OLIVER WYMAN

August 26th, 2009

Opportunities with self organizing / self optimizing networks (SON)

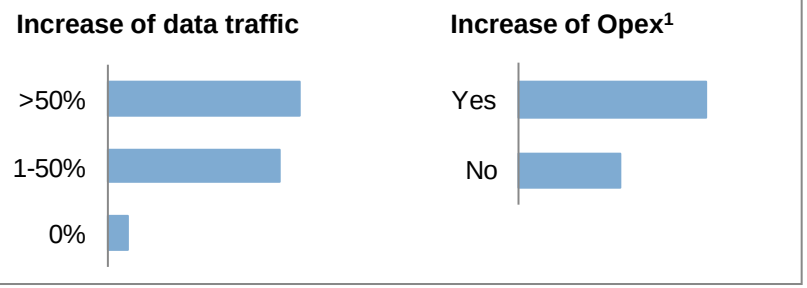
Munich

RESEARCH SPONSORED BY actix

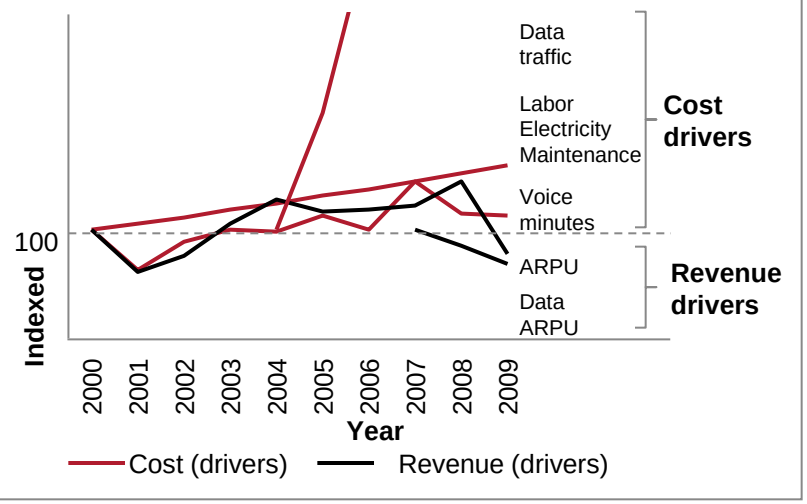
Initial situation

By rolling out LTE, mobile operators will face even stronger cost pressures

Expected LTE impact (survey, mobile operators)



General cost pressures



Pressure to act

- Rollout of new technologies (LTE) leads to increasing number of new sites (grid density) and Capex for new technologies
- 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 flat-rates/bundles
- Maintain quality of service without increasing costs

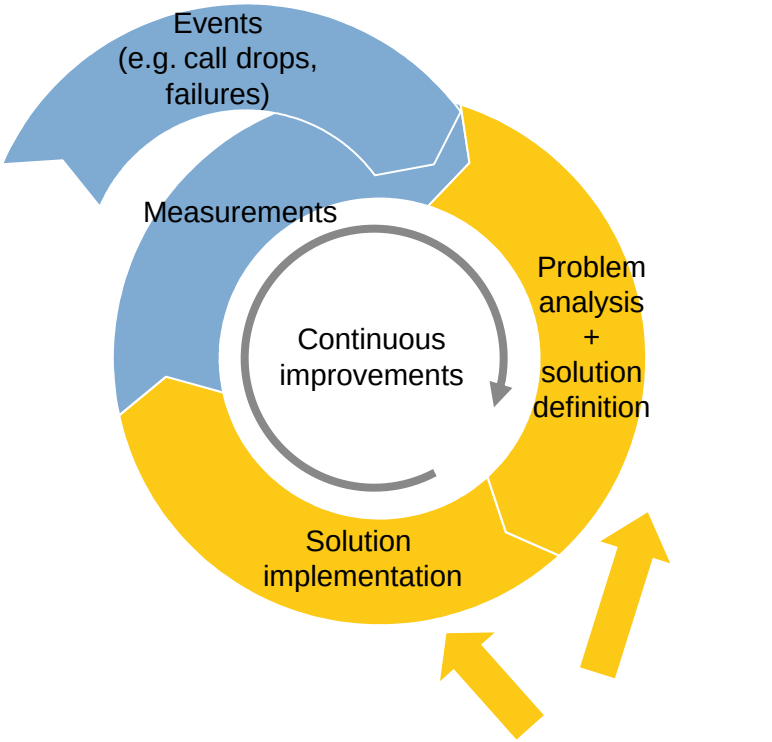
1 In absolute terms not relative (e.g. per Gigabyte)

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

SON introduction

Self optimizing networks (SON) goal is to continuously improve the network and to reduce the cost base

Network optimization lifecycle



Automated by SON
(Self configuration, self optimization, self healing)

Self optimizing networks (SON)

- Self optimizing networks are an essential part of the LTE technology, but also available for 3G/2G networks
- SON has been defined and harmonized by the 3GPP Release 8 specifications in a series of standards
- SON includes automatic configuration, optimization and healing of networks based on algorithms and remote implemented changes

Goal

- Accelerate rollout of LTE and extension networks through automatic configurations
- Improve capacity and network performance (e.g. trend detection of traffic, optimal setting, achieving peak performance, reducing failures)
- Reduce manual effort by reduction of human involvement (e.g. reduce unplanned site visits, maintenance costs)

LTE:
- Increase of downlink and uplink rate to 50-100 Mbit/s
- Improved mobility up to 350 km/h
- Spectrum flexibility (1.4, 2.5, 5, 10, 15 and 20 MHz)

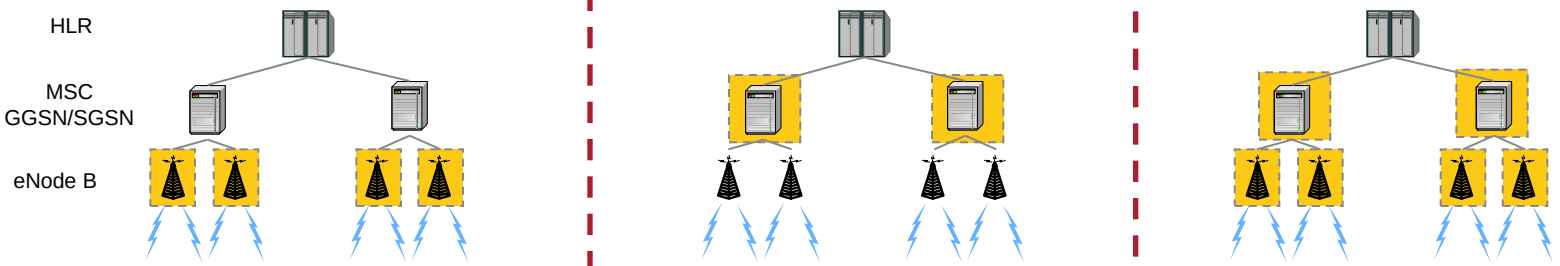
RESEARCH SPONSORED BY actix

SON architecture

SON functionalities differ heavily between centralized and distributed architecture

FOCUS OF PRESENTATION

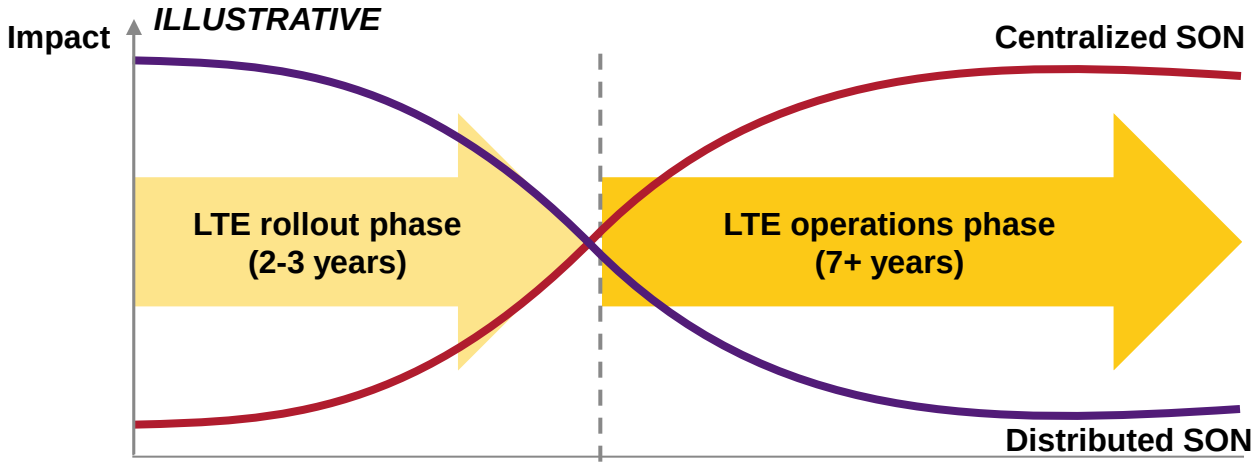
	Distributed	Centralized	Hybrid
	▪ SON system is distributed in each node – however cells communicate with each other	▪ SON system is centrally executed at the network management level ▪ Multiple cells involved ▪ All data flow into and out of the network management level	▪ SON is executed partly at the network operations and partly at the cell level
+	▪ Fast and flexible updates ▪ Short term statistics	▪ Multi-vendor solution ▪ Stable and easy to implement ▪ Addressing multiple cells	▪ “Best-of-breed”
−	▪ Addressing only one cell ▪ Higher implementation effort	▪ Longer update ▪ All data has to be forward on a central level	▪ More complex handling



SON

Centralized vs. distributed SON

SON offers advantages both in the introduction as well as in the operations phase – centralized SON systems focus on the operations phase



Rationale	▪ Distributed systems have advantages in configuration of single sites	▪ Centralized systems are more efficient for an optimization decision (e.g. healing) as they have the view of many sites within an area
Main efficiency levers	▪ Automated planning ▪ Self configuration of cells	▪ Reduced field maintenance due to self-healing ▪ Power savings due to automatic configuration ▪ Improved network quality – Reduced failures – Adoption of future subscriber behavior ▪ Less sited due to coverage optimization
Effect	**One-off savings**	**Continuous savings**

Functionalities of SON (selected)

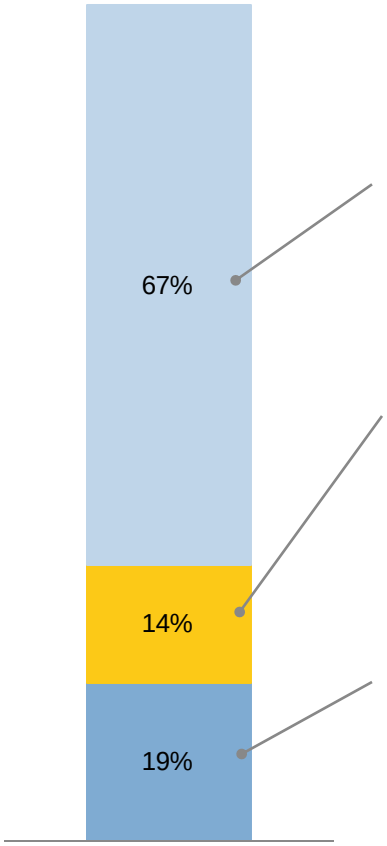
SON offers a wide range of efficiency and quality benefits

	Self configuration	Self optimization	Self healing
Description	▪ Status management and automated reports ▪ Self-configuration of new sites and introduction of new services to existing sites e.g. cell parameter and coverage re-configuration	▪ Parameter measurement and re-configuration ▪ Neighbor discovering and exchange of information (incl. re-configuration)	▪ Root-cause analysis for failures ▪ Automatic detection of failures ▪ Automatic adjustment of parameters
Benefits (selected)	▪ Faster cell planning and rollout ▪ Reduction of manual work for new sites / services ▪ Coverage optimization	▪ Reduction of interference ▪ Hand-over optimization ▪ Coverage optimization and capacity enhancement	▪ Reduction of manual work for failures ▪ Reduction of failure possibilities ▪ Automatic detection and removal of failures

Costs of network development and operations

Due to these efficiency gains SON can reduce OPEX in all network areas

Network related Opex (mature market)



Cost drivers		SON efficiency levers (selected)
Non-resources		
▪ Rent	-	▪ -
▪ Support/maintenance/tools	✓	▪ Root-cause analysis, removal of failures,…
▪ Electricity	✓	▪ Adoption of electricity to minimum,…
▪ Transmission	-	▪ -
Network development		
▪ Planning	✓	▪ Automatic configuration, frequency planning,…
▪ Optimization	✓	▪ Automatic coverage optimization, neighbor detection, optimize interferences, handover optimization, …
Network operations		
▪ Deployment	✓	▪ Automatic configuration, automatic updates, …
▪ Field service	✓	▪ Automatic configuration and removal of failures,…
▪ NOC	-	▪ -
▪ Central support	-	▪ -

D-F

Market player capabilities for SON systems

Centralized SON systems are sold mostly by smaller equipment vendors, independents and IT vendors

		Large equipment vendors	Small equipment vendors	Independents	Established IT vendors
Vendor examples		Nokia Siemens Networks; ERICSSON	Alcatel·Lucent; MOTOROLA	amdocs; actix	ORACLE; IBM
Business model and SON capability		▪ General telecom equipment vendors ▪ Focus on selling own equipment and providing add-on services/systems ▪ Leverage of client base and brand	▪ General telecom equipment vendors ▪ Focus on selling own equipment and on top multi-vendor services/ systems ▪ Leverage of client base and brand	▪ Selling software as a stand-alone ▪ Leverage of specialist know-how ▪ Independent companies selling multi-vendor systems	▪ Established IT companies offering multi-vendor software solutions ▪ Leverage of client base, brand and software know-how
Supplying centralized SON	**Strengths**	▪ Deep insights into own LTE equipment	▪ Multi-vendor focus for systems and software ▪ Deep insights into LTE equipment	▪ High flexibility and multi-vendor focus ▪ Specific know-how and development of innovative algorithms	▪ Deep software / IT know-how ▪ Scale advantages
	Weak-nesses	▪ Broad offering of OSS and BSS software – no focus on centralized SON ▪ Lack of multi-vendor know-how	▪ Only broad offering of OSS and BSS software – not too specialized	▪ Focus on few areas of applications / tools only	▪ Only broad offering of OSS and BSS – not too specialized ▪ No network knowledge

OLIVER WYMAN

MARSH MERCER KROLL
GUY CARPENTER OLIVER WYMAN