Facing up to the traffic challenge
Mobile broadband demand is heading for a thousand-fold growth by 2020. While the widespread deployment of faster radio access with LTE and LTE-Advanced will go a long way to avoiding congestion, upgrading macro network capacity will eventually hit its limits.

Outdoors, operators are changing their focus from coverage to capacity and from hot spots to more fully integrated hot zones. Furthermore, growing indoor demand will require more coverage and capacity, especially for very large indoor enterprises and highly strategic locations such as public indoor buildings.

So it’s little surprise that the deployment of small cells to provide capacity for indoors and outdoors, as well as for businesses, is moving to center stage. Yet operators need to integrate the small cell layer with the macro network in order to create an efficient Heterogeneous Network (HetNet). Along with this integration, mobile operators also need to manage their small cell networks as they scale up capacity and coverage.

Operators can also benefit by integrating Wi-Fi fully into their networks and use it as simply another option in their portfolio of radio access technologies.

Deploying tens or hundreds of thousands of small cells brings significant challenges. For example, the extra control traffic generated could swamp the transport and core networks, there will be substantial interference between the macro and small cell networks, and backhaul bottlenecks must be avoided. HetNets are also far more complex than traditional macro networks, so automating many of the conventional manual processes involved in controlling and optimizing network operations will be essential.

Nokia Flexi Zone forms our main offering in the small cells arena. We are constantly innovating, integrating the capabilities normally only found in macro base stations. This will open up new ways for operators to use small cell technology to meet the coverage and capacity needs of their customers in urban and rural areas.

Nokia Flexi Zone delivers cost-effective capacity and coverage
A novel architecture for unrivalled versatility

Nokia Flexi Zone features a novel architecture that helps operators to meet all the challenges they face in deploying HetNets. Flexi Zone is a small cell cluster solution for indoor and outdoor “hot zones”. There are two key elements at the heart of Flexi Zone – Flexi Zone Access Points and the Flexi Zone Controller.

Flexi Zone Access Points combine low power LTE, 3G (for indoor) and Wi-Fi into self-configuring units to provide coverage and capacity underlay networks, both indoors and outdoors. These access points can operate as stand-alone micro/pico base stations for hot spots and small deployments and then be evolved with the addition of the Flexi Zone Controller, enabling hotspots to grow into hot zones. This is the most cost-effective way to expand limited-coverage deployments to meet growing demand or to serve very large indoor locations.

Flexi Zone’s novel “hot zone” architecture simplifies the complex deployment and operation of a large number of small cells. The architecture also boosts performance and significantly reduces the Total Cost of Ownership (TCO) of small cells by up to 50 percent compared to stand-alone small cells.
Nokia Flexi Zone Access Points – compact and powerful

Flexi Zone small cells are not only the smallest in the industry, they are also the industry's only base stations to offer the same features and capacity as macro cells, simplifying integration and operation of small cells with the macro network to offer 30 percent lower overall costs than conventional units.

These Flexi Zone Access Points can run as stand-alone pico LTE (or 3G for indoor) base stations to address highly localized hot spots or small coverage areas. If demand grows substantially, access points can be upgraded using software and a controller can be added to create a fully-fledged “hot zone”. Operators can build up almost unlimited capacity and coverage for up to very large indoor locations by deploying clusters of access points across a hot zone and enterprise/public indoor space. In addition, the Flexi Zone Indoor Pico 3G Base Station can be software upgraded to LTE when operators decide to re-farm 3G spectrum for LTE.

Flexi Zone micro/pico base stations are suitable for deployment outdoors and in harsh indoor environments and support all the most commonly used frequency bands for 3G, FDD LTE and TD-LTE. The range includes optional Wi-Fi, enabling operators to take advantage of unlicensed spectrum to further increase site capacity and improve the customer experience at busy locations.

A further indoor picocell base station available in 3G or LTE, with optional Wi-Fi support, is aimed at all public indoor and enterprise small and medium-sized buildings and offers significant performance gain over femto solutions. When combined with the Flexi Zone Controller, up to 500 picocells can be part of the cluster to address very large and dense indoor deployments. Flexi Zone can be used to overlay LTE on top of older Distributed Antenna Systems (DAS) systems or to provide a very competitive alternative to DAS and hybrid DAS in very large buildings. In effect, Flexi Zone offers the lowest upfront costs and simple deployment through its ability to piggyback on existing Ethernet and also offers the possibility of network sharing from day one.

Flexi Zone innovation doesn’t stop there. Flexi Zone eMIMO Omni Antenna is a new type of compact small cell antenna that can provide the equivalent performance of a directional antenna while providing the benefit of 360 degree coverage. The omni antenna is the first in the industry to maintain cross-polarization in all directions to improve Multiple Input Multiple Output (MIMO) performance by up to 60 percent at the cell edge, compared to standard omni antennas.
First small cell to offer >1Gbps peak rate

To help meet demand in very dense urban areas, the Nokia Flexi Zone Multiband Micro/Pico Base Station platform is the first to offer small cell data rates in excess of 1Gbps. Based on LTE-A Pro standards, it features up to three radio modules that can support a combination of three different LTE licensed bands/carriers, up to 60MHz of LTE-U/LAA (License Assisted Access) and up to 80MHz of Wi-Fi/LWA (LTE-Wi-Fi Aggregation).

With LAA or LWA support, the platform enables operators to offer guaranteed Quality of Service through LTE, while also using unlicensed spectrum to provide data rates of more than 1Gbps for subscribers.

Macro power in a mini package

Equivalent in size to a small cell, Nokia Flexi Zone Mini-Macro LTE Base Station delivers macro-like base station RF power (2 x 20W). This allows operators to provide macro-sized coverage in locations unsuitable for macro base station deployment. As well as being an easy way to provide rural coverage, the base station opens up new use cases such as low cost indoor coverage for high rise buildings from an outdoor deployment on an adjacent building (‘outside-in’), and for discreet deployments in sensitive residential areas.
Flexi Zone Controller covers all deployment scenarios

The Flexi Zone Controller can be implemented as a hardware element to support up to 500 access points in a hot zone that appears as a single eNodeB to the rest of the network. This aggregation of all access point interfaces simplifies integration and IP addressing, reduces signaling back to the core network and simplifies the backhaul by providing a backhaul delay tolerant topology. The controller also coordinates scheduling across the cluster to manage interference within the hot zone and distribute capacity efficiently. Furthermore, by being placed in the controller, Self-Organizing Network (SON) functionality can be faster, more accurate and affect more elements, reducing operational and maintenance costs.

The controller can run a mix of indoor and outdoor cells within one cluster, making it the first small cell solution capable of addressing large and very large indoor environments like airports, university campuses and shopping malls. The virtually unlimited scaling of capacity and advanced interference mitigation techniques also support very high density indoor locations such as busy metro stations, exhibition centers and conference halls.

For indoor small cells that lack easy access to GPS signals, new Flexi Zone timing and synchronization features make deployment simple. Over-the-air synchronization of TD-LTE cells means up to five small cells can be chained together to use a single GPS synchronization signal from one access point located near a window. Meanwhile, Network Timing Protocol (NTP) enables FDD-LTE small cells to be synchronized from timing signals over lower quality Internet access.

Nokia Flexi Zone and Mobile Edge Computing - bringing individual content to the user

Yet, Flexi Zone is about more than just achieving the right capacity and coverage. Flexi Zone allows operators to bring customized content to a specific area, using Nokia Mobile Edge Computing (MEC) to build “intelligent small cells.”

MEC provides processing and storage, together with the ability to collect real-time network data. These features can be exploited by applications to offer context-relevant services that transform the mobile broadband experience.
The possibilities are endless. Examples include security camera local encoding and motion detection. Combined with caching and a local offload to Internet POP, this gives improved performance and the lowest transport costs.

Flexi Zone also finds uses in enterprise applications. It can be used for caching and content extension, giving a performance boost to enterprise apps. Again it offers a lower transport cost, as well as the chance to provide integrated wireless machine type communications. Flexi Zone can also be used to provide a virtual cluster for each enterprise in the same building.

In shopping malls, Flexi Zone and Mobile Edge Computing can provide indoor location tracking, and contextual data analysis to enable shopper-friendly apps such as real-time store guidance to help shoppers find the departments or product they want. A find “my spouse” application is something a lot of people have wished for while shopping, while the ability to adapt the content of billboards to suit shoppers’ interests is another possibility.

Adapting in-store offers to the user based on the store inventory and the shopper’s personal preferences is a similar option. Fraud prevention, checking a subscriber and their credit card are in the same location before the transaction is authorized is another possibility, while shopping malls and large stores will find it useful to have an analysis of the footfall in their retail areas. Linked to a profile of customers and their shopping habits at different times of the day, month or year, this could give valuable information to inform marketing plans.

Small Cell solutions from Nokia Networks

Flexi Zone is part of Nokia’s end-to-end portfolio of small cell products and services that also includes a carrier-grade Nokia Airscale Smart Wi-Fi solution for building, optimizing and controlling Wi-Fi that integrates seamlessly with cellular networks, and Flexi Lite Base Station for outdoor 3G coverage in-fill and hot spots.
About Nokia

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Nokia Networks, which provides broadband infrastructure, software and services, operates at the forefront of our industry. From the first ever call on GSM to the first call on LTE, we have set the pace of innovation, a record that continues with future technologies such as 5G. Together with our operator customers, who serve close to 5 billion subscribers, we are embracing the opportunity of the connected world and helping to solve its challenges. http://networks.nokia.com/

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