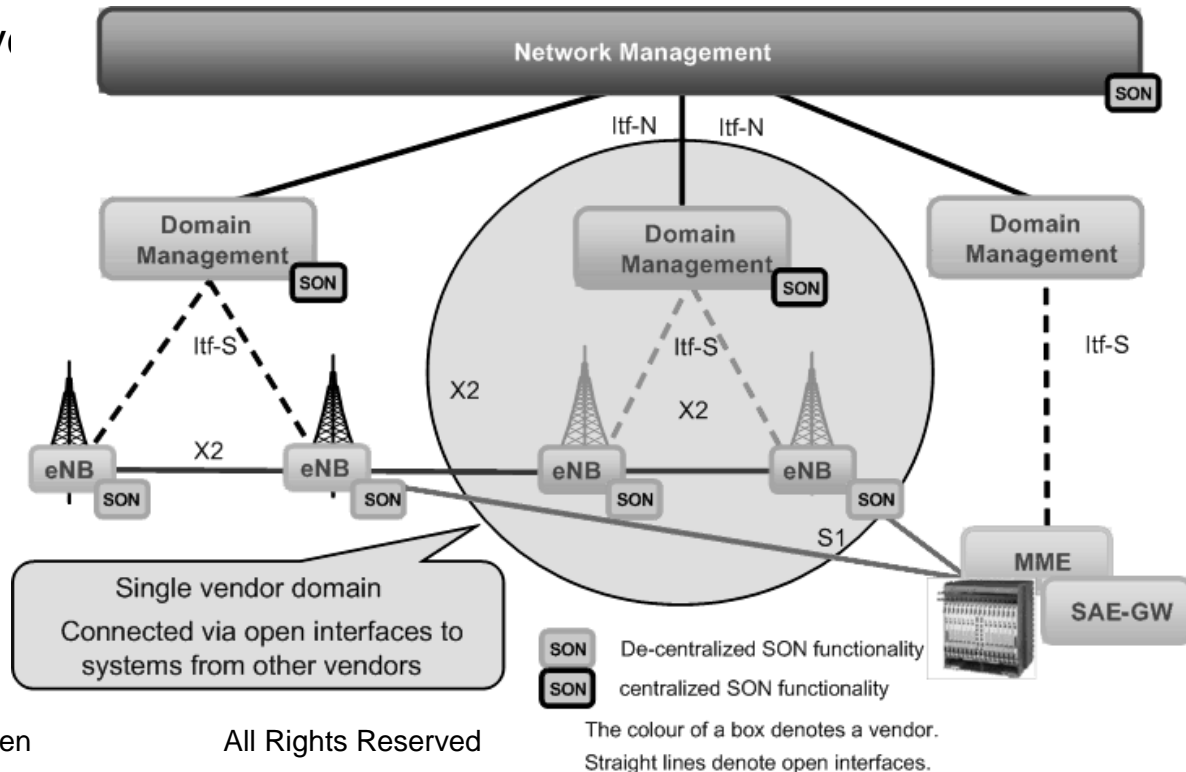


# **SON Architecture**

## **Chapter 3.4**

# SON functions in OAM architecture

- In OAM architecture NE element is managed with vendor specific Element Manager
- Different vendor domains are managed with uniform way via Itf-N at the network management level
- SON function can reside at different levels:
  - Network management level (centralised)
  - Domain management level
  - Network element level (distributed, local)
  - A combination of above (hybrid)

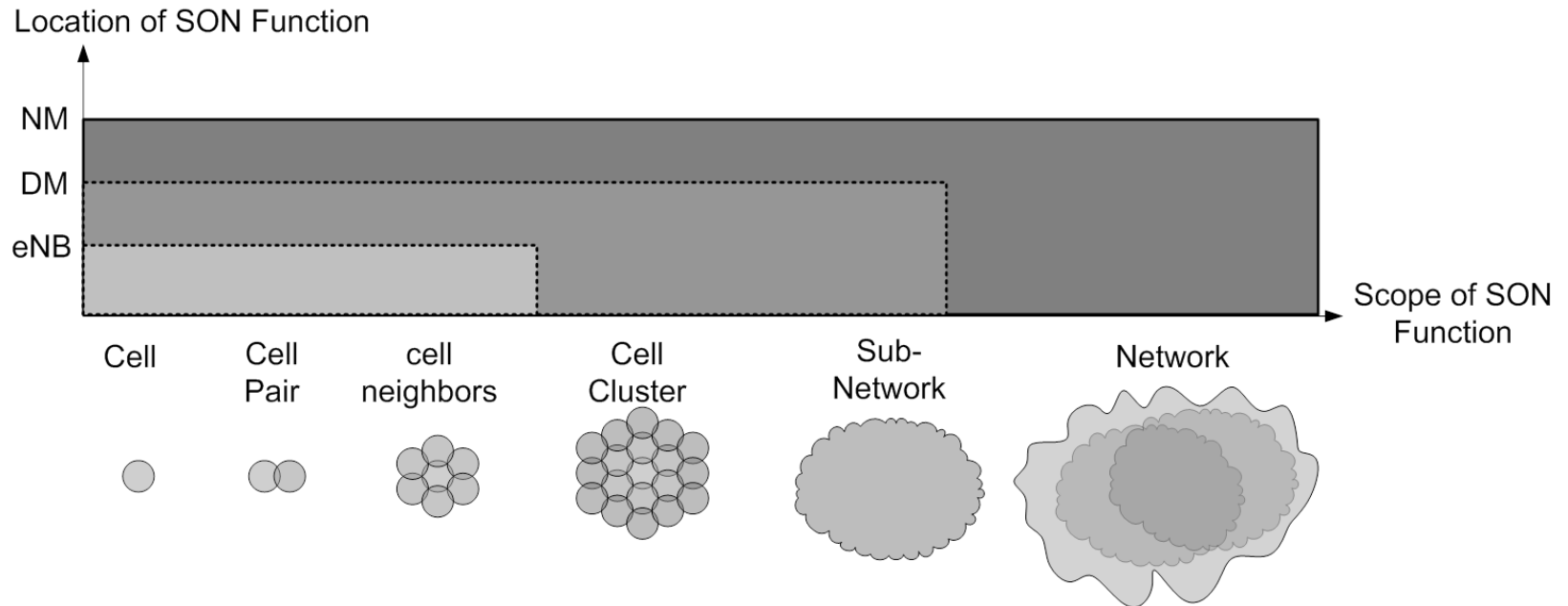


# Criteria for selecting location for SON function

## Use case related criteria

- **Spatial scope**

- functions with network-wide scope (covering multiple vendor domains) are natural to locate at the NM level
- functions having a rather limited scope like a cell pair are natural executed on the NE, because the function is driven by data already available on two Nes
- Technically other approaches could be selected



# Criteria for selecting location for SON function

## Use case related criteria

### Timing requirements

- SON functions have very specific time intervals in which they acquire data, execute and request reconfigurations of Nes
  - SON functions requiring relatively frequent data acquisition and execution advocate more a distributed location of functions, while
  - Functions which rarely execute should be realised in a centralised way

### Amount of data / processing required

- NE resources for processing are usually limited due to the relatively high cost of installing memory and processing power in NE when comparing to the DM / NM level → centralised realisation
- transfer of data mentioned above from the NE to the DM /NM level consumes OAM bandwidth and causes delay → distributed approach

# Criteria for selecting location for SON function

## Use case related criteria

### Standardised vs proprietary parameters

- Standardised parameters
  - E.g. 3GPP, IETF, ATM Forum
  - These parameters have common semantics across all vendors thus they can be configured and optimised independently from the vendor
- Vendor specific parameters for call processing features
  - Parameters related to vendor specific algorithm logic – e.g. handover algorithm logic
  - Cannot be mapped and therefore optimised across vendors
- Vendor specific parameters low level HW and internal properties of the NE
  - Usually set during commissioning
- Standardised parameters cover 10 – 20 % of all parameters, while vendor specific parameters count 80 – 90 % of all

# Criteria for selecting location for SON function

## Use case related criteria

### Decision making

- Centralised decision making based on inputs from several NEs is usually straightforward
- Distributed decision making needs to be carefully planned and controlled to avoid classical concurrency issues in distributed systems like oscillations, race conditions and deadlocks
- Distributed decision making may work efficiently for spatial scopes like a cell cluster, but may not scale to, e.g., domain-wide tasks

# Criteria for selecting location for SON function

## System level criteria

### Scalability

- SON functions usually have a scope up to a cell cluster-level
- There is an upper bound on the number of NEs which can be treated within a centralised administrative OAM/SON domain
- ➔ For scenarios with a very high number of Nes it may be required to introduce an additional (DM) level of hierarchy to improve scalability
- In a distributed SON approach, no additional such means are required

### Reliability and availability

- In the centralised SON approach contains with the DM-/NM-level entities a single point of failure
  - OAM system which usually already contains redundancy mechanisms like server clustering to improve reliability and availability
- In the distributed approach has some inherent redundancy being a distributed system

# Criteria for selecting location for SON function

## System level criteria

### Multivendor capability

- At the DM-level only a proprietary integration is possible
- NE- and the NM-level provide for 3GPP-standardised multi-vendor integration
  - SON-related standardisation for NEs is oriented along the call processing standardisation
    - The interoperability regarding the exchange of data is assured
    - This comes at the price of a rather long standardisation process
  - NM-level standardisation for SON is faster but to leaves more room for vendor-specific interpretation
- In general, the interoperability regarding algorithms inside SON functions is not directly covered in the standards



# Criteria for selecting location for SON function

## System level criteria

### Management and controllability

- Operator control for SON systems is needed
  - Operators want to monitor what SON functions are doing
  - New operational workflows have to be realised by the combination of SON functions with existing (human-level) workflows
- Both requirements are facilitated by a centralised approach
  - All the SON-related data and the automated SON decision making is co-located with the execution location of both aspects
- In a distributed approach, however, specific additional instrumentation of SON functions is required

# Criteria for selecting location for SON function

## System level criteria

### Extensibility

- Centralised approach provides a single entry point for doing upgrades for the existing SON functionality and adding new SON functions

### System legacy and lifecycle

- Evolution paths to SON functions are possible from both the RRM as well as the network optimisation tool domains
  - If an existing optimisation tool is evolved into a set of SON functions, the natural architecture choice will be centralised SON
  - If RRM functions serve as the baseline for a SON function, the approach will typically be a distributed one

# Quiz

Where SON function should be located for the following use cases and Why?

Automatic Neighbor Relations

QoS Optimization

Minimization of Drive Test

Handover Optimization

Load Balancing

Cell Outage Compensation

Energy Saving

Common Channel Optimization

