Data Sheet

Axyom™ Element Management System (AeMS)

The Axyom Element Management System (AeMS) provides the visibility, control, automation and efficiency service providers need as they expand and evolve their mobile access networks to meet the demands of the next generation of services. The Axyom AeMS is a virtualized solution that provides full life-cycle element management functions including:

- Initial activation and configuration: self-discovery, self-configuration
- Performance management: self-optimization, self-healing
- Status monitoring
- Fault management and troubleshooting

This scalable, carrier-grade solution implements a robust set of software for managing and optimizing 3G and 4G small cells, including:

- HMS and HeMS small cell management system functions
- TR-069 Auto-Configuration Server (with TR-196v2 and TR-181 data models)
- KPI Management (over 100 KPIs supported)
- Syslog
- Real-time Hybrid SON Manager
- X2 Gateway

Fully virtualized, each of the above software modules communicates directly with the Unified Management Framework through a web application to an advanced Graphical User Interface (GUI). Service providers have access, via the GUI to all the small cell base station parameters as well as visibility to over 100 KPIs. From this single pane of glass, small cell integration, management and optimization is real-time, highly efficient, and comprehensive.

Highlights

Improve Efficiency and Reduce Costs

- Automation of small cell activation and configuration tasks
- Zero touch plug-and-play provisioning
- Self-optimization
- Self-healing

Achieve Faster Time to Market

- Standards based, highly flexible solution
- Scalable, fully virtualized software can be deployed at the edge or in a centralized cloud environment

Improve End User Experience

- Real-time SON provides early notification and begins to remedy any faults that impact user experience
- KPI management of over 100 KPIs

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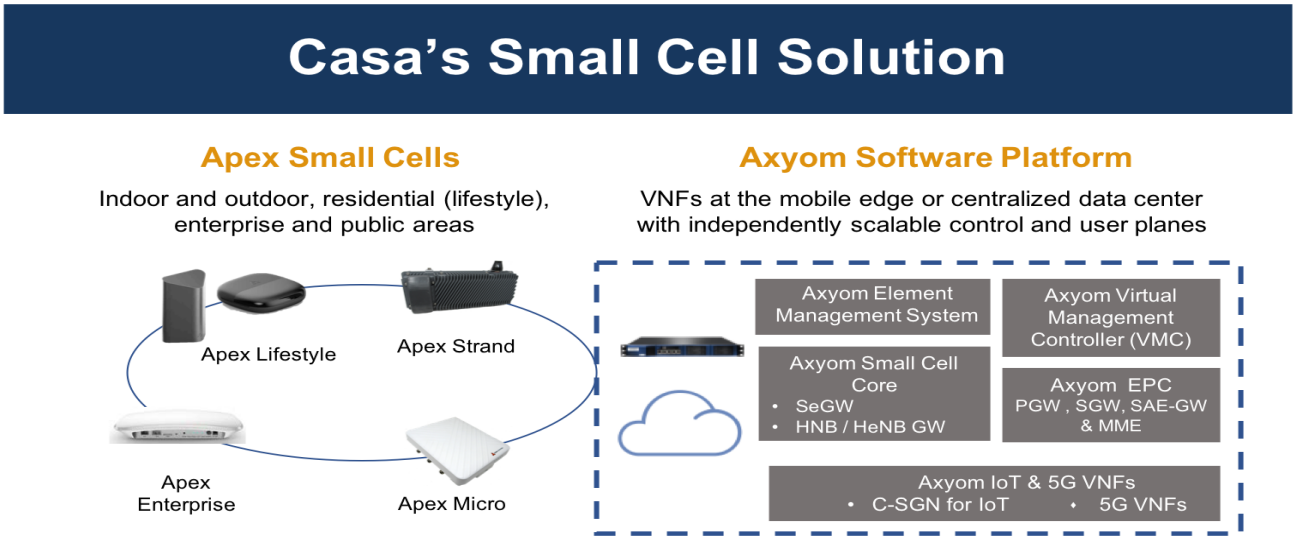


The Axyom Element Management System (AeMS) is an important part of Casa Systems' small cell solution, which includes Lifestyle and Enterprise small cells, Outdoor microcells, and the Apex Strand (a strand mount picocell) as well as virtualized high performance small cell gateways. The AeMS runs on Casa's Axyom Software Platform, which is a carrier-grade software architecture that provides the highest level of performance and control.

Unified Management Framework

Visibility | **Control** | **Efficiency**

Advanced GUI provies full Access for 3G and 4G small cells

The AeMS Unified Management Framework provides visibility and access to all modules from a single pane of glass. From this powerful GUI, service providers can monitor and control small cells, cell parameters, and KPIs more efficiently and effectively than ever before.

HMS and HeMS Small Cell Management System

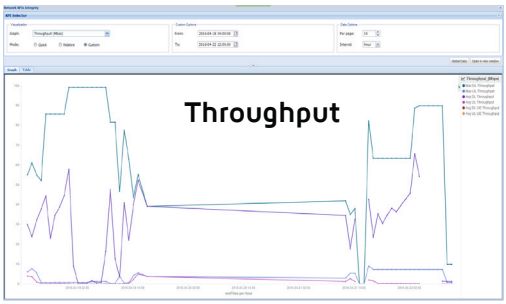
The HMS and HeMS modules provide network element management for HNB and HeNB respectively. The management interface between the small cells and the management system is based on TR-069 standards and provides the following functions:

- Provision of configuration data to the small cell
- H(e)MS small cell management system functions (3GPP TS 32.592 and TS 32.593)

- Location verification of the small cell
- Facilitates discovery of the small cell for the small cell gateway
- Full access to all the small cell base station parameters
- Supports TR-196v2 & TR-181 Data Model Support - Get/Set parameters, profiles, configuration files, and RPC Methods as specified by 3GPP

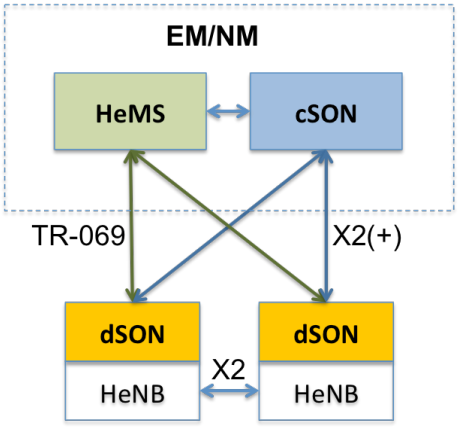
KPI Management

Granular visibility in graphical or tabular formats to over 100 KPIs through the Unified Management Framework facilitates control over network performance, network efficiency and end user experience.



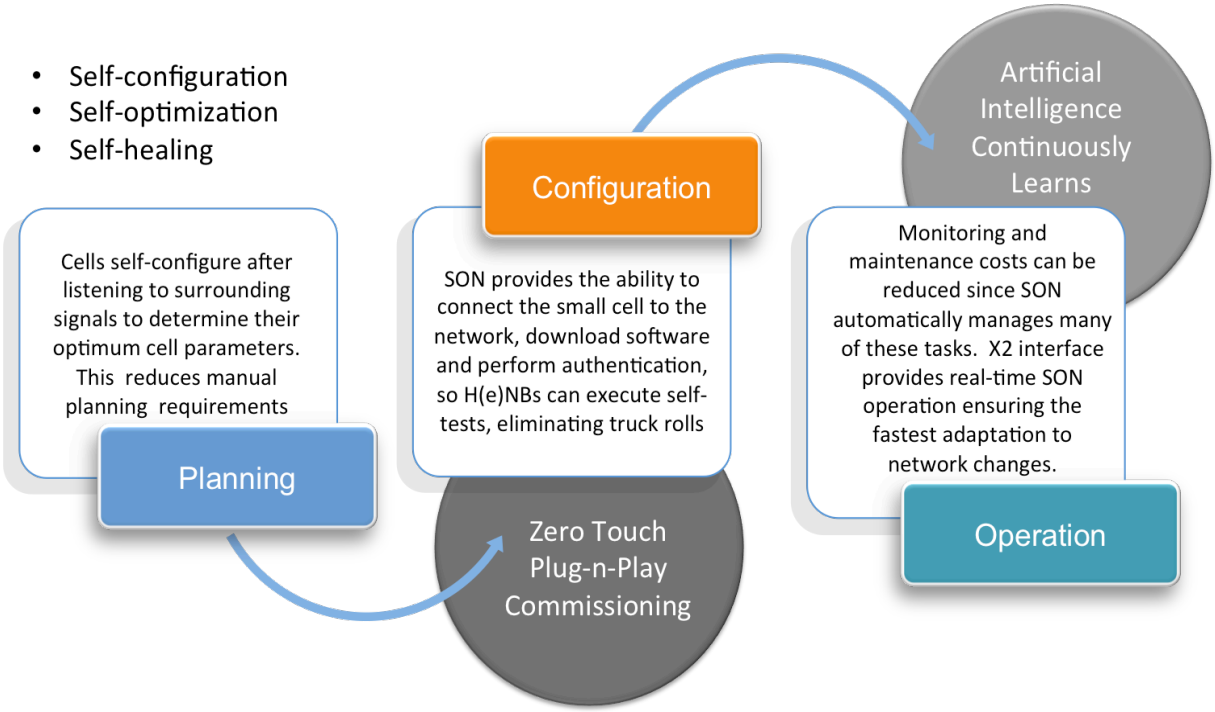
Real-Time Hybrid SON

The AeMS includes a powerful SON module that enables real-time operation via X2 and TR-069 implementation. In this hybrid architecture, each SON component is optimized for performance, with Centralized SON in the SON Manager and Distributed SON in the small cell SON agents. This hybrid architecture delivers the best of pure centralized and pure distributed solutions while minimizing drawbacks and inefficiencies.



Key Benefits of the Axyom AeMS SON include:

- **Plug-and-play auto-configuration,** requiring NO action from the user, providing full "Zero Touch" commissioning
- **TR-069 + X2 interface provides real-time** SON operation ensuring the fastest adaptation to network changes
- **Artificial Intelligence techniques** available to continuously update the network in real time, running unattended, thus enabling massive deployments and the operation of millions of Small Cells at an optimized cost. Multi-agent platform that complies with FIPA specifications
- **Hybrid architecture** delivers the best of pure centralized and pure distributed solutions while minimizing drawbacks and inefficiencies
- **Full integration** with other management elements, providing the relay functions for SON messaging between the SON Agents and the SON Manager



Aligned with the Small Cell Forum's SON API specifications, Casa's AeMS SON module supports a range of use cases. For service providers seeking a solution for deployments of large numbers of small cells and for managing complex networks with inter-layer coordination, Casa's SON solution offers key functions, including:

- **Self-Establishment:** Self-discovery and detection upon initial power up and self-configuration of cell parameters and interfaces
  - Auto-scan for regional parameter acquisition
  - Fast and automatic neighbor cell discovery allows automatically building the Neighbor Lists of the HeNB for LTE intra & inter-frequency cells and for 3G cells
  - PHY Cell ID (PCI) and PRACH root sequence planning, conflict detection and reporting, supporting re-planning (automatic or on-demand) addresses PCI collision & PCI confusion use cases.
  - Tx Power Initial configuration
- **Interference Management:** Minimize overall interference of the network through use of different interference management algorithms
  - Dynamic Fractional Frequency Re-use
  - eICIC ABS and RP-ABS patterns with dynamic pattern configuration support
  - Fully integrated with the L2 MAC Scheduler
  - Support of Optimal Clusters and Joint Radio Resource Management

- **Mobility Robustness Optimization:** Configures the different parameters of the handover (HO) procedure for minimizing the Radio Link Failures (RLFs) when the UE is performing handovers, improving handover success and the user experience
  - Reduction of Handover Frequency (including IRAT ping-pong) and unnecessary HO processes
  - Improvement of the Radio Link Failure ratio and connection failures due to mobility

- **RACH Optimization:** Optimization of RACH parameters for reducing parallel access time, and reducing interference to neighbor cells
  - Optimization of RACH parameters based on UE measurement reports and neighbor cell information exchange using the X2 interface and air sniffing agent

- **Load Balancing**: Coordinated optimization of load between a cluster of neighbor cells under various constraints
  - Load Balancing among different cells to enhance throughput and the user experience
  - Using information about clusters of cells to be jointly optimized at the local cSON

- **Transmit Power Optimization**: Optimization of the TX power to ensure good coverage while not creating excessive interference
  - Energy Savings algorithms using TX On/Off algorithms
  - Tx power optimization for minimizing overall transmit power

Casa Systems' Axyom Element Management System is designed to help service providers more efficiently expand coverage and capacity, speed time to market for new services and improve the end user experience.

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