

The cost items plus a nominal profit, mandated under most accounting regimes, will be split according to the use of the RAN. For MOCN based sharing, all costs of RAN not related to individual investments should be split with a mechanism having a fixed component and a variable component, e.g. 40% of costs being split 50:50 and 60% according to usage. Usage needs to be measureable and a combination of voice and data use. The split can be converted to a per MB or per minute cost, but the

conversion should take place at least yearly, preferably more often. The reason being that the telecom industry will also in the future find ways to decrease cost per traffic unit and that should be reflected in the cost split model. For transmission, similar models could be used.

For MORAN there are larger portions of the cost base that can be attributed to individual investments, e.g. the parties having different capacity criteria. In such cases, the MOCN model outlined above could be used for the common parts and the rest be seen as individual investments.

Apart from what the parties may wish for, this is also an area where competition authorities may impose limitations.

One important point here is to keep focus on the big picture as it is very tempting to try to make sure that the cost is “fair”. “Absolute fairness” is not viable and should be sacrificed in order to gain simplicity. Even if you strive for simplicity, the model will become complicated and “absolute fairness” will not be achieved in any event. This is one of the areas where it is crucial to focus on the big gains each party gets, not worrying about who gets the 49% and who gets the 51%; you will not get it right even if you try.

As it will be difficult to change once the model is operational, principles for the model should be stated in addition to the actual model. This way it will be possible to work with the model when new possibilities and requirements appear, e.g. pricing QoS classes and technologies like “fair scheduler”.

When setting up the charging model, it should be considered whether unusual events like M&A, wholesale or NRA impacts the co-operation and the charging.

For asset-light co-operations, the issue of balance between investments must be handled. In case of a geo-split of both asset ownership and operations, that can be quite complicated, as the assets balance will be skewed over time. This can be handled by an asset lease charge that compensates for the imbalance or by transferring assets.

Maintaining the asset balance in an asset light model is easier if the operation is joint or the geo-split of operations does not follow the ownership, as the split of operation only has to worry about asset ownership.

3.8 Trading shares

This section is only relevant for an asset-heavy JV, where the balance sheet reflects a substantial value of the network assets.

In such a situation, it may be attractive to sell off parts of the JV in order to gain cash for other investments, in a manner similar to selling off towers to tower companies. While this is perfectly possible, selling the RAN in its entirety is not an obvious choice.

Being a mobile network operator (as opposed to a service provider or MVNO) implies economies of scale inherent in the RAN ownership and strategic control of use of investments. Relinquishing these through sale of shares in the JV will change this.

For the model to be robust, also for a potential buyer, there are at least two options:

- 1) Jointly sell a proportion of the shares that is so small that full control is maintained jointly by the parties with limited minority protection right, e.g. profit levels from the partners.
- 2) Split the shares into privileged and non-privileged shares where the non-privileged only control things like profit levels etc.

In both these situations, the shares will effectively be moderate-yield bonds (although the financial KPIs of course will reflect the difference in share ownership), depending upon the risk profile and profit levels agreed upon.

Other models may exist as well, but using the network share to transition to becoming service provider or MVNO is problematic for all involved; and a knowledgeable investor will also be wary in case such an option exists as his value is critically dependent upon the network containing traffic.

3.9 Staffing and HR

Like in all major undertakings, ensuring appropriate staff is important and challenging. This includes both the initial project and the subsequent staffing of the company and the consolidation project.

3.9.1 Staffing the initial project

The initial project is quite extensive in that it has involves M&A, regulatory, RAN strategy, process interfaces and potentially sourcing, all embedded in a contract that typically becomes fairly complex.

This needs to be managed across two organisations, both of which may resist the change. Typically, vendors are also part of the equation.

Therefore, a robust program management needs to be put in place. Initially, it also requires substantial senior management attention. The project organisation evolves over time from a small group with limited structure up to the closing of the framework agreement into a more formal project structure when real execution begins.

The project should have a “business architect” from each side who at a quite detailed level understands the agreements and the compromises made. This can be the program manager(s), assuming that individuals with sufficient breadth of skills can be allocated.

Quite a lot of the work is generic legal, radio or process work, so a large team of network sharing experts is not necessary. Adding experience from group functions or externally will speed up the process and make the foundation more robust.

When setting up a joint venture, it is in particular beneficial if the team has some entrepreneurial spirit; otherwise the important progress can bog down in more corporate stuff.

For the first two steps of the project, the staffing should be a small, focused group without much internal structure, and preferably with mostly full-time assignments. Later, the work must be expanded into several work streams.

3.9.2 Staffing the company

Similarly, care must be taken when staffing the network company. It is easy to underestimate the complexity of running the co-operation as it often contains small organisations and for asset-light co-operations, also limited assets. However, if the aim is to avoid the parties interacting directly over all matters, some seniority is required.

Furthermore, it is important to recognize that the requirements are very different in the start-up phase from the steady-state running of the company.

In the start-up phase, some entrepreneurial spirit is required as well as robust program management. Subsequently, financial diligence, stakeholder management and steady state operation is required. Particularly in situations where the joint company is not in charge of the operation of the network, the profiles are very different.

While the staff intended for the long term may be part of the initial phase as well, it is important to recognize that starting up the company and running the initial consolidation project are very demanding tasks, and tasks that are not typically handled by the average telecom manager. And people

capable of these tasks may not be motivated by the roles available for subsequent phases.

When staffing the joint company and project, it is also important to be clear on what role the parties play vs. the joint company/project as mismatch of expectations easily occur here. In particular, it is important for the sharing company to understand that it exists to serve the mother companies and does not, at least in the normal case, have business development or other similar activities.

The larger the role of the joint entity, the more important is the choice of senior management for it. Therefore, these must be chosen with care and not necessarily from internal positions. In particular, there should be a “one to fire, two to hire” model, ensuring that the senior management has the tacit support of both parties.

3.9.3 Mother company organisations

Irrespective of the model, the network sharing introduces formal interfaces where they previously were informal or non-existing.

The situation is similar to entering a managed services agreement where the internal staff needs to transition from doing the work to ordering the work formally and managing a contract. Not infrequently, this requires partly replacement of staff.

For a managed services agreement, the implementation of interfaces is enforced by the vendor. If there is no purchase order, no work will be done. SLA and KPI reports appear as part of the vendor’s normal operation etc.

Not so for network sharing, where the interfaces need to be built up. If you have agreed that new sites are only built following purchase orders or that the JV can only decide up to a certain power of attorney, this should be enforced. However, as the people involved are used to information dialogue, making the transition to formality does not come naturally. To avoid embarrassment and potential conflicts the implementation project should pay attention to this dimension of change management.

3.10 Vendor management

Overall, the vendors stand to loose from network sharing: there are fewer base stations to install, fewer rental fees etc. Naturally, and irrespective of what they may say, they will want to recoup some of the losses through extending their scope or pricing the sharing software.

As different operators and operator groups approach vendors very differently, it is important to agree on a uniform approach.

Key items to agree upon include:

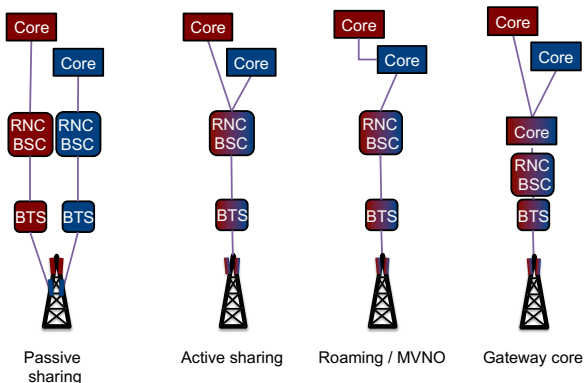
- 1) Who fronts the vendor and how rigidly is it enforced?
- 2) Which contract(s) are used as basis?
- 3) How is a credible threat established – is it an option to do a swap partially or wholly?
- 4) Business case principles, including how write-offs are affecting the business case.

These are mostly standard sourcing items and outside the primary scope of this document. The important thing is to agree upon the rules and adhere to them; the vendors are very good at locating “back doors”.

3.11 Sharing technologies

This section provides a brief overview of sharing technologies. It is not intended to be a primer on the technologies, but as a background for selecting the right solutions from the financial, control and regulatory perspective.

The main options are illustrated below:



The characteristics of each of these are briefly outlined below.

3.11.1 Passive sharing

Passive sharing consists of the sharing of towers, shelters, potentially transmission etc. It has a couple of huge advantages, including almost no strategic binding and ability to better take advantage of cross-border initiatives. In some countries, tower companies provide a structure for such sharing.

For consolidating existing networks, passive sharing has corresponding huge obstacle of not permitting reuse of all sites. Rooftop sites, for instance, very rarely allow a complete new set of antennas. As rooftop sites are part of the complete grid, their limitations impact the ability to consolidate other sites; if an operator already has a rooftop, the business case for moving that to a nearby tower is not necessarily attractive.

In addition, passive does not allow for many of the cost reductions available in active sharing: power, base station costs, operations, installations and in part site rental etc.

For these reasons, consolidating two networks based on passive sharing is typically a challenging business case.

3.11.2 MORAN

MORAN (Multi Operator RAN) is an active sharing technology where all the RAN is shared except the carriers. This means that capacity management is individual, but also that spectrum is not shared and individual carriers must be installed also in low-traffic areas. This permits a higher level of independence, but still works best in tight co-ordination.

As the spectrum is still managed independently, MORAN has the additional advantage of typically being easier from the regulatory perspective.

The independence allowed in spite of the sharing makes MORAN an obvious choice for the situations where less commitment is targeted.

Transmission can be shared or non-shared; typically, the natural way is to share the last few hops and then do the distribution and backbone individually.

3.11.3 MOCN

MOCN (Multi Operator Core Network) is an active sharing technology where also the carriers are shared. This has a number of advantages, including ability to free up spectrum for uses that would not be possible individually, e.g. freeing up 900 MHz spectrum for newer technologies, ability to deploy less hardware in low-traffic areas and the ability to provide higher peak speeds through spectrum aggregation. Finally, MOCN also permits better use of assets that are deployed unevenly prior to sharing. If, for instance, one operator has very good rural coverage and the other has deployed 4G/5G in the cities, the extra hardware required initially is a lot less with MOCN than with MORAN.

In MOCN, all RAN is shared and management must be done jointly.

MOCN is often more challenging to get regulatory approval for. There does not appear to be very good reasons for the resistance towards approving this technology, but regulators tend to be reluctant to permit freeing up restrictions on spectrum. Also, competitors not part of the sharing agreement may try to block relaxation of spectrum restrictions.

Transmission can be shared or non-shared as for MORAN, and the natural solution is similar.

3.11.4 National roaming

National roaming is a technology where one operator provides access in areas where another operator does not have sufficient coverage. The technology is very similar to international roaming and can be extended to a level where the second operator has no coverage at all, in which case it is normally termed MVNO.

In some market, the dominant operator(s) are required to offer national roaming as a service to lower the barrier of entry for new operators.

For a number of reasons, the technology is not very widely used:

- 1) The roaming provider can terminate the agreement and leave the roamer without coverage.
- 2) Although of course a matter for negotiation, the charging model often resembles the one for MVNO, RIC or service providers, i.e. with variable usage. As end-customers increasingly move towards “all you can eat” packages, this leaves the roamer in a challenging position.
- 3) The roaming provider must invest in capacity for the roamer for which no payment will be made in case the agreement is terminated. As the roamer often has coverage in densely populated areas, the load may be quite disproportional in rural areas.
- 4) The core networks need to be connected, and IN services require CAMEL enabled interfaces or other means of ensuring full functionality for the roamer.

National roaming is almost universally implemented with one-way handover, meaning that when the handset of a customer of the roamer is in dedicated mode, handover to the roamers network does not happen.

3.11.5 5G

At the time of writing, the relevant sharing technologies of 5G are similar to those of 4G, i.e., MORAN and MOCN and the governance issues are similar. There are technologies in 5G that in the future may be applied to more granular sharing, in particular slicing. Also, 5G has the ability to be utilized locally for factories, harbours etc. These items will require evolution of agreements in order to manage and charge for the joint resources. To the extent that actual use is clear, it can be embedded in the agreements. Otherwise, it will need to be a set of process governance rules that permits evolution of the co-operation. These can be general or specific to the evolution of 5G that can be foreseen.

3.11.6 Core network sharing

Most regulators do not accept sharing of core networks. Contrary to the resistance towards MOCN, there is some logic to this. At least parts of the core network are product-defining, and therefore a prerequisite for providing competing products.

Sharing of core networks is, consequently, not very common.

4 Contact

This document has been written to share experiences and may be freely distributed as long as its source is referenced.

Obviously, there is a lot more to network sharing than what can be contained in this document. If you wish further perspectives, access to contract templates etc., please feel free to reach out to lars@ra-advisory.dk.