



September 4th, 2009

Increasing efficiency with Network Status Management (NSM)

Munich

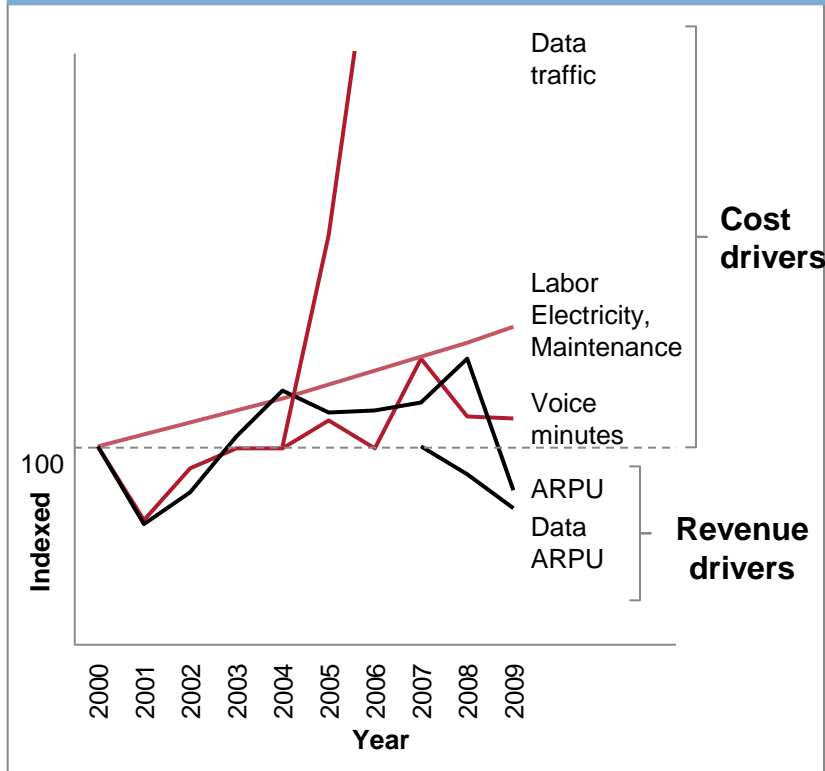
Contents

- **Introduction**
- Financial impact
- Qualitative impact
- Summary and conclusions

Situation of mobile operators

Increasing margin pressure due to declining revenues and an increasing cost base

Cost and revenue drivers of Western European mobile operators



— Cost drivers — Revenue drivers

Pressure to reduce Opex and Capex

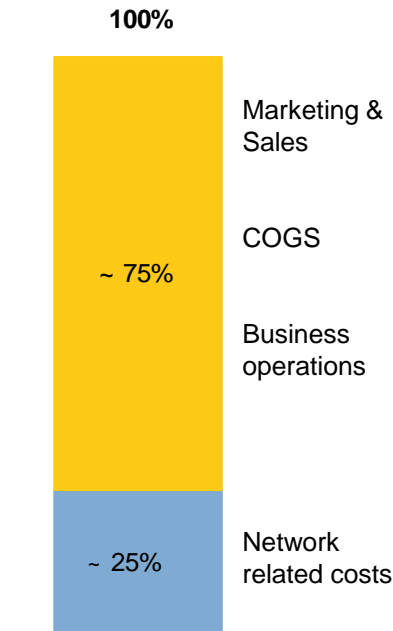
- Margin squeeze due to declining ARPU and increasing Opex
 - Increasing voice and data usage leads to higher backhaul and termination costs
 - Increasing costs for site rents, electricity, wages due to inflation effects
 - ARPU is capped due to flatrates / bundles
- Rollout of new technologies (LTE) leads to increasing number of new sites (grid density) and Capex for new technologies
- Maintain quality of service without increasing costs

Source: Ovum, Informa, World Cellular Information Service, Oliver Wyman analysis

Initiatives to decrease network related costs

Mobile operators have theoretically internal and external options to reduce their network cost base

Opex cost drivers (mature market operator)



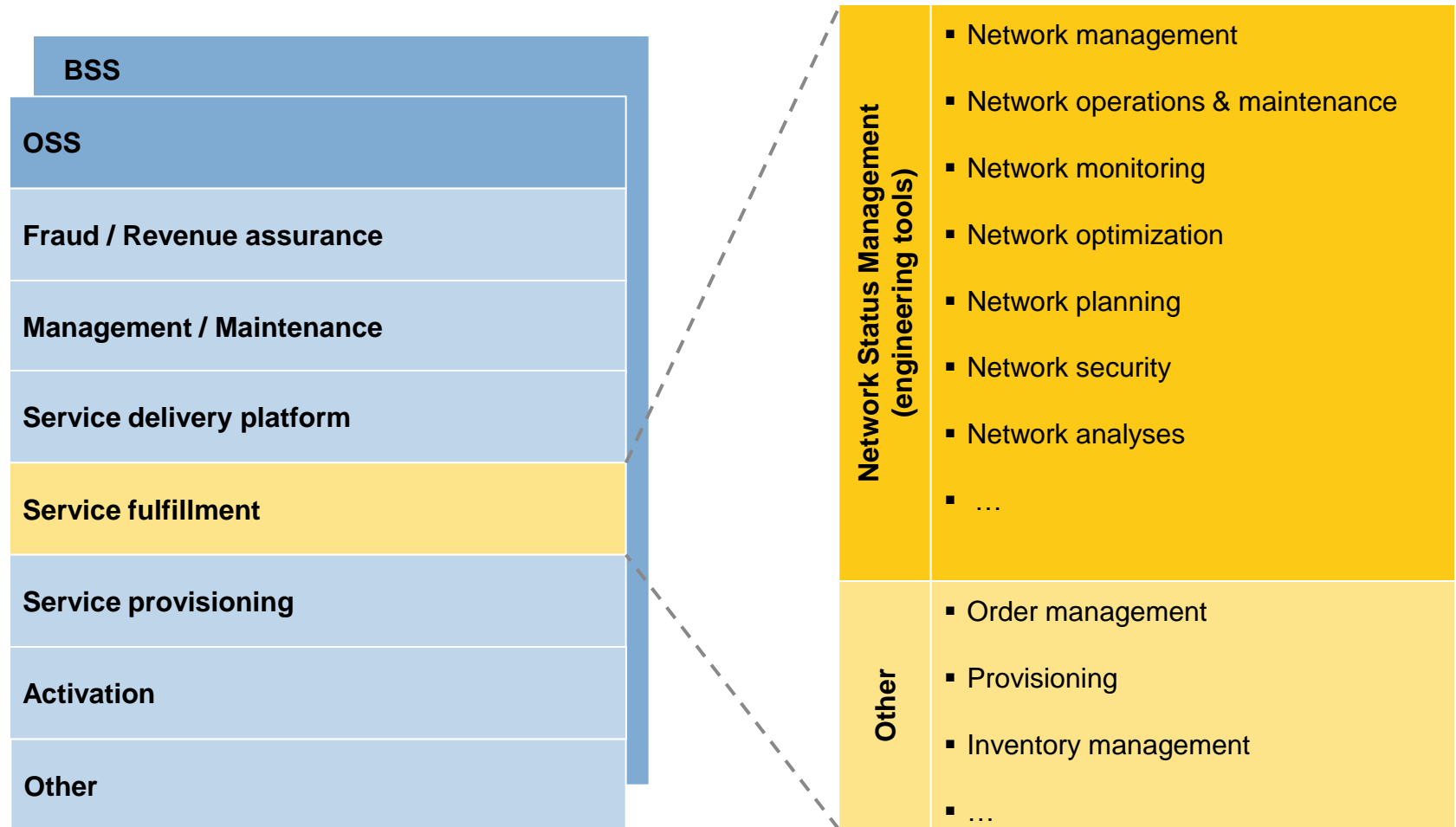
1 Operations support systems
2 Business support systems
Source: Oliver Wyman analysis

	Internal initiatives			External initiatives	
	Internal Initiatives	OSS ¹ / BSS ² Network Status Management (engineering tools)	Outsourcing	Sharing	Sale & lease back
Des-cription	<ul style="list-style-type: none"> Network process standardization, consolidation and automatization Network technology migrations and platform rationalization Feature and tool development 	<ul style="list-style-type: none"> Software and tools to support engineers in increasing the efficiency in network operations / optimization 	<ul style="list-style-type: none"> Outsourcing of the network processes to a outsourcer 	<ul style="list-style-type: none"> Network sharing with competitors 	<ul style="list-style-type: none"> Network asset sale and lease back
Goal	<ul style="list-style-type: none"> Efficiency 	<ul style="list-style-type: none"> Reduction of manual work for operations 	<ul style="list-style-type: none"> Higher process efficiency and synergies provided by the outsourcer 	<ul style="list-style-type: none"> Less existing and new radio network sites in shared network 	<ul style="list-style-type: none"> More favorable valuation of towers Economies of scale

FOCUS OF THIS PRESENTATION

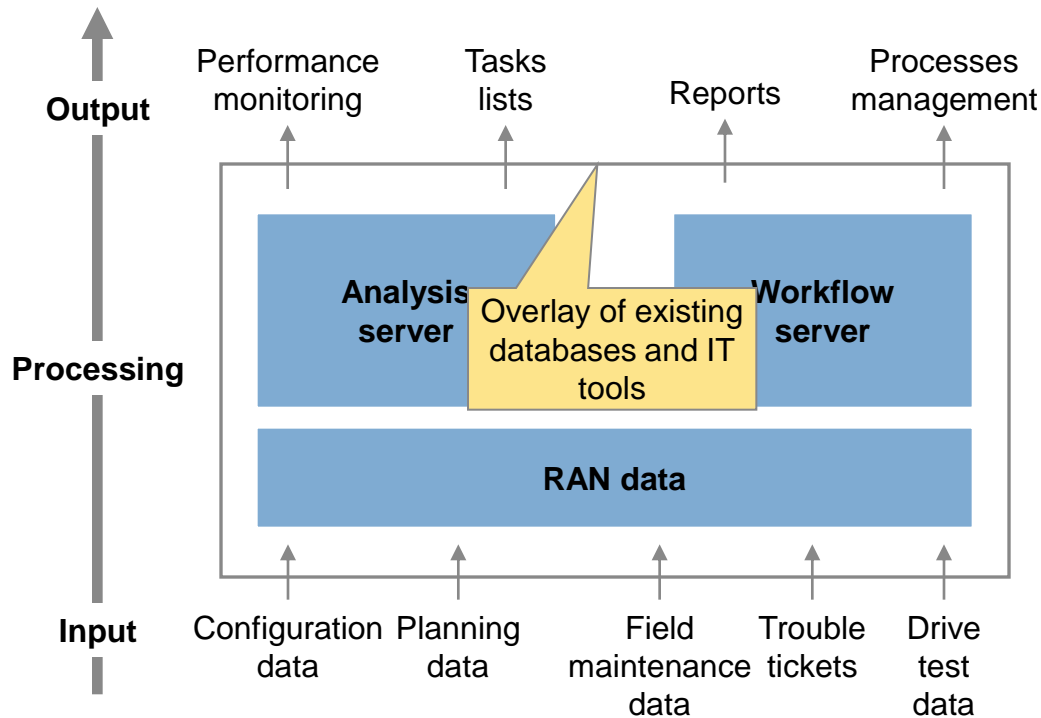
Network Status Management categories

Network Status Management is part of OSS



Network Status Management architecture

Network Status Management overlays existing databases to optimize the network operations



Comment

- **Input:** Collection and consolidation of RAN performance, fault and configuration data into one single data tool; overlay of multiple existing systems
- **Processing:** Use of rules engine and automatic generation of KPIs
- **Output:** Automatic generation of reports (checks, failures, root-cause analysis), issues and tasks creation

Source: Oliver Wyman analysis

Network Status Management outputs and efficiency levers

Network Status Management improves efficiency in three different ways

Output – detailed

- Automated checks and reports
 - Daily checks
 - Quality checks
 - Handovers
 - Traffic volumes
 - Path differences
- Creation of tasks lists and solution proposals for each sector for engineers
 - Prioritization of tasks based on the impact on the network, business and customer
 - Use of task list to drive network analysis and troubleshooting
 - Problem solving tools (maps, charts, statistical data) are provided
- Identification and prioritization of key issues
 - Performance alert
 - Solution support
- Cell optimization

Efficiency levers

1. Automatic data gathering and data analysis (e.g. automated reports) reduces manual work (e.g. look and search in 20 different tools)
2. Prioritization of most important tasks first leads to reduction of task volume
3. Less sites needed as capacity is optimized (e.g. configuration of parameters)

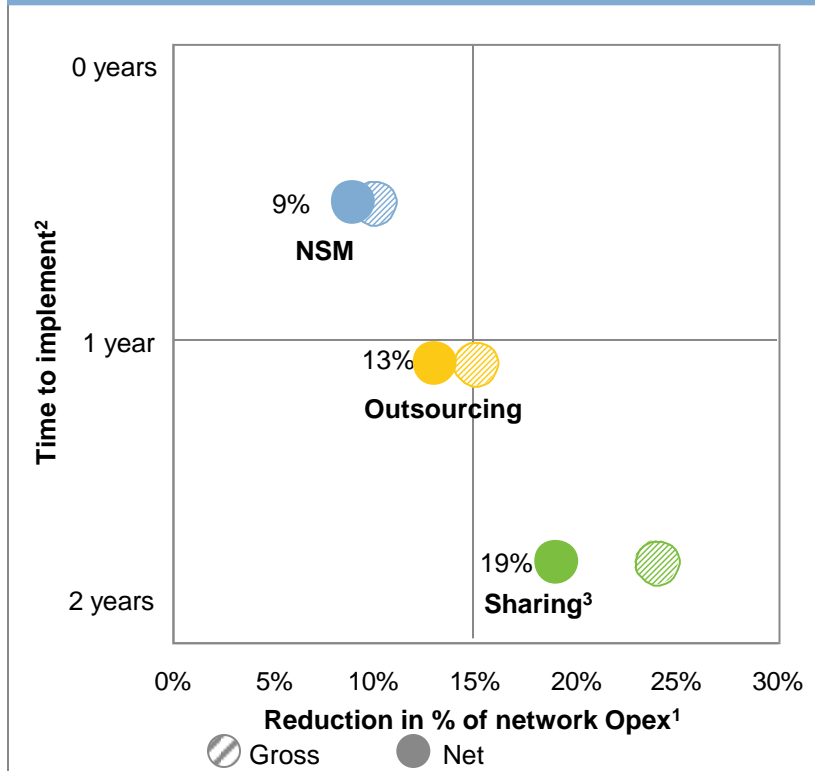
Contents

- Introduction
- **Financial impact**
- Qualitative impact
- Summary and conclusions

Savings overview

Fast gain of savings possible with Network Status Management (NSM)

Gross and net savings over 10 years vs. time to implement (mature market)



Comments

- Sharing with highest savings potential due to site closures and resource sharing, however slower realization
- Outsourcing driven by personnel and rent reduction due to process optimization
- NSM driven by site and network resource reductions, however fast realization

1 Only rent, maintenance, electricity, transmission and network resources

2 Not equivalent to cash-flow breakeven

3 Consolidation case

Note: Discounted gross savings are 10% for NSM, 15% for outsourcing and 24% for sharing

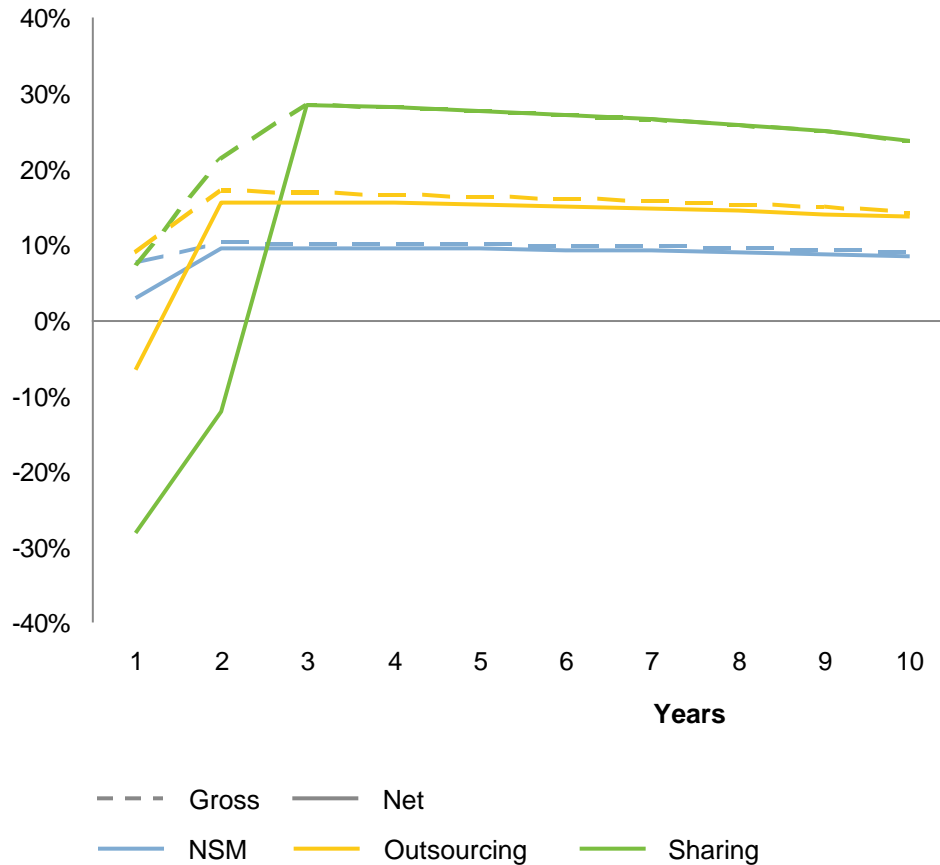
Discounted net savings are 8% for NSM, 12% for outsourcing and 16% for sharing

Source: Oliver Wyman analysis

Cashflow comparison

Sharing and outsourcing with larger upfront costs but higher savings in the long-run

Gross and net savings vs. base case (in % of network Opex)¹



Comments

- Differences between gross and net savings in the first 1-3 years are due to the additional costs of each initiative upfront
- NSM net savings positive from first year – however in the long-run below outsourcing and sharing
- Sharing with highest costs in the beginning but also highest net savings in the long-run
- Outsourcing between sharing and status management in terms of costs and savings

¹ Assumes that traffic is handled by the existing network platforms and increases over time

Gross to net savings comparison

Sharing with highest savings potential due to significant site and personnel reduction

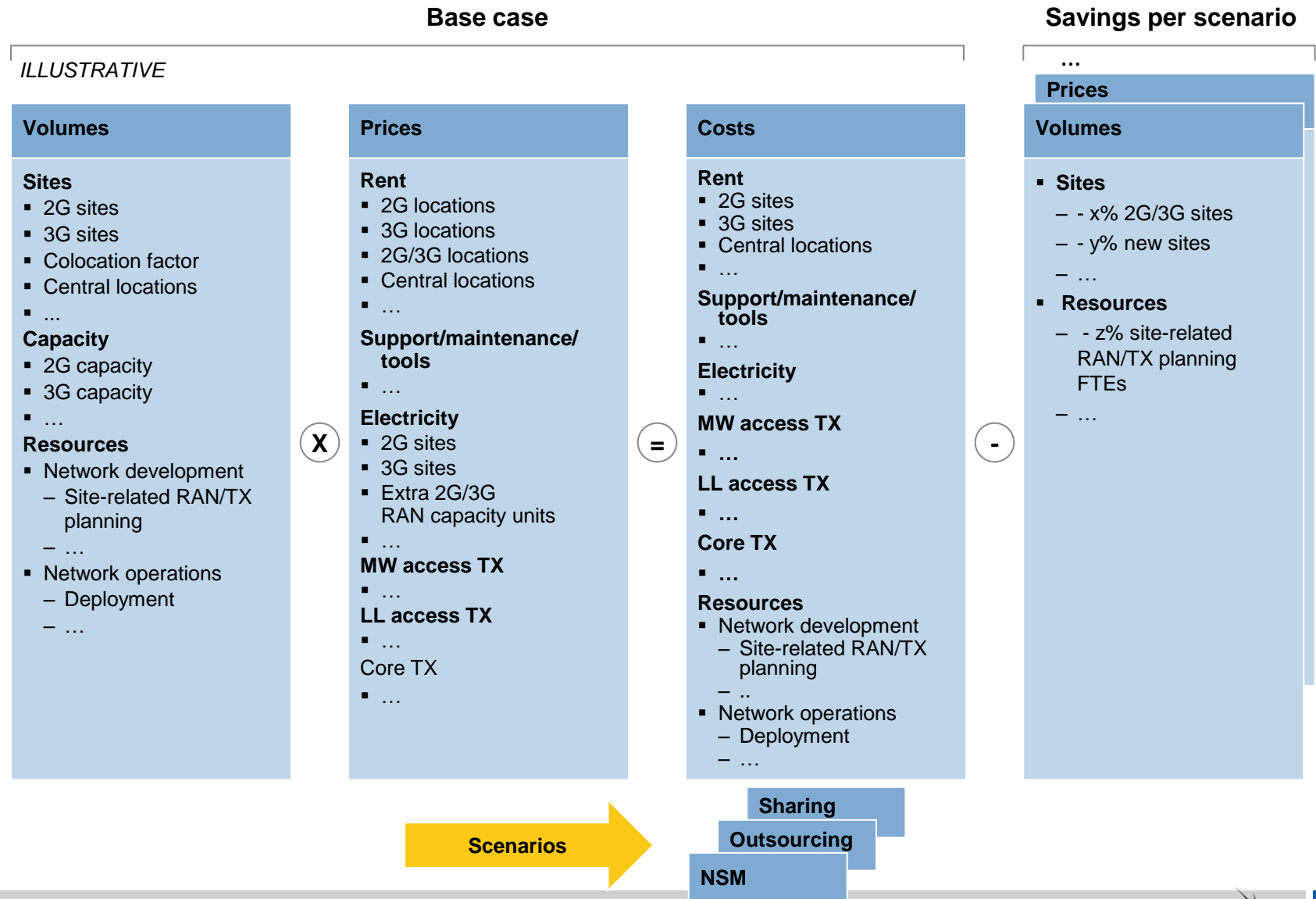
	NSM	Outsourcing	Sharing ¹
Gross savings (over 10 years)	10%	15%	24%
Savings levers	<ul style="list-style-type: none"> ▪ Less resources due to more efficient status management processes ▪ Less sites due to capacity optimization 	<ul style="list-style-type: none"> ▪ Reduced personnel ▪ Reduced rent, maintenance, electricity, transmission 	<ul style="list-style-type: none"> ▪ Sharing of sites (RAN sharing or site sharing) ▪ Sharing of resources
Additional costs (over 10 years)	-1%	-2%	-5%
Cost levers	<ul style="list-style-type: none"> ▪ System and maintenance fees ▪ Redundancy costs 	<ul style="list-style-type: none"> ▪ Outsourcing fees ▪ Retained organization for vendor management ▪ Redundancy costs 	<ul style="list-style-type: none"> ▪ Transformational costs (sites, equipment) ▪ Redundancy costs
Net savings (over 10 years)	9%	13%	19%
ROI² multiple	9.1	5.5	3.0

1 Consolidation case; sharing has additional Capex upsides (not included)

2 Based on 10 years

Financial advantages comparison

The savings have been calculated bottom-up with a volume / price model



Gross savings over 10 years – NSM

Savings levers are highest in maintenance and resources

	Network Opex	Costs in % of Opex	Gross savings	Savings levers
Savings	Rent	26%	-5%	<ul style="list-style-type: none"> Less sites due to capacity optimization of sites (e.g. parameter configuration)
	Support / maintenance / tools	9%	- 14%	<ul style="list-style-type: none"> Less tools needed due to overlay of systems
	Electricity	21%	-5%	<ul style="list-style-type: none"> Reduced electricity due to lower number of sites
	MW access TX	5%	-3%	<ul style="list-style-type: none"> Reduced transmission due to lower number of sites and optimization
	LL access TX	3%	-1%	<ul style="list-style-type: none"> Reduced transmission due to lower number of sites and optimization
	Core TX	2%	0%	<ul style="list-style-type: none"> -
	Resources	33%	-19%	<ul style="list-style-type: none"> Reduction of network operations engineers possible due to faster data gathering, analysis and prioritization of tasks <ul style="list-style-type: none"> – High efficiency gain in network optimization due to time savings of data gathering and analysis – Medium efficiency gain in network field source due to less tasks and prioritization of tasks – Low efficiency gain in NOC and planning
	▪ Network development		-26%	
	▪ Network operations		-15%	
Total			-10%	

Gross savings over 10 years – Outsourcing

Savings levers are highest in maintenance and resources

	Network Opex	Costs in % of Opex	Gross savings	Savings levers
Savings	Rent	26%	-5%	<ul style="list-style-type: none"> Reduction of rental contract prices
	Support / maintenance / tools	9%	-19%	<ul style="list-style-type: none"> Reduction of support / maintenance contract fees Tool consolidation
	Electricity	21%	-5%	<ul style="list-style-type: none"> Reduction of electricity fees
	MW access TX	5%	-5%	<ul style="list-style-type: none"> Optimization of MW access links
	LL access TX	3%	-5%	<ul style="list-style-type: none"> Reduction of LL fees
	Core TX	2%	-5%	<ul style="list-style-type: none"> Optimization of core TX (e.g. consolidation)
	Resources	33%	-36%	<ul style="list-style-type: none"> Pooling of resources Renegotiation of contracts (hours, pay)
			-31%	<ul style="list-style-type: none"> Network development
			-39%	<ul style="list-style-type: none"> Network operations
Total			-15%	

Gross savings over 10 years – Sharing







Savings levers are across many areas due to a significant reduction of the site number

	Network Opex	Costs in % of Opex	Gross savings	Savings levers
Savings	Rent	26%	-20%	<ul style="list-style-type: none"> ▪ Less rentals (reduction of sites) ▪ Less new sites needed (joint roll-out)
	Support / maintenance / tools	9%	-26%	<ul style="list-style-type: none"> ▪ Less sites
	Electricity	21%	-18%	<ul style="list-style-type: none"> ▪ Less sites ▪ Counter-effect: More electricity for remaining sites
	MW access TX	5%	-18%	<ul style="list-style-type: none"> ▪ Less sites ▪ Counter-effect: More traffic on remaining sites
	LL access TX	3%	-5%	<ul style="list-style-type: none"> ▪ Less sites ▪ Counter-effect: More traffic on remaining sites
	Core TX	2%	0%	<ul style="list-style-type: none"> ▪ -
	Resources	33%	-39%	<ul style="list-style-type: none"> ▪ Joint network organization
	▪ Network development		-40%	
	▪ Network operations		-39%	
Total			-24%	

Overlap analysis between different initiatives

Combining either outsourcing or sharing with Network Status Management shows some overlap but still increases the savings

Size of overlaps and combined savings

Network Opex	NSM  Outsourcing	NSM  Sharing
Site-related savings¹	 <ul style="list-style-type: none"> Capacity optimization of sites with NSM does not overlap with outsourcing 	 <ul style="list-style-type: none"> Capacity optimization of sites with NSM overlap with large scale reduction of sites with sharing
Resource-related savings²	 <ul style="list-style-type: none"> Resource efficiency gains from NSM overlap with those from outsourcing 	 <ul style="list-style-type: none"> Resource efficiency gains from NSM do not strongly overlap with resource savings from lower number of sites with sharing
Gross savings³ (over 10 years)	20%	29%
Additional costs (over 10 years)	<ul style="list-style-type: none"> Costs assumed to be additive 	
Net savings³ (over 10 years)	17%	23%

Overlap of initiatives



1 Impacting rent, electricity, support / maintenance / tools, electricity, MW access TX, LL access TX, core TX

2 Impacting network development, network operations

3 Savings are not additive between the two respective initiatives

Example: Net savings NSM + Outsourcing

- If NSM is implemented initially and outsourcing later on, net savings will amount to 9% initially and additional 8% later on
- If outsourcing is implemented initially and NSM later on, net savings will amount to 13% initially and additional 4% later on as some savings have been transferred to outsource partner

Contents

- Introduction
- Financial impact
- **Qualitative impact**
- Summary and conclusions

Qualitative criteria








On top of financial aspects, Network Status Management shows many qualitative advantages when compared with outsourcing and sharing

	Description	NSM	Out-sourcing	Sharing
Option value / flexibility	<ul style="list-style-type: none"> Ability to combine with other initiatives 			
Level of control	<ul style="list-style-type: none"> Ability to determine solution autonomously Control over quality of service, technology strategy 			
Ease of implementation	<ul style="list-style-type: none"> Solution is easy to implement and there is little risk of a failure 			
Speed of implementation	<ul style="list-style-type: none"> Solution can be implemented fast 			
Competitive advantages	<ul style="list-style-type: none"> Technology enables/allows competitive advantages No risk of disclosing information 			
Future viability	<ul style="list-style-type: none"> Ability to launch and control new technologies Ability to exit 			
Overall				

○ Low ● High

Qualitative – NSM















Network Status Management can be implemented fast and can be a complement to the other initiatives

Option value / flexibility	<ul style="list-style-type: none"> ▪ NSM can be applied as add-on to other initiatives ▪ Multi-vendor capable system 	▶ 
Level of control	<ul style="list-style-type: none"> ▪ Oversight of radio engineer, higher centralization possible ▪ High-level of control of network operations as last instance remains the operator ▪ Full control over rent, sites and transmission 	▶ 
Ease of implementation	<ul style="list-style-type: none"> ▪ Overlay of existing systems and retrieval of data from existing databases ▪ Little to no risk of failure 	▶ 
Speed of implementation	<ul style="list-style-type: none"> ▪ Less than 12 months, depending on the complexity of the existing systems, and on the number of status management applications/ customizations being implemented 	▶ 
Competitive advantages	<ul style="list-style-type: none"> ▪ Little risk of disclosing competitive information (e.g. site configuration, performance) 	▶ 
Future viability	<ul style="list-style-type: none"> ▪ All future technologies can be applied on top ▪ System is relatively flexible, can be enhanced for newer versions 	▶ 
Overall		▶ 

○ Low ● High

Qualitative – Outsourcing

Outsourcing is a relatively lengthy process and difficult to reverse

Option value / flexibility	<ul style="list-style-type: none"> ▪ Difficult to start other initiatives after outsourcing ▪ Exit scenario has to be agreed up-front – penalties might apply 	 
Level of control	<ul style="list-style-type: none"> ▪ Influence limited to agreed level (e.g. maybe no freedom in choice of support systems) ▪ KPIs have to be measured and evaluated (e.g. coverage, quality, O&M) on a regular basis ▪ Risks of increasing variable costs to maintain service level (out of scope activities) 	 
Ease of implementation	<ul style="list-style-type: none"> ▪ Complex process due to identification of RFP, pricing matrix, retained organization, planning, testing ▪ Potentially critical situations during the transition/transformation phase 	 
Speed of implementation	<ul style="list-style-type: none"> ▪ Long process as many parties are involved and have to be coordinated 	 
Competitive advantages	<ul style="list-style-type: none"> ▪ Information outflow (RFP) involves risk of disclosing competitive advantages ▪ A controlling body e.g. network performance board monitors KPIs 	 
Future viability	<ul style="list-style-type: none"> ▪ Influence on future technologies depends on contractual agreements and relationship to outsourcer 	 
Overall		 

○ Low ● High

Qualitative – Sharing

Sharing has e.g. the risk of disclosing information to a competitor – moreover the operators need to align on certain joint objectives

Option value / flexibility	<ul style="list-style-type: none"> ▪ Clear exit conditions (e.g. unilateral exit only after minimum period with notice period and compensation) 	▶
Level of control	<ul style="list-style-type: none"> ▪ Clear tasks and responsibility splits necessary ▪ Operators to a certain degree lose autonomy and need to align on certain joint objectives regarding network evolution ▪ Risk of not achieving savings with shared entity 	▶
Ease of implementation	<ul style="list-style-type: none"> ▪ Migration can get complex due to different technologies (e.g. different vendors) and due to complex migration/cut-over processes 	▶
Speed of implementation	<ul style="list-style-type: none"> ▪ Long process due to tax, legal, financial, governance and technical specifications ▪ Best-practice picking 	▶
Competitive advantages	<ul style="list-style-type: none"> ▪ Robust governance structures necessary and clear escalation for change request procedures to be agreed in contract ▪ Transparent reviews of costs splits, old figures should stay until new ones agreed 	▶
Future viability	<ul style="list-style-type: none"> ▪ High-quality network possible if managed with consistent KPIs ▪ Demand driven upgrade of shared equipment necessary 	▶
Overall		▶

○ Low ● High

Contents

- Introduction
- Financial impact
- Qualitative impact
- **Summary and conclusions**

Summary and conclusions

Network Status Management (NSM) offers financial and qualitative benefits also compared to outsourcing and sharing

Concept

- NSM is a system to support engineers in network operations and network optimization
- NSM reduces manual work and improves network efficiency by
 1. Automatic data gathering and analysis
 2. Prioritization of most important tasks
 3. Less sites due to capacity optimization

Financial advantages

- Mobile operators can reduce their network Opex with NSM by net 9%
- NSM has relatively little investment and thus shows a high return on invest multiple of more than 9

Other qualitative aspects

- NSM can be implemented fast and be applied on top to other initiatives
 - Less than 12 months for implementation
 - Future technologies and other initiatives can be applied on top (e.g. outsourcing, sharing)



OLIVER WYMAN



MARSH MERCER KROLL
GUY CARPENTER OLIVER WYMAN