CENTRALIZED SELF-ORGANIZING NETWORKS (C-SON):

ESSENTIAL FOR SMALL CELLS DEPLOYMENT

ADDRESS THE CHALLENGES IN THE DEPLOYMENT OF SMALL CELLS

cellwize

Driving value through SON

CELLWIZE: SMALL CELLS DEPLOYMENT CHALLENGES

Caroline Gabriel, Research Director at Maravedis-Rethink: "The industry is taking longer than previously expected to deploy small cells in large volumes, except in a few markets, but when key enablers like virtualization and SON are in place, the floodgates will open for dense RANs harnessing a combination of macro and metro level technologies. The real gold mines will lie in the software to optimize these new networks and maximize their returns."[1]

The attempt of deploying Small Cells using its embedded interfaces alone is prone to fail as has already being proven in multiple cases worldwide.

The need for a Centralized SON (C-SON) solution that is able to holistically combine small cells into the macro layer in different technologies, taking into account the range of constraints and policies, is crucial for seamless, fast and effective operation.

As mobile networks enter a period of densification using small cells, Cellwize sees vendor interoperability as key. This comes in many forms and shapes and is one of the most challenging issues at hand. Cellwize recognizes that at this current time, the industry is looking forward, and there is no doubt that with the advantages that small cells bring, adoption will be wide-spread; however there are some serious questions regarding the technology that need to be addressed.

Cellwize envisages the SON technology maturing through a three stage adoption process:

1. SMALL CELLS AWARENESS

The first phase is actually the simplest solution, since it occurs in a static mode. SON simply blocks out resources (e.g. a set of scrambling codes etc.) and dedicates their use for the small cells layer nationwide. All Macrocells already have these codes configured in their neighbor lists, which means that any Femtocell or small cell will be recognized and used.

However, this method of optimization is not the most efficient and it wastes potential resources. Alternatively, Cellwize employs a trigger-based mechanism that identifies where and when small cells have been deployed, and increases the allocation needed dynamically. The focus is mainly on the Macrocell side for ANR (Automatic Neighbor Relations).

In other words, there is no need for tight co-ordination between the C-SON and small cells providers. This same principle is used for both 3G and LTE technologies.

2. Bi-Directional Interface

The second phase still does not offer a fully interoperable solution, however it does allow for some two-way dialog through the small cells gateway. Interaction with the small cells is enabled in order to access specific configuration management data.

There is quite a variation in the degree to which different small cells vendors allow external systems to modify their configuration. Some vendors, such as ip.access, Airspan, Alcatel-Lucent and Samsung each have different policies for external configuration. For example, ip.access, which is the most open vendor from Cellwize perspective, have a clear view as to how they need to interact with a C-SON system in order to ensure maximum overall benefit. Their guidelines even enable overriding some of their own D-SON functionalities when necessary.

Typical small cells parameters which could be remotely set by the C-SON include ANR (neighbour lists), 3G scrambling codes and LTE PCI (Physical Cell Identifiers).

3. Mature HetNet Partnerships

The third and last phase is the most sophisticated stage, whereby C-SON and D-SON truly co-exist. Specific LTE-Advanced features such as eICIC require real-time interaction, through the X.2 interface, with other small cells and the Macrocell layer in order to operate most efficiently. This real-time interaction is perhaps the most important feature for an LTE small cells to have embedded and it is a key capability for equipment vendors and D-SON software suppliers to address.

Once the real-time efficiency of the HetNet has been addressed, then SON features such as MLB (Mobility Load Balancing) and MRO (Mobility Robustness Optimization) have a role to play. These balance and direct traffic loads across the Hetnet, both in terms of small cells and Macrocell layers as well as between 3G and LTE.

While there are indeed many sophisticated optimizations that could be taken advantage of when deploying small cells, it is clearly visible that a mutual partner ecosystem for cooperation between C-SON, D-SON and small cells vendors - is necessary. And, since the industry still has a ways to go before reaching such harmony, Cellwize is already proactively developing strategic partnerships with leading vendors, leveraging the combined offering to enable operators to successfully grow their networks.

[1] Caroline Gabriel, Research Director at Maravedis-Rethink http://shop.maravedis-bwa.com/products/towards-the-hyper-dense-network-the-shape-of-the-hetnet-2013-2019