

## CLARIFYING THE MISCONCEPTION OF CLOSED-LOOP SON

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“Does your SON work in a closed-loop fashion?” Is a question frequently asked today by wireless operators in almost all operator-vendor dialogues. Closed-loop SON is one of the main promises of automated Centralized SON (C-SON) solutions and is sometimes a mandatory requirement from operators. It is therefore an essential attribute in any solid SON offering.

In most cases, when the vendor answers “of course” have they truly understood the full intent of what the operators are asking or is Closed-loop SON missing a critical aspect?

### The Mirage

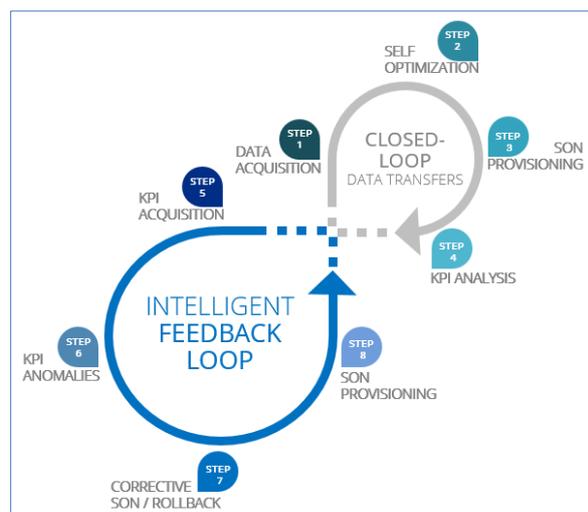
A Closed-loop SON would have the ability to automatically receive parameter network sets, run optimizations and then provision parameter set adjustments back onto the network – automatically and faultlessly. This loop part of a C-SON integration with vendor OSS, is the basic foundation of any C-SON solution ensuring the automation of coordinated SON activities.

But does this truly define what Closed-loop SON is?

### In Reality

The true meaning of Closed-loop SON is actually much broader. It isn't just the configured connections that allow for the closed-loop data transfers, but rather a wider network-centric approach, which continuously seeks for anomalies in network performance. Closed-loop SON can only be completed when realizing corrective C-SON techniques, which consider the current level of network performance degradation, while comparing normal traffic pattern behaviors.

Parameter changes will have a direct impact on network performance. With that said, any C-SON parameter adjustment applied on the network will affect the network performance for the sector and its surroundings, in some way, positively or in some cases negatively. In order to carry out the next phase of successful optimization, and avoid negative impact to the network, C-SON is first requested to verify the positive effects of the latest parameter changes by analyzing the network health, usually through network KPIs.



A C-SON solution has to recover from a degraded network performance situation automatically. It can do this by either reverting back to a healthy network snapshot or applying corrective SON activities.

In the event where the expected results are not met, for example the KPIs are indicating a deterioration of network coverage, then C-SON would search for a counter-corrective activity. This is possible since the C-SON system, by default, knows how to map certain KPIs to optimization techniques and can therefore trigger the most relevant and applicable C-SON optimization module with the appropriate policy.

### The Intelligent Feedback Loop

In order for C-SON to be able to recover from a degraded network performance, it needs to have the following capabilities:

- Identify network degradation
- Combine several KPI values into complex conditional anomalies
- Map of multiple KPIs to their correlative SON corrective techniques
- Determine which set of parameters together with which SON module would be best efficiently applied

For SON to be truly beneficial the KPI layer needs to be incorporated within the platform mediation layer and triggered upon the arrival of new KPI reports. The immediate outcome is the discovery, which is a list of sectors where users or the network is suffering from poor network performance. Following the discovery, the list is then cross-diagnosed with the latest SON activities along with other non-SON related activities for the specific sector, resulting in multiple alternative correction methods.

The next stage, the active phase, is where the C-SON system self-initiates the most relevant corrective technique for the sector or cluster at hand along with its corresponding parameters. Alternatively the C-SON system simply decides to revert back to a previously stored network configuration record. The rollback action re-iterates all SON adjustments provisioned on a sector until the entire configuration is recovered.

### Lifting the Veil of Closed-loop SON

The entire process, intelligent feedback loop, is continuous and on-going. With each new set of KPI reports arriving from the network, C-SON evaluates the current KPI set in real-time. It compares the most recent cycle (every 15-60 min) of automatic parameter adjustments to verify that the current network is healthy and is performing as expected.

Next time a mobile operator asks about Closed-Loop SON – Vendors need to present the accurate picture.

Closed-loop SON is much more than just a simple automated network monitoring feature with automated data feeds traveling back and forth. Closed-loop SON conceals the many

necessary elements in the monitoring infrastructure layers which continuously guard network performance, striving to continuously pre-empt and recover from degraded situations automatically and in Closed-loop.